Maternal Sensitivity and Responsiveness: Parent Teaching during Shared Writing
Activities and Early Literacy Outcomes

by

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Abstract

The present observational study examined the roles of maternal sensitivity and responsiveness in relation to child early literacy skills. Mothers and their 3- to 5-year-old children were asked to write together three word pairs. Each word pair contained a common phoneme. In one word, the phoneme was represented by one consistent letter, and in the second word, the phoneme was represented by two letters: one consistent and one inconsistent. Mothers demonstrated sensitivity by adjusting their teaching support for letters that varied in consistency, or difficulty. Further, mothers who taught at a higher level had children with more advanced early literacy knowledge, but no differences were found in parent self-report and observed measures of teaching. Mothers also adjusted their teaching support when their child struggled, or were responsive. However, maternal responsiveness depended on the type of difficulty the child experienced. Finally, the majority of mothers only accepted conventional spellings.

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Maternal Sensitivity and Responsiveness: Parent Teaching during Shared Writing Activities and Early Literacy Outcomes

Individual differences in children's reading abilities emerge early, and tend to persist across the lifespan (e.g., Butler, Marsh, Shepphard & Shepphard, 1985). Indeed, children who have reading difficulties in Grade 1 are less likely to succeed in school, to graduate, and to pursue post-secondary education (Entwisle, Alexander & Olson, 2005). Given the documented importance of reading, the factors that contribute to the successful development of a young child's early literacy skills are of interest to researchers and educators alike.

Young children seem particularly sensitive to environmental influences (Landry, Smith, Swank & Guttentag, 2008). In light of this, special attention has been given to factors at home that might facilitate the acquisition of early literacy. Specifically, the role of the parent's involvement in a child's early literacy development has been considered (Sénéchal, LeFevre, Thomas, & Daley, 1998).

Ample research has investigated the role of the parent in a child's early reading development, but considerably less has focused on the role of the parent in a child's early spelling development. Further, when the role of the parent is considered, the majority of the research focuses on the frequency, not the quality of parent teaching (Sénéchal, Whissell & Bildfell, in press). Indeed, this body of literature supports that the frequency of parent teaching about early literacy in kindergarten longitudinally indirectly predicts children's early literacy skills in Grade 1 (e.g., Sénéchal & LeFevre, 2014). The limited research on the quality of parent teaching suggests that higher quality parent teachers have children with more advanced early literacy knowledge (Aram & Levin, 2001). A

possible explanation for these findings is that parents are sensitive to what their child knows about literacy, and adjust how they teach them accordingly. However, the body of research that makes this claim did not specifically test this question. Further, the role of responsiveness on the part of the parent was also not considered. Therefore, the main purpose of this thesis was to measure parent sensitivity and responsiveness using innovative methods and to investigate their impact on a child's early literacy skills.

In this introduction, I begin by discussing early literacy skills that are foundational to a child's eventual reading and spelling abilities. Then, I review what is known about parent-child literacy interactions. To do so, I review the questionnaire-based research on the frequency of parent teaching about letters and words, followed by a review of the observation-based research on the quality of parent teaching of spelling. Finally, I describe the notions of parent sensitivity and responsiveness that lead to a description of the current study.

Early Literacy and Phonological Awareness

Children begin learning to read and spell long before they enter their first classroom (Teale, 1986). Of special interest to this thesis, are young children's knowledge of the alphabet and their early attempts at spelling words, albeit in an unconventional manner (also called invented spelling). Although phonological awareness is not always considered an early literacy skill per se, children also need an awareness of the structure of oral language in order to read and in particular, spell (Ouellette & Sénéchal, 2008). Therefore, a discussion about phonological awareness is included in this section before early spelling.

Alphabet knowledge. Alphabet knowledge is one of the best predictors of a child's eventual reading and spelling success (Adams, 1990; Ferreiro & Teberosky, 1982; Whitehurst & Lonigan, 1998). Alphabet knowledge consists of knowledge about the names and sounds of letters (Puranik, Lonigan, & Kim, 2011).

Letter-name knowledge. Children are exposed to letter names and letter shapes in their environments on a regular basis both passively (e.g., hearing an adult spell their name, menus, signs) and through instruction (e.g. flashcards, the alphabet song; Adams, 1990). Letter-name knowledge is a child's understanding of the oral labels associated with specific letter names and their ability to map the name of a letter onto its visual form. As such, letter-name knowledge consists of letter-name production and letter-name recognition. Letter-name production involves a child being able to produce the label associated with the letter (e.g., showing the child the letter *a*, and the child saying: "this is the letter *a*"). Another component of letter-name knowledge is letter-name recognition. Letter-name recognition involves a child being able to recognize the letter associated with the label (e.g., being shown a variety of letters, and asking the child to point to the letter *a*). Of note, just because a child can produce letter names does not necessarily mean they can recognize them.

Often times, children first learn the names and shapes of letters in their own names because they are exposed to them more frequently, and then extend this knowledge to the other letters of the alphabet (Bloodgood, 1999; Treiman & Broderick, 1998). Children tend to develop some letter-name knowledge between the ages of 3- and 5-years-old. That is, 3-year-old children were reported to recognize five letter names on

average, whereas 5-year-old children recognized most letters from hearing their names (Worden & Boettcher, 1990).

Letter-sound knowledge. In order to eventually read and spell, children need to become aware of the oral sounds associated with letters. This process is known as letter-sound knowledge and is a child's understanding that specific letters correspond to specific sounds of language (Ehri, Nunes, Willows, Schuster, Yaghoub-Zadeh, & Shanahan, 2001). That is, learning how to map graphemes (i.e., letters or letter combinations) onto their associated phonemes (i.e., smallest units of sound). Illustratively, this involves learning that the letter *a* can correspond to the phoneme /ə/. This knowledge extends to both being able to produce a letter sound (e.g., what sound does the letter *a* make?) and recognize a letter sound (e.g., what letter makes the sound /ə/?). This skill is usually distinct from letter-name knowledge in that it deals with the sounds that correspond to a letter and not with the oral label attached to the letter itself. Whereas letter-name knowledge develops between the ages of 3 and 5, letter-sound knowledge tends to develop between the ages of 5 and 7 (Worden & Boettcher, 1990). This indicates that letter-sound knowledge tends to develop after letter-name knowledge, which suggests letter-sound knowledge is the more challenging of the two concepts for children to grasp.

Phonological awareness. Phonological awareness, or an understanding of the sound structure of words, is an additional key predictor of eventual reading and spelling success (Ehri & Wilce, 1987; Wagner, Torgesen, & Rashotte, 1994; Whitehurst & Lonigan, 1998). In addition to letter knowledge, children need to develop an understanding of how to break down and manipulate the oral sounds of language, or

acquire phonological awareness (Ehri et al., 2001). It is the manipulation of the oral sounds of language that makes phonological awareness distinct from letter-sound knowledge, which only refers to the mappings between sounds and letters. Illustratively, phonological awareness would involve being able to sound out the word *cat* by breaking the word down into its phonemes (e.g., /k/ /æ/ /t/). Once acquired, phonological awareness enables a child to complete three main tasks: break a word down into its sounds (e.g., what are the three sounds in *cat*?), delete or substitute sounds in a word (e.g., say *cat* and then say it with /l/ instead of /k/) and blend sounds to create a word (e.g., What word is this? /k/ /æ/ /t/; Ehri, 1989). All three of these phonological skills are required for a child to learn to both read and spell.

Typically, a child progresses from learning about how to break a word into its syllables (the largest phonological unit a word can be broken down into) to its phonemes (the smallest phonological unit a word can be broken down into; Yopp & Yopp, 2009). To illustrate, in Fox and Routh's (1975) study, 3-year-olds were more successful at segmenting words into syllables than phonemes. This indicates that the smaller phonological units are more challenging for young children to manipulate than larger phonological units. Typically, phonological awareness begins to develop between the ages of 4 and 5 (Burgess & Lonigan, 1998).

Burgess and Lonigan (1998) demonstrated a bidirectional relation between alphabet knowledge and phonological awareness. Multiple regression analyses demonstrated that letter knowledge predicted growth in phonological awareness and phonological awareness predicted growth in letter knowledge when controlling for age and oral language skills. This suggests that knowing about letters enhances a child's

understanding of phonological awareness, and phonological awareness enhances a child's letter knowledge, or that these two skills build on one another as they develop.

Invented spelling. Children's early spelling attempts are also an excellent predictor of a child's eventual reading and spelling success (e.g., Morris & Perney, 1984; National Early Literacy Panel [NELP], 2008; Shatil, Share, & Levin, 2000). In order to produce invented or phonological spellings, a child needs to break the words they hear into their constituent parts, and then map those sounds onto their available knowledge of the alphabet, be it letter names or sounds. Although these spellings are often unconventional, they adhere to fairly regular linguistic rules (Read, 1971). Over time, children progress from producing scribbles to gradually representing phonological sounds in their writing (Chomsky, 1971). For example, at first, a child may only capture the first sound in a word. That is, they may spell the word *lady* as *L*. Then, as their spelling abilities become more sophisticated, they may capture the initial and final consonants and represent *lady* as *LD*. This may also reflect that the child uses a letter name to capture a letter sound in their early writings. With more experience, they may progress from marking only consonants to capturing the vowel sound and represent *lady* as *LAD*. This process is a reflection of a child's developing understanding of how speech is represented in writing. Children are able to produce invented spellings around the age of 5-years-old which increase in sophistication with time (Ouellette & Sénéchal, 2008).

Given the above description, one would expect that the degree with which children capture the phonology of a word in writing would be linked to alphabet knowledge and phonological awareness, and it is. Ouellette and Sénéchal (2008) demonstrated that letter-sound knowledge and phoneme awareness are both linked to

invented spelling sophistication after controlling for age, parental education and child analytic intelligence in a sample of 5-year-olds ($r = .61$ and $.60$, respectively). This finding was also demonstrated by Caravolas, Hulme and Snowling (2001).

The act of printing letters itself involves fine motor skills that also take time to develop (Maldarelli, Kahrs, Hunt & Lockman, 2015). Therefore, a child's level of printing knowledge may be distinct from their level of invented spelling knowledge. That is, a child may be able to capture the initial and final consonants in the word *lady* as LD by recognizing letter tiles and placing them on a board, but not able to physically print the letters. As a result, if a child was asked to spell the word *lady* by printing it, they may not be able to accurately express their level of spelling knowledge if their printing knowledge is not as developed.

Given the demonstrated importance of these early skills, researchers have examined how the home environment might account for individual differences in their development. Accordingly, the next two sections review what is known about the role a parent plays in a child's early literacy development, specifically, how children learn about these skills through natural interactions with their parents in their homes.

Learning about Literacy at Home

Parents are children's first teachers (Bornstein, 1995). Although parents are not teachers in the traditional sense, their natural behaviours might encourage the development of early literacy knowledge in their children. Therefore, a parent's involvement in a child's early education may be critical for their cognitive and academic development (Reynolds, 1992). For this reason, the impact of the parent as a teacher has emerged as an important factor that influences a child's early literacy development

(Sénéchal et al., 1998; Sénéchal & LeFevre, 2002). In the next sections, I review the research on parent teaching about letters and writing. Research on parent teaching frequency is reviewed followed by the limited work on the quality of parent teaching. Correlational, longitudinal, and intervention evidence is reviewed.

Frequency of parent teaching. Parent teaching about early literacy specifically refers to exposing children to alphabet knowledge and explaining how to read and spell words prior to Grade 1. However, these parent-child interactions are not necessarily formal in nature. Parents use a variety of naturally occurring contexts to capitalize on opportunities to teach their kindergarten-aged children about literacy. In fact, parents reported, on average, teaching their 5-year-olds about early literacy in 13 of 18 possible activities such as using street signs, letters from schools, writing lists, and recipes (Martini & Sénéchal, 2012).

Parents also report that they teach their children about early literacy frequently (Sénéchal et al., in press). Hood, Conlon, and Andrews (2008) demonstrated in Australian children that 81%, 77%, and 57% of parents self-reported teaching their children the alphabet, to spell their name, and to read words respectively either often or very often. Given that parents report teaching their children about early literacy frequently, it was of interest to investigate its impact on the development of a child's early literacy skills.

Sénéchal and colleagues conducted a series of concurrent and longitudinal studies looking at the relation between the frequency of parent teaching children about early literacy and children's early literacy skills. In their concurrent work, they found, using a series of stringent regression analyses, that the frequency of parent teaching (ranging

from never to very often) about alphabet knowledge, early reading and early spelling explained 4 to 19% unique variance in child early literacy skills in kindergarten, after controlling for vocabulary, phoneme awareness, nonverbal intelligence, income and parent education and literacy knowledge (Martini & Sénéchal, 2012; Sénéchal, 2006; Sénéchal et al., 1998).

Further, they found that these findings held longitudinally. Parent teaching about early literacy in kindergarten also indirectly predicted child word reading performance in Grade 1 after controlling for child early literacy skills in kindergarten (Sénéchal & LeFevre, 2002, Sénéchal, 2006). In other words, the frequency that parents taught their children about early literacy predicted early literacy skills, which in turn predicted word reading performance in Grade 1. Overall, parent teaching was associated with both child early literacy skills in kindergarten and word reading performance in Grade 1 (Sénéchal & LeFevre, 2002; Sénéchal, 2006).

Interestingly, Sénéchal (2006) found in a French sample that it was the frequency of parent teaching the alphabet that was most predictive of children's early literacy skills. Whereas in an English sample, Sénéchal et al. (1998) found that it was the frequency of teaching about reading and printing words that best predicted children's early literacy. Continuing, Martini and Sénéchal (2012) looked at parent teaching about letters or words to understand better their respective roles. They demonstrated that parent reports of teaching the alphabet were more strongly associated with a child's alphabet knowledge than with reading. However, this variance was almost completely shared with parent reports of teaching more advanced skills like reading. Presumably these findings could be explained by the notion that if a child was able to write words, they would have also

been taught about letters. These findings are of interest to the current study because these results may indicate that parents are sensitive to their child's pre-existing knowledge about early literacy. That is, parents who had children that did not have letter knowledge taught them about letters, and parents that had children that did have letter knowledge taught them about words. Taken with Sénéchal's (2006) work, these findings suggested that specifying the questions parents answer about their teaching practices could nuance our understanding of the impact the quality of parent teaching has on the development of child literacy skills.

It should be noted that in the previous studies as well as that of Hood et al., (2008), parent teaching did not uniquely predict children's phoneme awareness, once child vocabulary and early literacy skills were controlled for. They argued that children's progress in phoneme awareness was mostly attributable to gains in oral vocabulary and alphabet knowledge (see also Evans, Shaw & Bell, 2000; Haney & Hill, 2004). Although phoneme awareness is an important predictor of a child's eventual reading and spelling success, it is not predicted by parent teaching alone.

Taken together, I have established that the frequency of parent teaching is related to child early literacy skills in kindergarten and indirectly related to child word reading in Grade 1 (after controlling for child early literacy skills in kindergarten) in both concurrent and longitudinal research. That is, parents who reported teaching their children more frequently about literacy knew more about literacy. However, all of this literature was based on self-report measures of teaching frequency and did not consider the quality of parent teaching. This work could be strengthened by comparing self-report measures of parent teaching to observations of parent teaching, as was done in the

present research. Now, I review the limited research on parent teaching interventions that has served to strengthen the implied causal relation between parent teaching behaviours and child literacy outcomes.

The Influence of the Quality of Parent Teaching about Early Literacy in the Home

Although the research on the relation between the frequency of parent teaching and child early literacy skills is limited, the research that has been done looking at the quality of parent teaching is even more scarce. Intuitively, one would assume that there would be variations in the quality of parent teaching behaviours, especially given that these behaviours occur naturally in the home. This notion was supported by Burns and Casbergue (1992). In fact, they were some of the first researchers to observe the quality of parent teaching behaviours. They remarked that parents responded in different ways when writing a letter with their young child (3-5 years old). That is, some parents focused on the mechanics of writing, while others focused on the story writing process itself. This highlights the natural variability in parent behaviours during these interactions.

Based on this work, Aram and colleagues conducted a series of concurrent and longitudinal studies with mothers and their 5- and 6-year-old children to investigate the influence of the quality of parent teaching on their children's early literacy skills. In these studies, they observed mothers and their children spelling and printing words together. I turn now to a discussion of both their concurrent and longitudinal findings.

In their concurrent study, Aram and Levin (2001) recruited 41 children between the ages of 5 and 6 (19 boys and 22 girls) from Israel. Of note, these families came from a low socioeconomic background and the parents were less educated on average than the

population (27% of the mothers and 51% of the fathers did not complete high school). Mothers were tested on their literacy levels, and the children were tested on measures of early literacy including word writing, word recognition, phonological awareness and orthographic awareness. Further, they observed mothers and their children spelling and printing words together. This included two types of shared writing activities: one structured and one unstructured. In the structured activity, the dyad was shown four pairs of images and asked to spell the corresponding words. In the unstructured activity, the dyad was asked to write the names of children their child would like to invite to an imaginary birthday party.

From there, the researchers scored the dyads on four separate observational scales, of which the graphophonemic mediation is the most relevant to the current study and is reviewed in detail. The term mediation refers to the guidance a parent provides their child to help promote independent functioning (Feuerstein & Feuerstein, 1991). Feuerstein's model suggests that a child's understanding of the world around them is shaped by their parent matching what they want to teach their child with their developing abilities. It is for this reason that in this literature, they use the term mediation to refer to teaching. Therefore, in this thesis, the terms mediation and teaching are used interchangeably.

In keeping with Feuerstein's model, Aram and Levin (2001) designed the graphophonemic mediation scale to capture how a parent's guidance during a shared writing activity promoted the development of a child's early literacy skills. This 6-point scale intended to measure the extent to which the mother helped her child spell a word, and scored maternal behaviors on a letter-by-letter basis. The lower end of the scale

captured the mother's teaching about letters and the higher end of the scale captured the mother's teaching about letter sounds. Further, the scale assessed the type of teaching behaviors of the mother (e.g., mother dictated, mother encouraged). The researchers made the claim that the lower end of the scale reflected that mothers were teaching at lower quality level (e.g., mother writes down all the letters of the word for the child), and the higher end of the scale reflected that mothers were teaching at a higher quality level (e.g., mother encourages the child to link a phonological unit with a letter name).

Two of the other three scales (morpho-phonology and medial/final letters mediation) captured elements of parent teaching that were exclusive to the Hebrew language and the printing mediation scale referred to the level of support the mother provided the child as they attempted to physically write the letters. I now turn to a discussion of their findings.

In this study, maternal literate mediation, captured by the graphophonemic mediation scale, was strongly correlated with child early literacy behaviours (word writing/recognition, phonological awareness and orthographic awareness: $r = .82, .60$, and $.52$ respectively). Further, using hierarchical regressions, the researchers established that the quality of the mother's mediations explained unique variance in their child's early writing, word recognition (literate mediation = 30%, printing mediation = 22%) and phonological awareness (literate mediation = 20%) measures, after controlling for sociocultural factors (SES, maternal literacy and child literacy tools and activities at home). These findings suggested that the quality of the mother's teaching behaviours influenced the child's early literacy outcomes. These findings were replicated in a series of studies by Aram and her colleagues (Aram & Levin, 2002; Bindman, Skibbe,

Hindman, Aram & Morrison, 2014; Lin, McBride-Chang, Aram, Levin, Cheung, Chow & Tolchinsky, 2009; Lin, McBride-Chang, Aram & Levin, 2011).

Aram and Levin (2004) followed up with the participants in their 2001 study two-and-a-half-years later. In this longitudinal study, hierarchical regressions revealed that the quality of maternal literate mediation in kindergarten, predicted the child's performance on spelling, reading comprehension and linguistic knowledge in Grade 2, after controlling for the influence of socioeconomic status and kindergarten literacy skills. These findings suggested that the quality of a mother's mediations, or teaching during shared writing activities is an important factor in a young child's early literacy development success. In sum, this finding was demonstrated both concurrently and longitudinally.

Limitations. Taken together, the studies I have reviewed suggest that the quality of parent teaching during shared writing activities is predictive of a child's eventual literacy knowledge. This has been demonstrated concurrently, longitudinally and through intervention work. All of these studies have involved assessing the maternal quality of teaching using an observational graphophonemic mediation scale. However, there are noteworthy limitations to this body of work. Primarily, the strength of the correlations between maternal literate mediations and their child's early literacy skills ($r = .82, .60, \text{ and } .52$ respectively) leads me to question these findings.

Aram and colleagues explained their findings by suggesting that mothers were sensitive to their child's literacy levels and scaled their mediations accordingly. In other words, mothers were aware of their child's current early literacy skill levels and taught their child at a developmentally appropriate level. Indeed, this explanation is intuitive.

However, I argue the scale they used to assess maternal quality of teaching does not accurately assess maternal quality of teaching or capture the notion of maternal sensitivity. Specifically, it confounds maternal teaching behaviours with maternal assumed understanding of her child's early literacy skills. That is, lower-level teaching behaviours (e.g., modeling) were paired with higher-level concepts (e.g., letter sounds) and higher-level teaching behaviours (e.g., encouraging the child) were paired with lower-level behaviours (e.g. letter names) on the scale. However, this was not done systematically. For this reason, I argue that this scale may not be accurately capturing maternal quality of teaching, or maternal sensitivity.

Therefore, they cannot explain their findings by claiming that mothers were sensitive to their child's knowledge level. That is, is a mother that teaches their child at a lower, but developmentally appropriate level, a better quality teacher than a mother that teaches her child at a higher, but developmentally inappropriate level? Overall, I am left to wonder whether it is a mother's sensitivity to their child's knowledge instead of the quality of their mediations that predicts early literacy skill development.

Intervention research. To provide additional support that parents can stimulate early literacy knowledge in their young children, Sénéchal (2015) conducted a meta-analysis of intervention studies. This meta-analysis served to update Sénéchal and Young's (2008) meta-analysis. Given the focus of the current study, only the *parents teach specific literacy skills with activities* category of this meta-analysis is discussed. Four studies were included in this category that together represented 282 families. Each study involved teaching parents about how to teach their kindergarten-aged children about specific early literacy skills. In the four studies, parents were instructed how to:

(1) Teach about letter sounds and how to blend them (Kraft, Findlay, Major, Gilberts & Hofmeister, 2001); (2) Teach about letter names and sounds and sight words (St. Clair & Jackson, 2006); (3) Teach their children during shared writing activities (Levin & Aram, 2012); (4) Teach their children using practice exercises how to read basic words (Niedermeyer, 1970).

Collectively, these studies yielded a large mean weighted effect size .94, 95% CI [.70, 1.19]. This suggests that parents can be effective in improving their child early literacy outcomes. Further, it suggests that ameliorating the quality of a parent's teaching promotes the development of child early literacy skills. This can justify why the study of the quality of parent teaching is of value.

Levin and Aram (2012) investigated if informing parents about how best to teach their child about writing would help them improve the quality of their teaching. Accordingly, they designed a seven-week intervention, with a delayed posttest two-and-a-half-months later. In the writing group, parents were coached on how to enhance their children's early literacy skills through practicing alphabetic skills and writing words. Indeed, they found that parents improved the quality of their teaching both at immediate and delayed posttests. Further, these children improved on alphabetic skills, word recognition and word spelling.

Parent responses to unconventional spelling. In reviewing the research on the quality of parent teaching, it was revealed that hardly any research has been done on parent responses to their children when they produce unconventional spellings. Therefore, the present section reviews the very limited research in the area. Burns and Casbergue (1992) observed differences in parent responses to unconventional spellings

during shared writing tasks. Importantly, they remarked that parents that exhibited higher levels of control had children that focused on the act of writing itself and parents that exhibited lower levels of control had children that focused on the meaning of the text. Moreover, the more controlling parents had children who produced more conventional spellings and the less controlling parents had children that produced spellings more unconventional in nature. In further work, DeBaryshe, Buell, and Binder (1996) found that when 5- and 6-year-old children wrote a letter with the help of their mother, irrespective of the child's pre-existing knowledge, mothers encouraged the use of conventional spelling. This may suggest a comfort with conventional spelling and a discomfort with invented spelling. In contrast, Bindman et al., (2014) found that parents tended to accept unconventional spellings instead of asking the child to correct themselves. This highlights a discrepancy in the limited literature. I now turn to a discussion on what is known about parent sensitivity before proposing the current study.

Parent Sensitivity

Parenting is a dynamic process. The complex interactions between parents and their children are impacted both by the history of the relationship, and the flavor of their day-to-day interactions. In the literature, there are various definitions of the terms sensitivity and responsiveness. For this thesis, sensitivity refers to a parent's awareness of their child's existing knowledge about a topic (Ciciolla, Crnic, & West, 2013).

Another component of sensitivity, responsiveness, is characterized by a parent's ability to accurately interpret, and respond to the signals of their child. In particular, this includes a parent responding to child non-responses, mistakes or requests for help. Sensitivity also refers to what the parent assumes about their child's knowledge and responsiveness

refers to how the parent adapts their behaviours based on the actions of their child. In the literature, maternal sensitivity is sometimes used to refer to maternal responsiveness.

However, in the context of this thesis, they are viewed as distinct.

The research on parent sensitivity and responsiveness suggests they are key-contributing factors to a child's development in various domains including attachment security, cognitive and language development, psychological health and emotion regulation (Ainsworth, 1979; Bowlby, 1969; Kelly, Morisset, Barnard, Hammond & Booth, 1996). Further, lower parent sensitivity and responsiveness have also been linked to worse child outcomes including behaviour problems, maladjustment and cognitive delays (Bradley & Corwyn, 2007; Campbell, 2002; National Institute of Child Health and Human Development, 1999). Given this information, I can infer that a higher degree of parental sensitivity and responsiveness can encourage positive child outcomes (Ciciolla et al., 2013). In the rest of this section, I look at the limited research on parent sensitivity and responsiveness in the parent-teaching literacy domain. Sensitivity is discussed first, followed by responsiveness and their impact on child learning outcomes.

Sensitivity to a child's knowledge. Children can learn through social interactions with learned adults (Evans, Moretti, Shaw, & Fox, 2003). Parents who are sensitive to their children's prior knowledge levels are considered to be more effective at facilitating learning than those who are not (Wood & Middleton, 1975). Sensitivity involves an awareness of what the child knows, so the parent can teach them about novel, but developmentally appropriate information. Sensitivity also refers to the notion that an effective teacher gradually provides the child with less and less support as they become more proficient at the target skill (Vygotsky, 1978). For instance, teaching a child about

letter names when they already know the alphabet would not help them advance their knowledge. Therefore, this idea focuses on the theory that there is a need for the level of teaching, or support provided to change with the child's changing knowledge about a particular subject. This notion extends to task difficulty as well. For instance, a sensitive parent would provide their child with more support for a more difficult task such as being asked to write a whole word and less support for a less difficult task like being asked to write a single letter. These behavioral adaptations would suggest that the parent is aware of, or sensitive to their child's knowledge level. In contrast, a non-sensitive parent would not provide different levels of teaching support for tasks that varied in difficulty which would indicate a lack of awareness about their child's knowledge level. Now, I review research that suggests parents adapt their teaching behaviours about reading and writing as a function of their children's changing knowledge.

The research on parent teaching about reading suggests that parents may be sensitive to their children's changing knowledge and adjust their teaching behaviors accordingly. Silinskas, Leppänen, Aunola, Parrila and Nurmi (2010) studied 189 mothers and 165 fathers to investigate what contributes to the frequency of reading teaching patterns in kindergarten and Grade 1. Data from both the parents and their children were collected twice; once in kindergarten and once in Grade 1. Interestingly, they found that children who performed lower academically at the beginning of Grade 1 had parents who reported teaching them the alphabet more frequently later in the year after controlling for parent reports of teaching in kindergarten. Further, Silinskas, Lerkkanen, Tolvanen, Niemi, Poikkeus and Nurmi (2012) found a negative relation between child reading and parent reports of teaching reading. That is, as the children learned more about reading,

researchers saw a decrease in parent teaching. Additionally, when children demonstrated poor reading performance, researchers saw an increase in parent teaching. Taken together, these results suggest that parents may be sensitive to their children's knowledge, or lack thereof, and adjust their level of teaching support accordingly.

In support of this interpretation, Sénéchal and LeFevre (2014) demonstrated that the parents of children with higher reading scores at the end of Grade 1 reported less frequent teaching at the end of Grade 2 whereas the parents of children with lower reading scores at the end of Grade 1 reported more frequent teaching. This suggests that parents may be sensitive to changes in their children's increasing reading knowledge and adjust their teachings accordingly, providing more or less support as required by the child. In sum, this evidence suggests that parents may be sensitive to their children's changing knowledge levels.

Aram (2007) also investigated the issue of maternal sensitivity during parent teaching about writing. For this concurrent study, she recruited 28 sets of twins (five identical and 23 fraternal) and their mothers. On separate afternoons, mothers participated in the same shared writing tasks as in Aram's previous work with each twin, who had different levels of early literacy knowledge (word writing, letter naming and phonological awareness). Overall, mothers taught about spelling differently for each twin. Given that the same mother altered her teaching behaviours as a result of which twin she was working with, it can be suggested that mothers were sensitive to their child's pre-existing knowledge about literacy. In light of this finding, it was of interest to investigate whether maternal sensitivity to child knowledge, not maternal quality of teaching predicted the development of a child's early literacy skills.

Skibbe, Bindman, Hindman, Aram and Morrison (2013) extended Aram's body of work to examine whether the quality of maternal teaching changed over one year and was predictive of a child's early literacy skills. At each testing point, the researchers asked the dyads to complete an unstructured shared writing activity where they wrote a guest-list to the child's imaginary birthday party together. Maternal quality of teaching was assessed in a similar way to Aram's work, using a modified scale. Children, at ages 4 and 5 at the first testing session were tested on alphabet knowledge, decoding, phonological awareness and vocabulary. The researchers found that parents taught at a higher level at time two (e.g., what letter does the name Brice start with?) than time one (e.g., write R-A-C-H-E-L) and that child early literacy knowledge improved overall. This indicated that parents changed their mediation levels in response to their children's changing knowledge about literacy. Further, in support of Aram's work, they found using multivariate regression techniques that parent teaching of writing behaviours was predictive of decoding and phonological awareness skills one-year later after controlling for child gender, ethnicity, age at the first testing session, child literacy skills, parent years of education and performance on each respective task (decoding and phonological awareness) at time one. Taken together, these studies suggest that mothers are sensitive to their child's knowledge levels.

Although the Skibbe et al. (2013) findings provided support for parent sensitivity, their use of an unstructured task leads me to question the validity of their findings. That is, the unstructured nature of the task did not allow for controlled comparisons between children, or over time. For instance, some children might have had a *Christine* on their guest list where as another child might have had a *Marina*. Moreover, the scale used to

assess parent sensitivity is somewhat biased in favor of children who had more early literacy knowledge. For instance, parents obtained a lower score if they focused on printing letters rather than matching corresponding sounds to corresponding letters. It is therefore somewhat not surprising that the parent's scores are so highly related to the children early literacy skills. Importantly, maternal responsiveness was not considered. I turn to this issue next.

Parent responsiveness. Parent responsiveness is a component of sensitivity that can also affect learning. Wood and Middleton (1975) argued that parent responses to their children during teaching activities need to be contingent on the child's behaviors, or attempts at learning. In other words, parents need to be responsive to the behaviours of their children. This includes the errors they make. For instance, if a child's attempt at a task failed, the parent should respond by increasing their teaching support. In contrast, if a child's attempt at a task succeeded, the parent should respond by decreasing support (Wood, 1980). Pratt and Savoy-Levine's (1998) experimental study demonstrated that children who attempted to tackle a long division problem and were tutored using responsive strategies (i.e., the tutor provided more teaching support in response to a failure *or* less teaching support in response to a success) outperformed those that were tutored using other, less effective methods. This evidence suggests that children who have parents that are both more sensitive and more responsive to their child's performance will make greater gains relative to those children with less sensitive parents. Further, parents may be responsive to the difficulty level of the task. That is, a more difficult task would require that the parent respond by providing their child with more teaching support whereas a less difficult task would require that the parent respond by

providing less teaching support. Now, we turn to reviewing the limited research on parent responsiveness during shared reading activities.

Evans et al., (2003) investigated parent responsiveness to their child's behaviours during shared book reading. Indeed, they examined parent teaching during shared storybook reading interactions with their 6-year-old children and analyzed parent responses to their child's oral mistakes. They also coded a child's efforts to re-read, misread words. The results revealed that parents adjusted the level of help they provided to their child when an error was made. That is, after the error was made, the parent provided their child with increased support. In response, the child produced the misread word correctly more often. Further, children with weaker word reading skills overall were provided with increased parental support. This indicates that parents may be responsive to their children, that parent responsiveness may improve child performance, and that parents may have an understanding of their child's knowledge level about word reading.

In further work, Mansell, Evans and Hamilton-Hulak (2005) examined whether parent feedback to child miscues, or responsiveness, during shared storybook reading would change over time. Children were followed from kindergarten to Grade 2. Indeed, the results suggested that parents did adapt how they responded to their children's mistakes as their child's knowledge advanced. Or rather, that they were sensitive to their child's knowledge about reading, and responsive to their child's behaviours. In sum, these findings provide support that parent responsiveness style may be adapted as a function of a child's changing knowledge, which also suggests a degree of parent

sensitivity. Now I discuss the relation between maternal instructional sensitivity and child outcomes.

Maternal sensitivity and responsiveness during a task that varied in difficulty. As indicated before, maternal sensitivity has been linked with positive child outcomes. In this section, I look at one study that specifically investigated this question. Baker, Sonnenschien and Gilat (1996) examined the relation between maternal sensitivity and child performance. Although this study claimed to assess maternal sensitivity, according to the definition of the current thesis, it specifically assessed maternal responsiveness. Therefore, in keeping with this thesis, this section explores maternal responsiveness. Sixty children between the ages of 3 and 5 participated in a sequence of three tasks. In the first and last phases, all children worked independently whereas in the second phase, half the children completed the tasks independently and half completed the tasks with their mothers. In each phase, children had to complete both an easy and a difficult version of a concept-matching task. The easy task was deemed simpler because the concepts the children had to distinguish between were more concrete (e.g., open-closed, full-empty), whereas the difficult task was deemed more challenging because the concepts the children had to distinguish between were more abstract (hot-cold, big-little).

The teaching strategies of the mother were coded using a 6-point scale that ranked her teaching strategies from low support (i.e., no maternal involvement) to high support (i.e., the mother does the task for the child). Mothers were also coded as either responsive or non-responsive using two, three-point scales that compared the behaviours of the mothers to the behaviours of the child. For example, a mother was coded as responsive if the child failed to produce a correct match and the mother increased her

level of support on the child's next attempt, and non-responsive if the child failed to produce a correct match and the mother provided the same level of support on the child's next attempt or decreased it (91% coder agreement).

Baker and colleagues (1996) found that maternal teaching strategies varied as a function of child age and task difficulty. Mothers provided higher levels of teaching support for 3-year-old children than 5-year-old children and for the difficult task than the easy task. They also found that the level of maternal responsiveness was related to child performance. That is, they found that most mothers were responsive to their children by adjusting the level of support they provided their child based on their actions. For 3-year-old children, 75% of parents were responsive during the easy task and 63% of parents were responsive during the difficult task. For 5-year-old children, 95% of parents were responsive during the easy task and 89% of parents were responsive during the difficult task. Interestingly, maternal responsiveness was even more strongly related to the initial performance of the child for both the easy ($r = .38$) and difficult ($r = .48$) tasks than after subsequent interactions with their mother. This suggests a potential understanding of the child's existing knowledge level on the part of the mother, or sensitivity. Therefore, this study suggests that most mothers are responsive to their children, to the difficulty of the task and potentially sensitive to their pre-existing knowledge levels.

In conclusion, the research reviewed suggests that mothers are both sensitive to their children's knowledge levels and responsive to their child's behaviours during shared-learning activities. Further, sensitivity and responsiveness have been linked to

positive child performance on tasks that vary in difficulty. Now, I turn to a discussion of the present study.

The Present Study

In the literature, it is well established that early literacy skills are important for a child's future reading and academic achievements. This includes alphabet knowledge, phonological awareness and invented spelling; all three of which are linked to a child's eventual reading and spelling success. Concurrent, longitudinal and intervention research by Sénéchal and colleagues on the frequency of parent teaching has demonstrated that the frequency of parent teaching in kindergarten predicted a child's early literacy skills concurrently (correlations between parent teaching and child early literacy skills range from $r = .22$ to $.39$) and indirectly predicted child word reading in Grade 1 after controlling for child early literacy skills. Further, parents that self-reported teaching their children about letters and writing more frequently had children with stronger early literacy skills in kindergarten and stronger word reading skills in Grade 1 (e.g., Sénéchal & LeFevre, 2002, Sénéchal, 2006). However, this research relied on parent self-report measures of teaching frequency and could be strengthened by observation work to assess the quality of parent teaching.

In response, Aram and colleagues used observational techniques to assess the quality of maternal teaching and its relation to child early literacy skills. Indeed, they found that the quality of maternal teaching was related to child early literacy skills. However, the strength of the correlations between these variables ($r = .52$ to $.82$; approximately double Sénéchal and colleague's findings) leads me to question these findings. Aram and colleagues explained that the strong correlations were due to

mothers' sensitivity to their child's knowledge levels and resulting adjustments to their teaching levels (Aram & Levin, 2001, 2004). However, as demonstrated, I argue the scale they used to assess the mother's teaching confounded maternal teaching behaviours with maternal assumed understanding of her child's early literacy skills and therefore did not measure maternal sensitivity per se. Given the demonstrated importance of maternal sensitivity, finding a way to assess this construct could greatly contribute to the current body of literature. The present study seeks to provide a solution to this methodological issue.

In the present study, parents were observed and videotaped reading a storybook and writing words with their 3- to 5-year-old children. Then, they were asked to write three pairs of words: *ape* and *day*, *bite* and *tie*, *note* and *boat* using a pair of letter boards (described below). In each word pair, the same phoneme was present (/ə/, /aj/, and /o/). However, within word pairs, the same phoneme was represented with either one or two letters. For the phonemes spelled with one-letter, the vowel sound was always represented by a consistent letter (*a*, *i* and *o*). For the two letter phonemes, the vowel sound was always represented by two letters: one consistent and one inconsistent (*ay*, *ie*, and *oa*). The inconsistent letter in the two-letter phoneme was judged to be more challenging for a child to write than either of the consistent letters because it could not be sounded out by the child.

The present study used the shared writing task to assess maternal sensitivity and responsiveness by evaluating the amount of teaching support the parent provided their child within and across phoneme types (consistent vs. inconsistent letters). Children were also assessed on letter knowledge, phonological awareness, early spelling and early

reading and their parents were given a home literacy questionnaire and assessed on their literacy knowledge. Now I turn to a discussion of my hypotheses.

Hypotheses

Goal 1: Investigate whether parents demonstrated sensitivity to their child's knowledge by adjusting their teaching support for phonemes that vary in spelling difficulty. In the present study, parent sensitivity referred to the parent's understanding of their child's knowledge levels and how they adjusted their teaching behaviours accordingly (Ciciolla et al., 2013). According to the literature reviewed, sensitive parents adjusted their teaching level to the assumed knowledge level of their child (Aram & Levin, 2001, 2004). As mentioned previously, in the one-letter and two-letter phonemes, the consistent letters were expected to be easier for the children to write than the inconsistent letter in the two-letter phoneme.

Therefore, if a parent was sensitive to their child's knowledge level, they should have responded to the difficulty level of the task. That is, the parent should have provided more support to their child when they were spelling an inconsistent letter in a two-letter phoneme and less support when they were spelling the consistent letters in either one- or two-letter phonemes because the inconsistent phoneme was judged to be more challenging. If there was a difference in the support levels the parent provided their child across letter types, it would demonstrate parent sensitivity by the parent responding to the difficulty level of the task. If there was no change across letter types, it would not demonstrate parent sensitivity. Therefore, I hypothesized that parents would demonstrate sensitivity by adjusting their teaching support levels as a function of phoneme to grapheme, or task difficulty and provide a higher level of support (and therefore receive a

lower overall score) for inconsistent or more difficult letters compared to consistent or easier letters.

Goal 2: Investigate whether parents were responsive to their children by adjusting their level of teaching support when their child had difficulty.

Responsiveness is a component of sensitivity that refers to the parent's reactions to the behaviours of their child (Wood & Middleton, 1975). A sensitive parent may adjust their level of teaching based on their child's behaviours, including failure to elicit a response, mistakes, requests for help, asking a question or guessing. This would indicate responsiveness. In the present study, if a mother started teaching her child how to write a letter at one support level, and failed to elicit a response from her child, her child made a mistake, asked for help, asked a question or guessed, she would demonstrate responsiveness to her child's actions by increasing her level of teaching support (e.g., mother asks her child what letter makes the sound /o/, child fails to produce the correct answer so the mother responds by pointing to the letter *o* for her child). Therefore, I hypothesized that parents would demonstrate responsiveness by adjusting their level of teaching support contingent on their child's behaviours when they were struggling.

Goal 3: Investigate the impact of observed parent teaching support on a child's early literacy skills. Parent sensitivity has been used as an explanation for the relation between parent teaching quality and child early literacy skills in the past (Aram & Levin, 2001, 2004). However, it has never been tested. Therefore, I hypothesized that the parents who were observed teaching at the letter level would have children with less developed early literacy skills (alphabet knowledge, early spelling and early reading) than parents who were observed teaching at the word level. This would provide further

support that parents were indeed sensitive to their children's knowledge levels and adjusted the level of support they provided during teaching interactions accordingly.

Goal 4: Investigate whether parent self-reports of teaching at home about letters and words were consistent with observed parent teaching measures.

Convergent evidence is needed in the parent teaching literature. The frequency of parent teaching has been linked to child early literacy skills (e.g., Martini & Sénéchal, 2012; Sénéchal, 2006; Sénéchal et al., 1998). That is, the more frequently a parent taught their child about letters and words the stronger their early literacy skills were. Consequently, parents who teach more frequently should also teach their children at a higher level because parents who teach more have children who know more. Therefore, I hypothesized that parents who were observed teaching at the letter level would report teaching about the names and sounds of letters more frequently, and that parents who were observed teaching at the word level would report teaching how to print and read words more frequently.

Goal 5: Investigate parent responses to invented spellings. In reviewing the literature, to my knowledge, there is very little research on parent responses to invented spellings. Therefore, the present study explored whether or not parents were receptive to invented spellings. In DeBaryshe et al.'s (1996) work, they mentioned that irrespective of the child's pre-existing knowledge, mothers encouraged the use of conventional spelling whereas Bindman and colleagues (2014) found that parents did not ask children to correct their spellings. Given the limited research, the present study observed parent responses to invented spellings.

Method

Participants

Three- to five-year-old children and their families were recruited from Ottawa to Petawawa, Ontario to participate in the present study. Children were recruited from daycares, schools, churches, community centers, libraries and a newspaper ad. In total, twenty-eight parents and their children participated in the current study. The final sample size was smaller than anticipated for logistical reasons. As a result, the present study's analyses have been modified to account for fewer children.

Twenty-seven of the 28 parents were mothers, and 14 of the 28 children were daughters. For this reason, parent and mother is used interchangeably in this thesis. Seven of the children were in pre-kindergarten, 15 of the children were in junior kindergarten and six of the children were in senior kindergarten. The children ranged in age from 3;8 to 6;4 ($M = 4.8$ years, $SD = .65$). One mother participated in the present study with both of her children, one son and one daughter. All 28 families reported that English was the majority language spoken in the home. Thirty-two percent of families were monolingual, 64% reported that their child had at least some knowledge of French, and 3.6% of children had knowledge of Japanese.

Families that participated in this study had between one and four children, with 67.9% of families having two children. Family income was reported by all but one family. Average income before taxes ranged from \$10,000 to \$200,000 annually ($M = \$97,962.96$, $SD = \$50,574.00$). Parent education was reported by all parents that completed the survey, however the child's other parent's education was reported by all but one family. Of the parents that participated in the study, the majority had some level

of post-secondary education. In fact, 42.9% of parents had a college certificate or diploma and 46.3% of parents had a university undergraduate degree. In contrast, the child's other parent was generally less educated with only 29.6% of them having a college certificate or diploma and 18.5% of them having a university undergraduate degree. Parent literacy was assessed as well using Form G of the WRMT-R. This sample of parents had average literacy knowledge for an adult sample ($M = 94.46$, $SD = 5.49$). For more information on this sample's demographics broken down by Grade, see Table 1.

Table 1
Parent and Child Demographic Information by Grade

	Pre-K	JK	SK	Overall Scores
	n = 7	n = 15	n = 6	n = 28
Mean Age in Years (SD)	4.06 (.16)	4.75 (.40)	5.62 (.44)	4.76 (.65)
	%	%	%	%
Child Gender				
Male	42.9	53.3	50.0	50.0
Female	57.1	46.7	50.0	50.0
Number of Siblings				
0	0.0	6.7	16.7	7.1
1	85.7	60.0	66.7	67.9
2	14.3	26.7	0.0	17.9
3	0.0	6.7	16.7	7.1
Primary Language at Home				
English	100.0	100.0	100.0	100.0
Other Languages Spoken in the Home				
None	42.9	33.3	16.7	32.1
French	57.1	60.0	83.3	64.3
Japanese	0.0	6.7	0.0	3.6
Mean Income before Tax in Dollars (SD)	112,142.86 (62,172.95)	96,785.71 (40,495.35)	84,166.67 (62,323.08)	97,962.96 (50,574.00)
Parent Education				
Some high-school	0.0	0.0	0.0	0.0
High-school graduate	0.0	13.3	0.0	7.1
College certificate or diploma	28.6	40.0	66.7	42.9
Some university	0.0	0.0	0.0	0.0
University undergraduate	57.1	46.7	33.3	46.4
Master's Degree	0.0	0.0	0.0	0.0
Doctoral Degree	14.3	0.0	0.0	3.6
Other Parent Education				
Some high-school	14.3	0.0	16.7	7.4
High-school graduate	28.6	33.3	16.7	29.6
College certificate or diploma	0.0	40.0	33.3	29.6
Some university	0.0	13.3	16.7	11.1
University undergraduate	42.9	13.3	0.0	18.5
Master's Degree	0.0	0.0	0.0	0.0
Doctoral Degree	14.3	0.0	0.0	3.7

Note. One parent did not report their income and one parent did not report their child's other parent education level. Therefore, n = 27 for Mean Income before Tax in Dollars and Other Parent Education. Pre-K= pre-kindergarten children (n = 7), JK = junior kindergarten children (n = 15), SK = senior kindergarten children (n = 6).

Materials

Child measures.

Alphabet knowledge. Alphabet knowledge was assessed using the same task as in Ouellette and Sénéchal (2008). Children were asked to name both the letter names and letter sounds of the upper-case letters presented to them on index cards. The cards were printed in 72-point Arial font and were presented in a fixed, random order. This produced two scores: one for letter names and one for letter sounds. The inter-item reliability for both measures were excellent ($\alpha = .93$ and $.91$, respectively). Notably, children were only tested on the 17 letters that were used in other measures included in the study. If a child struggled to produce three letter names and three letter sounds consecutively, testing was stopped.

Phonological awareness. Phonological awareness was tested using the Sound-Matching subtest of the Comprehensive Test of Phonological Processing (CTOPP; Torgesen, Wagner & Rashotte, 1999). This subtest was selected because it was most appropriate for 4 and 5-year-old children. For the Sound-Matching subtest, children were shown four images simultaneously and the experimenter said the name of the image on the page. Then, the child was asked to say if each image started (part 1: 10 items) or ended (part 2: 10 items) with the same sound as the first image. This test had 20 items. The composite inter-item reliability for all three subtests (Sound-Matching, Elision and Blending Words) was excellent ($\alpha = .95$). Each child was administered at least seven of the 10 items for both parts 1 and 2 of the test. Testing was stopped after the seventh item if the child had given four incorrect responses in total.

Invented spelling. An invented spelling task was used to assess a child's early spelling abilities. For the current study, the invented spelling task was inspired by the task used in Martini and Sénéchal (2012) and originally used by Mann, Tobin and Wilson (1987). With these words, the inter-item reliability was reported to be excellent at .97 (Sénéchal & LeFevre, 2001). However, for the purposes of the current study, the children were only asked to spell five words as best as they could (*no, sit, boot, pretty* and *lady*). Each word was repeated twice and children were asked to spell each word as best as they could. Children were given as much time as they needed to write each word. Each word was scored on a seven-point scale (0-6) that evaluated the sophistication of the child's spelling by assessing the number of phonemes represented and the degree of orthographic correctness (Ouellette & Sénéchal, 2008; see Appendix A). However, if a child failed to write three consecutive words, testing was stopped (Sénéchal & LeFevre, 2014).

Early reading. In order to assess the children's early reading skills, they were asked to read five familiar consonant-vowel-consonant (CVC) words: *dog, cat, bed, sun* and *hit*. If the child was unable to read the word, they received help from the experimenter. That is, they asked the child to say the sound of each letter, then, they encouraged the child to blend the sounds to say the whole word. For each word they blended correctly, they received one point. The inter-item reliability for this task was excellent at .95 (Sénéchal & LeFevre, 2002). If a child failed to read three consecutive words, testing was stopped.

Parent measures.

Parent teaching questionnaire. The parent teaching questionnaire was adapted for the purposes of this study from Martini and Sénéchal (2012). Parents were asked about a variety of demographic variables including child age, gender, language (s) spoken in the home, parent education level and family income. Second, parents were also asked what kinds of early literacy activities they engage their child in. This included a series of questions on shared-book reading. Third, parents were asked a series of questions regarding how they help their child write words. For example, parents were asked about whether they teach their children letter names, letter sounds or to print or read words now, or in the past. All questions were answered on a 5-point Likert-scale ranging from *never* to *very-often*. Finally, parents were asked about the type, if any, of early literacy homework that is sent home with their children (see Appendix B).

Parent literacy. Parent literacy was assessed using Form G of the Word Identification sub-test of the Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1989). This test involved the parent reading an isolated word presented to them in large font. Indeed, this test has been demonstrated to have high internal reliability (.91). If parents could not read six consecutive words with the highest numbered item ending with the last item on an easel, testing was stopped.

Observations

Children and their parents were observed doing a shared-reading and a shared writing task. Both tasks were videotaped; however, only the shared writing task was scored at a later date for the purpose of this thesis. For the shared-reading task, the dyad read a developmentally appropriate storybook provided by the researcher to help the

dyads become at ease with the camera. The storybook was called *How to Catch a Star* by Oliver Jeffers. For the shared writing task, parent-child dyads were asked to write a series of words together (for the instructions to the parents and children, see Appendix C).

Shared Writing Task

The words. There were three pairs of words for each dyad to write. All words were spelled using the same array of 10 letters. These three word pairs (*ape* and *day*, *bite* and *tie*, *note* and *boat*) were chosen because they contain three different long vowel sounds (/ə/, /aj/, and /o/) that are spelled differently in each word pair. That is, in the word pair *ape* and *day*, the long /ə/ sound is captured in *ape* by the letter *a* only. In contrast, in the word *day*, the combination of letters *ay* makes the sound /ə/. Therefore, the phoneme /ə/ is easier to spell in the word *ape* than the word *day* because it is represented by only one, consistent letter in the first word, compared to two letters in the second word: one consistent and one inconsistent. Within each word pair, in one word, the vowel sound was represented by one, consistent letter and in the other word, the same vowel sound was represented by two letters: one consistent and one inconsistent. The inconsistent letter was judged to be more difficult for a child to write than either of the consistent letters because it could not be sounded out. These words were selected to enable me to assess parent sensitivity by comparing how parents adjusted their teachings based on the orthographic difficulty of the phoneme they were trying to help their child spell.

Scoring. Each letter of each word was scored and coded. See a detailed description of the scoring of these interactions below.

The task. For the shared writing task, the parents and their children were asked to use pairs of letter boards (12 boards total) to spell each of the six words together. This letter board approach was chosen to disentangle child knowledge about writing from child knowledge about printing. By asking children to recognize the letters they want to use to write a word instead of asking them to print the letters, the researcher only assessed the child's knowledge of writing instead of confounding it with their knowledge of printing.

The boards. The dyads were presented with two boards at a time. The boards were made of foam, and covered in black flannel. The board presented to the parent was blank, with only the target image on the top of the board. In contrast, the board presented to the child had 20 letters on it. The letters were printed in 72-point Arial font on white cardstock, backed with black felt and protected from inevitable wear and tear with clear packing tape. This presented the dyad with a blank canvas of sorts to write the words as they normally would. Further, this enabled the parent to write the target word as a model for the child to copy, if they chose. The dyad was only presented with upper-case letters because 4- and 5-year-old children recognize more upper-case letters than lower-case letters (Worden & Boettcher, 1990). None of the six words the dyads were asked to spell contained double letters. For this reason, the pair was able to select from twenty letters in total, or the ten pairs of the letters that were required to write the target words. Because not all of the letters were required to spell each word, distractor letters were present in all cases. The letters were presented in a fixed order. The top left hand corner of the board always contained the first *A* and then the rest of the letters were presented in pairs, in five vertical columns containing four letters each in alphabetic order.

Task procedure. For this task, the dyads were asked to spell six words *ape*, *day*, *bite*, *tie*, *note* and *boat* using twelve separate letter boards. Before the task began, the parent was shown a sheet of paper with all six words printed below the corresponding image. This ensured that the parent cued the child with the correct label for the target word (e.g., the mother knew to ask the child to spell *ape* and not *monkey*). The dyad was always asked to spell a word that contained a one-letter target phoneme first to prevent them from becoming frustrated. From there, the words were presented in a constrained random order so only two words with one-letter target phonemes or two words with two-letter target phonemes were ever presented consecutively (six versions in total). When the dyad was done writing one word, the experimenter cleared that set of boards and presented them with a new set of boards for the next word. The camera was placed so that the letters placed on the letter board could be seen in the field of view. Further, the researcher recorded all of the letters placed on the board after the task.

Coding. Parent behaviours were assessed using a graphophonemic mediation scale. Parent orthographic explanations were coded in addition to whether the final spelling of the word was conventional or unconventional. Child behaviours were also coded (see Appendix D and E). Each video was coded by an independent evaluator that was blind to the study's hypotheses. Each scale is now discussed in turn.

Graphophonemic mediation (Appendix D). The spelling process involves two main steps: A word needs to be broken down into its letters or sounds and a letter(s) need to be chosen to represent the part of the word the dyad is trying to spell. This may be achieved by discussing letter names, letter sounds or the word itself. As previously mentioned, it is accepted that letter-name knowledge is considered more basic than letter-

sound knowledge, and that dealing with letters is considered more basic than dealing with words (Worden & Boettcher, 1990).

This 16-point scale measured the degree to which the parent supported the child's attempts to represent oral words in writing. Importantly, this scale was adapted for the present study from Aram's work (Aram & Levin, 2001). This scale was designed to capture behaviours that pertained to letter names (1-4), letter sounds (5-8) and the word itself (9-16) with the lower end of the scale capturing more basic teaching behaviours and the higher end of the scale capturing more sophisticated teaching behaviours. The letter-name section of the scale ranged from parents placing the letter on the board for their child to the parent asking the child to say a letter themselves (e.g., what letter comes next?). The letter sound section of the scale ranged from parents making the letter sound for their child (e.g., the letter *a* makes the /ə/ sound?) to encouraging their child to link an isolated letter sound with the letter itself (e.g., what letter makes the /ə/ sound?). The word section of the scale ranged from parents breaking a word down into letters (e.g., /a/ /p/ /e/ spells ape), to encouraging the child to make the next sound in the word (e.g., what sound comes after /ə/ in ape?) to encouraging their child to spell the word independently (e.g., spell ape). Within each section, the lower end of the scale captured the most maternal guidance provided and the higher end captured the least maternal guidance provided.

Orthographic explanations. Given the depth of the English orthography and the inconsistent spellings of some of the target words, parent teaching behaviours pertaining to orthography were coded. For example, a parent might have commented on why the sound /ə/ in the word *day* was spelled with two letters instead of one.

Spelling accuracy. For each word the dyad attempted to write together, the word was scored as having been spelled conventionally or unconventionally.

Child behaviours (Appendix E). Child responses to the parent were also coded. Behaviours included in this 6-point scale ranged from the child not responding or saying they didn't know, to guessing, making a mistake, asking for help, doing the action independently or self-correcting.

Scoring. Each letter in each word written by the dyad was coded. Because the dyads did not necessarily move through the spelling process or word itself in a linear fashion, the coding scheme was designed to be flexible enough to accommodate the flexibility of the parent-child interactions. Further, parents may have attempted multiple teaching behaviours in order to get their child to successfully find a letter, each of which were coded.

Each word was marked by a symbol, each letter in each word was marked by a number, and each parent or child behaviour was marked by a letter. Therefore, codes could be composed of two, three or four components. Two-part codes represented behaviors at the word level and three-part codes represented codes at the letter level. Four-part codes meant that the parent also included an orthographic explanation for whatever letter they were trying to help their child write.

Coding files were run through a program called Perl to create the data file used for this thesis. The inter-rater reliability for the graphophonemic mediation scale was $\kappa = .80$ and the inter-rater reliability for the child behaviour scale was $\kappa = .94$. Both of these statistics were calculated using Cohen's Kappa and are considered to be high.

Procedure

Once parents were recruited and provided consent to participate, the researcher visited the homes of the families for approximately one hour. The participating parent was contacted by phone or email for the researcher to arrange a time for the meeting. At the time of the meeting, the researcher arrived at the family's home. From there, the researcher asked the parent to take her to an area where they would like to read and write together. Then, she proceeded to set up her video-camera in a position that was unobtrusive, yet captured the dyad's interactions with the storybook, letter boards, and each other. Once she was set up, she asked the parent to look at the word sheet with the target word images and corresponding printed labels, and then called the child to join them.

Shared reading and writing tasks. First, the dyad was asked to read a developmentally appropriate storybook together to help them become comfortable with being videotaped. Second, the dyad was asked to complete the shared writing task.

Literacy measures. For all children, the shared tasks were presented before the individual literacy assessments to avoid parents altering their behaviours in response to witnessing the researcher assess their child. The literacy measures were not videotaped and the parent assessment was completed before the child assessments to allow the child to take a break. While the mother was being tested, the child was permitted to play with a tablet provided by the researcher or play with their own toys if they preferred. Then, the child was tested on their alphabet knowledge, phonological awareness, invented spelling and early word reading knowledge. The order of these tasks was determined randomly for each child to counterbalance any potential unforeseen order or fatigue

effects. However, the phonological awareness assessment was never presented first so as not to frustrate the child. While the child was being tested, the mother was asked to complete a home literacy questionnaire. Given that the questionnaire included questions about spelling, it was administered after the shared writing task in all cases to avoid the mothers altering their behaviours or succumbing to the social desirability effect.

Results

In this section, the children in this study's early literacy and phonological awareness skills are presented. Then, the results of the sensitivity, parent teaching, responsiveness and invented spelling hypotheses are addressed.

Early Literacy and Phonological Awareness Skills

The children in this sample had a wide range of early literacy and phonological awareness skills. That said, preliminary analyses did not reveal any outliers. See Table 2 for more details. Although the original intention of this study was to include only junior-kindergarten, or 4-year-old students, recruitment challenges resulted in a sample with a wider age range than planned. Despite the age range, generally, the children with less developed literacy skills were younger and the children with more developed early literacy skills were older. Now, the sample's alphabet awareness, phonological awareness, invented spelling and early reading skills are described.

Alphabet knowledge was assessed by asking the children to tell the researcher the letter names and letter sounds of the 17 letters used in this study. On average, the children knew most of the names of the 17 letters used in the present study ($M = 13.8$, $SD = 5.9$). Although children generally knew fewer letter sounds, they still had moderate letter-sound knowledge ($M = 11.1$, $SD = 6.6$). This suggests that these children were

approaching ceiling on letter-name knowledge, and were developing letter-sound knowledge.

Phonological awareness was assessed using the sound matching subtest of the CTOPP. Of note, this assessment was normed for 5- and 6-year-old children and the table used to interpret raw scores was intended for children ranging from 5;0 to 5;5 years old. Although, the children in this study were younger on average ($M = 4.8$ years, $SD = 0.7$ years) than the intended age group for this assessment, the children in this study scored in the 63rd percentile on this subtest ($M = 9.3$, $SD = 2.9$). This suggests that these children had strong phonological awareness skills for their age. However, this test was normed before phonological awareness was taught in schools, and this could explain why the children in this study had advanced phonological awareness skills.

Invented spelling was assessed using six words on a scale that ranged from one to six with a one representing symbols or unrelated letters and a six representing conventional spelling. Fifty percent of the sample was able to spell the word *no* conventionally and 25% of the sample was able to spell the word *sit* conventionally. In contrast, only 4% of the children spelled *boot* and *lady* conventionally, and no children spelled *pretty* conventionally. Overall, the children's invented spelling abilities ranged from not being able to capture any phonological sounds of a word in writing to spelling words phonologically, if not conventionally.

Finally, early reading was assessed by asking the children to read five familiar words as best they could. Fifty-four percent of children read the word *dog* and 86% of children read the word *cat*. Further, 43% of children read the word *boot*, 36% of the children read the word *sit* and 46% of children read the word *sun*. This established that

although all of the children demonstrated that they had varying amounts of letter name, letter sound, early spelling and phonological awareness skills, only some children were reading simple words. Now, I turn to a description of parent sensitivity in a sample of children that had various levels of early literacy knowledge.

Table 2

Mean Performance and Standard Deviations on Child Early Literacy and Phonological Awareness Skills with Inter-Item Reliability by Grade

	Pre-K		JK		SK		Overall Scores		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	α
Alphabet Knowledge									
Letter Name	7.9	7.7	15.2	4.1	17.0	0.0	13.8	5.9	0.8
Letter Sound	2.0	3.3	13.2	4.4	16.7	0.5	11.1	6.6	0.9
Phonological Awareness									
First-Sound Matching	2.3	1.9	6.6	2.7	9.8	0.4	6.2	3.4	0.4
Last-Sound Matching	2.4	1.3	2.2	1.2	6.0	3.4	3.1	2.4	0.7
Early Spelling									1.0
No	0.3	0.8	4.5	2.0	6.0	0.0	3.8	2.6	-
Pretty	0.0	0.0	3.0	1.2	4.8	0.6	2.6	2.0	-
Boot	0.3	0.8	2.5	1.5	5.0	0.0	2.5	2.0	-
Sun	0.0	0.0	2.5	1.9	6.0	0.8	2.9	2.5	-
Lady	0.3	0.5	2.3	1.3	4.5	0.4	2.5	1.8	-
Total	0.7	1.9	14.5	6.3	26.3	1.4	13.6	10.1	1.0
Early Reading									
Total	0.9	1.1	2.7	1.6	4.7	0.8	2.6	1.9	0.8

Note. The letter-name and letter-sound knowledge assessments were out of 17, the first- and last-sound matching assessments were out of 10, each word for the early spelling assessment was scored out of 6 and early reading was scored out of 5. Pre-K= pre-kindergarten children (n = 7), JK = junior kindergarten children (n = 15), SK = senior kindergarten children (n = 6).

Shared Writing Task

For this task, each parent-child dyad was asked to write three word pairs, *ape* and *day*, *bite* and *tie* and *note* and *boat*. The target phonemes in each word pair were /ə/, /aj/, and /o/ respectively. In the first word in each word pair, the target phoneme was represented by only one letter, and in the second word in each word pair, the target phoneme was represented by two letters. In the words with a two-letter phoneme, the first letter name captured the phoneme (e.g., the o in boat) and was labelled as *consistent*. As

such, the second letter was labelled as *inconsistent* for our purposes (e.g., the *a* in *boat*). Preliminary analyses are presented followed by the analyses for each of the current study's goals.

Preliminary analyses. Given that the dyads used letter boards to write the target words, there were two different ways the target letter could be moved from the board with the letters to the board where the dyad was writing the word: by the child or by the parent. As expected, generally, the child placed the letters on the letter board. Specifically, for the letter *a* in *ape*, 79% of the children and 21% of the parents placed the *a* on the letter board. In contrast, 93% of the children and 7% of the parents placed the *y* on the board in *day*. Then, for the letter *i* in *bite*, 74% of the children and 26% of the parents placed the *i* on the letter board. In contrast, 88% of the children and 12% of the parents placed the *i* on the board in *tie*. For the *e* in *tie*, 92% of the children and 8% of the parents placed the letter on the board. Finally, for the letter *o* in *note*, 93% of the children and 7% of the parents placed the *o* on the letter board. In contrast, 86% of the children and 14% of the parents placed the *o* on the board in *boat*. Interestingly, for the *a* in *boat*, 68% of the children and 32% of the parents placed the letter on the board.

With the exception of three children, the child behaviours were always guided by the parent. Only, two children wrote the letters *a* and *y* in *day* and the letters *i* and *e* in *tie* without maternal guidance and only one child wrote the letters *o* and *a* in *boat* without maternal guidance.

During the shared writing task, the parent's guidance or teaching behaviours were coded at both the letter level (e.g., parent asked child to find the letter that makes the /ə/ sound) and the word level (e.g., parent encouraged the child to sound out the word

independently). Therefore, for all of the following analyses, in the case that the parent gave their child letter-level instructions, the first behaviour at the letter level was included in the analyses because these analyses were conducted by letter. However, in some cases, the parent's prompt at the word level resulted in the child succeeding to find and place the correct letter on the board (e.g., when writing the word *ape*, parent encouraged the child to sound out the word and the child responded by placing the letter *a* on the board). Therefore, in the case that the parent did not give their child a letter-level prompt, the parent's first behaviour at the word level was included in the analyses. The parent's first behaviour was always used for analysis because it presumably represented where the parent's understanding of their child's early literacy knowledge was. This was essential for the sensitivity analyses. Now, I turn to a discussion of this study's findings by goal.

Parent Sensitivity to Letters that Vary in Difficulty

In the context of this thesis, parent sensitivity was a parent's understanding of a child's existing knowledge level (Ciciolla et al., 2013). For my sensitivity hypothesis, I predicted that sensitive parents would be responsive by adjusting their level of teaching support when writing phonemes that varied in difficulty. That is, a child should require more parental support when writing a phoneme represented by a consistent letter compared to a phoneme represented by a consistent and an inconsistent letter. As a reminder, a lower number on the parent teaching scale, that ranged from 1-16, represented that the mother was providing her child a high level of teaching support, and a higher number on the scale represented that the mother was providing her child with a low level of teaching support. Therefore, if parents were sensitive to what their child

knew about early literacy, they would respond to the task difficulty level and one would expect an increase in parent teaching level between the consistent letters in the one- and two-letter phonemes and the inconsistent letter in the two-letter phoneme. No differences were anticipated in parent teaching level between the consistent letters in the one- and two-letter phonemes. This is because it should have been more challenging for a child to write a *silent* or *inconsistent* letter than one they can hear, independent of their early literacy knowledge. Now, I turn to a discussion of my findings and observations.

To test this hypothesis, a one-way within-subjects ANOVA was conducted with letter type as the independent variable (three levels: consistent letter in the one-letter phoneme, consistent letter in the two-letter phoneme and inconsistent letter in the two-letter phoneme) and observed parent teaching level as the dependent variable. This analysis included all three word pairs. That is, maternal teaching level for each letter type was averaged across the three consistent letters for the one-letter phonemes (*a* in *ape*, *i* in *bite*, *o* in *note*), and the three consistent or inconsistent letters for the two-letter phonemes (*a* vs. *y* in *day*, *i* vs. *e* in *tie*, *o* vs. *a* in *boat*). For the three children that were spelling some letters independently, they required maternal support for at least one letter in each letter category. Therefore, for these three children, their scores were averaged over the number of letters they did require teaching support for.

The goal of this analysis was to assess whether there was a change in parent teaching level depending on what type of letter the parent was teaching their child to write. Given that apriori hypotheses were set, a set of orthogonal contrasts were used to assess whether there were differences in parent teaching level for the consistent letters across the one- versus two-letter phonemes; and whether there was a decrease in teaching

level from the consistent letters to the inconsistent letters. The assumption of sphericity was violated for this ANOVA and therefore the stringent Greenhouse-Geisser results are reported.

Overall, parents were observed providing a high level of teaching support at the word level (e.g., encouraged her child to break a word down into letters) for the consistent letters in the one- and two-letter phonemes ($M = 8.4$, $SD = 3.9$ and $M = 9.4$, $SD = 3.7$, respectively) and providing a moderate level of teaching support at the letter-sound level (e.g., linked a letter sound and a letter for her child) for the inconsistent letter in the two-letter phoneme ($M = 6.58$, $SD = 3.8$). In support of my hypothesis, the analysis of variance demonstrated that although parents were observed teaching at a slightly higher level for the consistent letter in the two-letter phoneme than the consistent letter in the one-letter phoneme, the difference was not significant, $F(1, 27) = 3.09$, $p = .09$, $\eta^2_p = .10$. However, as expected, there were differences in parent teaching support level found between the consistent letters in the consistent and inconsistent phonemes and the inconsistent letter in the inconsistent phoneme, $F(1, 27) = 14.89$, $p = .001$, $\eta^2_p = .36$.

These findings support this study's sensitivity hypothesis. When parents were teaching their child about easier letters (i.e., those that were consistent), there were no differences in observed parent teaching level. However, there were differences in observed teaching level for both consistent letters and the more challenging (or inconsistent) letter. This indicates that parents tended to provide their child with word level support when helping them to write consistent letters in either the one- or two-letter phoneme and tended to provide their child with letter-sound level support when helping

them to write the inconsistent letter in the two-letter phoneme. This suggests that parents were sensitive to their child's knowledge levels by responding to the difficulty of the task given what their children knew about early literacy. Importantly, given that these analyses were done within-subject, these findings support the notion of parent sensitivity independent of the child's level of early literacy knowledge. In sum, these findings support that parents demonstrated sensitivity to their child's knowledge level and responded by adapting their level of teaching to letters of varying difficulty.

Sensitivity to other inconsistent letters. In an unplanned series of additional analyses, maternal teaching support for inconsistent letter *e*'s at the ends of words were explored. Three words with final silent letter *e*'s were included: *ape*, *bite* and *note*. In each word, each previously unanalyzed inconsistent letter *e* was silent at the end of the word, and modified a previous vowel sound. The purpose of these analyses were to test if there were differences in maternal teaching support between consistent letters (as defined in the previous analyses) and inconsistent final letter *e*'s and inconsistent letters (as defined in the previous analyses) and inconsistent final letter *e*'s. To do this, two t-tests were conducted to see if there were differences in parental teaching support in these two scenarios. Interestingly, there was a difference in maternal teaching support between consistent letters ($M = 8.92$, $SD = 3.47$) and inconsistent final letter *e*'s ($M = 5.86$, $SD = 3.56$), $t(27) = 5.64$, $p = .001$ but there was no significant difference in maternal teaching support between inconsistent letters ($M = 6.58$, $SD = 3.78$) and inconsistent final letter *e*'s, $t(27) = 1.66$, $p = .55$. This suggests that parents provided more teaching support for inconsistent final *e*'s than consistent letters, but not inconsistent letters. These findings

could suggest that parents can generalize their teaching support adjustments to a variety of inconsistent letters.

Orthographic explanations. Parents were also observed providing explanations about the English language's orthography as a teaching strategy. These explanations could include clarifying that a letter was silent, saying that a letter was required to make a different one say its name, or stating that a letter was tricky. Interestingly, orthographic explanations were provided more frequently for inconsistent letters than consistent letters. That is, 18% of orthographic explanations were given for consistent letters and 82% of orthographic explanations were given for inconsistent letters. This information may also suggest that parents were sensitive because the parents provided more explanations when a letter was inconsistent than when a letter was consistent. The following section provides qualitative support for this study's first goal based on a transcription analysis of parent-child interactions for this task.

Sensitivity- a qualitative description. The purpose of this section is to examine the sensitivity hypothesis qualitatively by examining real transcripts of parent-child interactions. Although similar behaviours were observed for the word pairs *ape* and *day*, and *bite* and *tie*, this example focuses on the word pair *note* and *boat*. First, I discuss how the parent-child dyad wrote the consistent letter *o* in *note*, then I discuss how the dyad wrote the respective consistent and inconsistent letters *o* and *a* in *boat*. I begin by describing the behaviors of a child who was not in school yet with minimal early literacy knowledge, then a child in junior kindergarten who had some early literacy knowledge and finally I describe a child in senior kindergarten who had strong early literacy knowledge.

The first dyad was a mother and daughter. The mother had her PhD in biology and the child attended daycare regularly. When writing the *o* in *note*, the mom asked her child, “what letter makes an /o/ sound?” That is, she asked her daughter to link a letter sound with a letter name. In response, her daughter was able to successfully map the phoneme /o/ onto the letter *o* and place it on the letter board. When writing the *o* in *boat*, the mom also got her daughter to select the correct letter using this teaching strategy. In contrast, when asking her child to find the letter *a*, she said, “We’re going to put an *a*. Can you find an *a*?” Here, the mom said a letter name and asked her child to link the letter name with the letter tile. The child succeeded to respond to the mom’s request. In sum, the mom encouraged her child to find the letter *o* by asking her to link the sound the letter makes to the letter tile itself in both words, or gave her more independence when writing a consistent letter. In contrast, when helping her child to find an inconsistent letter, the mom said the letter name, and then asked the child to map the letter name onto the letter tile, or provided her with more support.

The second dyad was a mother and daughter as well. The mother was a kindergarten teacher and the child was in junior kindergarten. Although this mom was a teacher, they were chosen to be featured because similar behaviors were also found in families where the moms had different professions as well. When writing the *o* in both *note* and *boat*, the mom sounded out the word and emphasised the /o/ sound for her child. This led to the child successfully identifying and placing the *o* letter tile on the letter board. Said otherwise, she emphasised a sound in a word and thereby asked her child to isolate the sound in the word, and then to map that sound onto the letter tile. In contrast, when writing a in *boat*, the mom said, “now again... because I’ve been spelling a long

time there's actually a letter that comes in between the *o* and the *t*, it's an *a* that's how you spell *boat*." Here, the mom told her child the name of the missing letter, and then she placed it on the letter board herself. In sum, the mom encouraged her child to isolate a letter sound in the word and map it onto the letter tile when writing the *o* in *note* and *boat*, or gave her more independence when writing a consistent letter. In contrast, when working with an inconsistent letter, the mom said the letter name and placed it on the letter board for her child, or provided her with more teaching support.

The third dyad was a mother and her son. The mom worked as a shift caregiver and her son was in senior kindergarten. For both the words *note* and *boat*, the mom said the target word and the child selected both *o*'s in both words independently. In other words, the child did not require his mom's help to select the correct letter. When the child wrote the word *boat*, he spelled it *bot*. In response, the mom used the extra letter tiles to write *boat* beneath her child's work. She drew attention to the fact that in this case, the *o* was a long *o*, and that the *a* was not able to be heard when the word was spoken aloud. Then, her child added the *a* to his spelling of *boat* in the correct position. In sum, this child was able to write *o* independently in both words, and his mom wrote the word *boat* correctly as a model for her child to use to correct his work, or provided him with more teaching support.

In all three examples, the mothers provided less teaching support when her child was writing a letter that was easier to spell or consistent, and provided more teaching support when their child was writing a letter that was more challenging to spell, because it was silent or inconsistent. These behaviours qualitatively supported my hypothesis

that mothers adjusted their level of teaching support depending on the difficulty of the target letter they were trying to write with their child.

Moreover, these mothers were sensitive to what their child knew about early literacy, independent of their level of early literacy knowledge and adjusted their teachings accordingly. In the first example, when writing *o*, the mother encouraged her child to link an isolated letter sound with a letter. In the second example, the mom encouraged her child to isolate a sound in a word, and then to map it onto a letter by sounding out the word and emphasising the target phoneme. In the third example, the child was capable of writing *o* independently and therefore the mom simply said the target word and letter her child work from there. Overall, mothers with children with less early literacy knowledge provided their children with more teaching support, and mothers of children with more early literacy knowledge provided their children with less teaching support.

Generally, parents were observed adjusting their levels of teaching support for letters that varied in difficulty. Further, parents of children with the least amount of early literacy knowledge were seen demonstrating the highest level of teaching support and parents of children with the greatest amount of early literacy knowledge were seen demonstrating the lowest level of teaching support. Taken together, both of these observations supported parent sensitivity to child knowledge for tasks that differ in difficulty and independent of what their child knows about early literacy.

In sum, these findings provided preliminary quantitative and qualitative support for the current study's hypothesis that parents were sensitive to their child's early literacy knowledge, and adjusted their levels of teaching support depending on the difficulty of

the letter they were helping their child to write and independent of their child's level of early literacy knowledge. Now, parent responsiveness to child difficulties is described.

Parent Responsiveness when their Child Experienced Difficulty

As a reminder, responsiveness is a component of sensitivity that refers to the parent's reactions to the behaviours of their child when their child is having difficulty (Wood & Middleton, 1975). In the present study, the child difficulties that were assessed included child non-responses (i.e., the mother made a request and the child did not say anything or take any action), child mistakes (i.e., child pointed to or selected the incorrect letter) and child requests for help (i.e., asked a question or guessed by pointing aimlessly). While some children did not respond, made mistakes or asked for help multiple times, these subsequent behaviours did not occur frequently enough to be analyzed separately. Therefore, this series of analyses only focuses on the first child behaviour in a sequence of parent-child interactions.

Although the previous analyses focused on only nine of the 21 letters used in the present study, the responsiveness analyses included all 21 letters. Whereas sensitivity was assessed by looking at differences in parent teaching based on letter consistency, responsiveness was assessed by analyzing parent behaviours before and after child difficulties. Although child difficulties did occur slightly more frequently for inconsistent than consistent letters, children experienced difficulties for all the letters used in this study. For this reason, all 21 letters were included in the responsiveness analyses.

Across the 21 letters, 75% of children did not respond at least once, 93% of children made at least one mistake and 61% of children asked for help. Of these

children, children did not respond to their parent's request six times, made seven mistakes and asked for help three times on average. To test the hypothesis that parents demonstrated responsiveness by increasing their level of teaching (which corresponded to a lower overall teaching score) after their child did not respond, made a mistake or asked for help, a series of one-tailed paired-samples t-tests were conducted. The goal of these analyses were to compare parent teaching level before and after the child had difficulty for non-responses, mistakes and requests for help, respectively. See Table 3 for more details.

Although there were no differences found in the level of parent teaching before and after child non-responses, $t(20) = .71, p = .24$ or child mistakes, $t(24) = 1.40, p = .09$, there were differences found in the level of parent teaching before and after child requests for help, $t(8) = 2.99, p = .01$. This suggests that although parents did not demonstrate responsiveness by increasing their teaching support when their child did not respond or made a mistake, they did provide more teaching support when their child asked for help. When a child asked for help, parents were generally observed shifting from asking their child to make a letter sound to encouraging their child to link a letter name with the correct letter, or providing more teaching support. These findings partially support the present study's responsiveness hypothesis. Now, I turn to a discussion of the impact of parent teaching level on child early literacy skills.

Table 3
Parental Teaching Support Levels Before and After Child Difficulties during the Shared-Writing Task

	Before		After	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Child Behaviour:				
Non-Response	6.3	2.4	5.9	2.6
Mistake	6.1	2.6	5.4	2.8
Requests for Help	5.0	2.0	3.3	1.0

Note. Parent teaching scale ranged from 1-16.

Impact of Parent Teaching Level on Child Early Literacy Skills

In their body of work, Aram and colleagues conducted correlational analyses to demonstrate that parent teaching quality, measured by their graphophonemic mediation scale, was predictive of child early literacy skills (Aram & Levin 2001, 2004). Given the limited sample size in this study, a different statistical approach was taken to answer the same question. Recall that the scale used to assess maternal teaching ranged from 1-16, where levels 1-8 captured maternal teaching about letters, and levels 9-16 captured maternal teaching about words. For the current analyses, families were coded based on whether they taught at the letter or the word level based on their first teaching behaviour for all the consistent letters used in the sensitivity analyses. Consistent letters were chosen over inconsistent letters because they are more representative of the mother's understanding of her child's early literacy knowledge.

Forty-six percent of parents were observed teaching at the letter level and 54% of the parents were observed teaching at the word level. Then, rather than using regression analyses to investigate whether parent teaching level predicted child early literacy skills, a series of one-way between-subject ANOVAs with parent teaching either about letters or words as the independent variable, and child early literacy skills (letter-name

knowledge, letter sound knowledge, early spelling and early reading) as the dependent variables were conducted. The goals of these analyses were to assess whether there were differences in child early literacy skill levels for parents that were observed teaching at the letter or the word level. That is, if parents were sensitive to what their child knows about early literacy, there should have been differences in child early literacy skills for parents that were observed teaching at the letter versus the word level.

No differences were found in letter-name knowledge for children whose parents were observed teaching about letters versus words, $F(1, 26) = 2.28, p = .14$. This is likely because the children were performing near ceiling on this task. That said, there were differences in letter-sound knowledge, $F(1, 26) = 4.56, p = .042$, early spelling knowledge, $F(1, 26) = 6.17, p = .02$ and early reading knowledge, $F(1, 26) = 5.20, p = .03$ for parents that were observed teaching their children about letters and words respectively. See Table 4 for more details. These findings support this study's parent teaching and early literacy hypothesis and suggest that parents who were observed teaching at the letter level had children with letter-level knowledge and parents who were observed teaching at the word level had children with word-level knowledge. Said otherwise, parents were observed providing their children with appropriate teaching support for their knowledge levels. These findings provided additional support for the notion of sensitivity. Now, the relation between observed and parent self-reports of teaching is discussed.

Table 4
Child Early Literacy Skills by Observed Teaching Level

	Letter Level		Word Level	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Child Early Literacy Skill:				
Letter-Name Knowledge	12.0	7.2	15.3	4.1
Letter-Sound Knowledge	8.5	6.8	13.5	5.6
Early Spelling	8.9	9.5	17.6	9.0
Early Reading	1.9	1.8	3.3	1.6

Note. The letter-name and letter-sound knowledge assessments were out of 17, each word for the early spelling assessment was scored out of 6 and early reading was scored out of 5. 13 parents were observed teaching at the letter level and 15 parents were observed teaching at the word level.

The Relation between Parent Self-Reports of Teaching at Home and Observed Parent Teaching Behaviours

In the literature, Sénéchal and colleagues demonstrated that the more frequently a parent taught their child about letters and words the stronger their early literacy skills were (Martini & Sénéchal, 2012; Sénéchal, 2006; Sénéchal et al., 1998). As a result, parents who taught more frequently should also teach their children at a higher level because parents who teach more have children who know more. In the present study, parents self-reported how frequently they taught their child about various aspects of early literacy knowledge both now and in the past ranging from never (1) to very often (5). Fifty-seven percent of the parents reported that they currently taught their child about letter names, 61% reported teaching about letter sounds, 57% reported teaching about how to print words and 61% reported teaching how to read words either often or very often.

To test if observed parent teaching levels were consistent with self-report parent teaching levels, a series of one-way between-subject ANOVAs with parent teaching about letters or words as the independent variable and parent self-report teaching

frequency for teaching letter names, letter sounds, to print or to read words as the dependent variables were conducted now and in the past. The goals of these analyses were to assess whether there were differences in self-reports of teaching frequency for parents that were observed teaching at the letter or the word level.

Unfortunately, there were no differences in parent self-report teaching frequency now for letter names, $F(1, 26) = 3.32, p = .08$, letter sounds, $F(1, 26) = 3.12, p = .09$, printing words, $F(1, 26) = 1.99, p = .171$ or reading words, $F(1, 26) = .01, p = .917$ for parents that were observed teaching at the letter or the word levels respectively. There were also no differences found in parent self-report teaching frequency in the past for letter names, $F(1, 25) = 2.30, p = .14$, letter sounds, $F(1, 25) = .006, p = .94$, printing words, $F(1, 25) = 3.76, p = .064$ or reading words, $F(1, 25) = .01, p = .917$ for parents that were observed teaching at the letter or the word levels respectively. For details, see Table 5. These findings do not support this study's observed versus self-report teaching hypothesis. Therefore, the present study cannot confirm that parents who were observed teaching at the letter level taught about letters more frequently and parents who were observed teaching at the word level taught about words more frequently. Now, parent responses to invented spellings are discussed.

Table 5

Self-Report Parent Teaching Frequencies by Observed Teaching Level

	Letter Level		Word Level	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Self-Reported Teaching Level Now				
The names of alphabet letters	4.1	1.1	3.3	1.2
The sounds of alphabet letters	3.9	0.9	3.3	0.9
How to print words	3.2	1.1	3.4	1.1
How to read words	3.7	1.1	3.4	1.0
Self-Reported Teaching Level in the Past				
The names of alphabet letters	4.6	0.7	4.1	0.8
The sounds of alphabet letters	3.8	1.1	3.9	1.1
How to print words	2.7	1.0	3.5	1.1
How to read words	2.7	1.1	3.5	1.2

Note. Scale ranged from 1 (never) to 5 (very often). 13 parents were observed teaching at the letter level and 15 parents were observed teaching at the word level.

Parent Responses to Invented Spellings

In this study, 95% of the words written were spelled conventionally with the help of the child's parent. Only three children spelled some letters independently, but no children were able to spell words both conventionally and independently. On average, children made seven spelling errors across all 21 letters the dyads were asked to write together. With their parents help, 96% of children eventually spelled the words *day*, *bite*, *tie* and *note* conventionally, 93% of dyads spelled *ape* conventionally and 89% of dyads spelled *boat* conventionally. Given that the children were observed making errors, this information suggests that parents generally demanded conventional spelling and corrected their child's spelling errors (or invented spellings).

Discussion

The present study provided support for its sensitivity hypothesis by demonstrating that parents were sensitive to their children's early literacy knowledge levels by responding to the level of the task difficulty. This was done by observing parent teaching

levels for a shared writing task using letters that varied in consistency or difficulty. The present study also provided some support that parents are responsive to their children, which is a component of sensitivity. However, it may have also suggested that the degree of maternal responsiveness depends on the type of difficulty the child experiences. The notion of parent sensitivity was further supported by demonstrating that parents who were observed teaching their child about letters had children with more basic early literacy skills and parents who were observed teaching their child about words had children with more advanced early literacy skills. Although the present study did not provide support that self-report levels of parent teaching were consistent with observed levels of parent teaching, this was most likely a result of the study's limited sample size. Each of the present study's goals is discussed in turn. Finally, all of these findings were possible as a result of innovative methodology. Therefore, I conclude with discussion of the methodological advantages of the present study before turning to the limitations and directions for future research.

Parent Sensitivity to Letters that Vary in Difficulty

In their body of work, Aram and colleagues demonstrated that parent graphophonemic mediation level, or parent teaching level, was predictive of child early literacy skills (Aram & Levin, 2001, 2002; Bindman et al., 2014; Lin et al., 2009; Lin et al., 2011). However, the strength of the correlations between these variables were surprisingly high ($r_s = .52$ to $.82$). Aram and colleagues explained that the strong correlations were due to mothers' sensitivity to their child's knowledge levels (Aram & Levin 2001, 2004). However, this notion of sensitivity had never been tested in this field. In order to test Aram and colleague's explanation for their findings, the present

study sought to investigate whether parents demonstrated sensitivity to their child's knowledge levels by adapting their teaching levels to the spelling difficulty of phonemes for children with varying levels of early literacy knowledge.

The originality of this research is that the spelling difficulty of words was manipulated. For each of three word pairs, the target phoneme was either represented with one or two letters, that is, the phoneme /ə/ in *ape* and *day*, /aj/ in *bite* and *tie* and /o/ in *note* and *boat*. The goal was to compare parent teaching level for easy letters where there was a match between the phoneme and letter, or they were consistent (in all cases the letter name corresponded to the target phoneme) and difficult letters where there was a mismatch between the phoneme and its letter representation, or where it was inconsistent.

This study's findings supported the sensitivity hypothesis. Overall, parents provided equal teaching support when helping their children write consistent letters, and provided more teaching support when helping their children write inconsistent letters. Specifically, parents demonstrated sensitivity to their child's knowledge by responding to the difficulty level of the task by providing more teaching support for a task that was more challenging for their child compared to a task that was less challenging for their child. This provides support for the notion of parent sensitivity to child early literacy knowledge independent of child knowledge level, which has never been achieved in this body of work (Aram & Levin, 2001, 2002; Bindman et al., 2014; Lin et al., 2009; Lin et al., 2011).

Although Aram and colleagues explained their findings by suggesting that mothers were sensitive, the scale they used to assess maternal quality of teaching did not

accurately assess maternal quality of teaching because it confounded maternal teaching behaviours with maternal assumed understanding of her child's early literacy skills (Aram & Levin, 2001, 2004). Specifically, lower-level teaching behaviours (e.g., modeling) were paired with higher-level conceptual concepts (e.g., letter sounds) and higher-level teaching behaviours (e.g., encouraging the child) were paired with lower level conceptual behaviours (e.g. letter names) on the scale. However, this was not done systematically. For this reason, the scales used in this body of work was not designed to test maternal sensitivity.

Therefore, Aram and colleagues cannot explain their findings by claiming that mothers were sensitive to their child's knowledge level (Aram & Levin, 2001, 2004). However, the present study can. Because of the spelling manipulation and the redesigned scale used to assess parent teaching support, the present study demonstrated parent sensitivity to their children, independent of their pre-existing knowledge levels.

Parent testimony. In further support of these findings, one of the parents in this study, who also happened to be a kindergarten teacher, kindly offered to write to the researcher to explain what she was thinking during the parent-child writing task. Her excerpt follows, "In our house, we focus on learning our name. We work on identifying it in various written formats. Our children have a lot of matching items, and as parents we have marked them with their beginning initial. As a family, we have decided that we are not focusing on explicitly teaching our children the letters of the alphabet prior to starting school. We are simply teaching them the letters in their name... Throughout the session, when it came time to spell the words, I was only focused on having her identify the letters that are in her name. I would write the letters on a card so that she could find the

match. I also made sure to name the letter. This allows her to match the letter and associate it with its name.”

This quote from a parent with a child in this study demonstrates the notion of sensitivity as it was hypothesised in the current study. By acknowledging that she focused on teaching her child about the letters in her name, and then used that information to adjust her teaching behaviours during the shared writing task, it demonstrated that this mom was indeed sensitive to what her child knew about early literacy. The anecdotal evidence presented also supports the notion that parents are sensitive to their children’s knowledge levels and adjust their teaching support accordingly. Now, the influence of parent responsiveness is discussed.

Parent Responsiveness

Wood and Middleton (1975) argued that responsiveness is a component of sensitivity that refers to the parent’s reactions to the behaviours of their child when the child is experiencing difficulties. They argued that parents should provide their child with more support when they are struggling in order to benefit their child’s learning. Although Aram and colleagues used the notion of sensitivity to explain their surprising findings, no one has ever considered this component of sensitivity. The addition of looking at maternal responsiveness adds to the originality of this work.

In the present study, maternal behaviours were assessed before and after child non-responses, child errors and child requests for help which included asking questions and guessing. If a mother did demonstrate responsiveness, it was expected that she would provide more teaching support after one of these child behaviours than when she provided her initial prompt.

Significant differences were found between maternal teaching behaviours before and after a child asked for help which included asking a question or guessing. This demonstrated that parents were responsive to their children for this particular type of child difficulty. When compared to the other types of child behaviours, this finding is of particular interest. On average, parents dropped two points on the teaching support scale when their child asked for help, from around a five, or asking the child to make a letter sound (e.g., mom says, “/b/, /b/, /b/”), to around a three, or encouraging her child to link the letter name with the correct letter (e.g., mom says, “can you find *a* for me?”). This could indicate that mothers are most responsive when their child when they explicitly ask for help or are prompted.

Although there were no significant differences found between maternal teaching behaviours before and after her child made an error, there was nearly a full point difference between the maternal teaching means. There are a number of possible explanations for this finding. Although it is possible that the study’s limited sample size influenced the results, it is also possible that mothers were observed scaffolding, or making minor adjustments in their teaching levels when their child made a mistake (Evans, Moretti, Shaw & Fox, 2003). Therefore, although no significant differences were found in maternal teaching behaviours, this finding could suggest that mothers make gradual changes to their teaching behaviours in response to child mistakes.

Interestingly, no differences in maternal teaching support were found when a child did not respond to the request of their mother. This suggests that the mother either repeated her instructions, or reworded her teaching prompt without providing more teaching support. Of note, this finding could indicate that mothers interpreted a child

non-response as more of a misunderstanding on the part of her child than a situation where they needed additional help.

To refresh, there were no differences in maternal teaching behaviours before and after child non-responses, there were subtle differences in maternal teaching behaviours before and after child mistakes and yet there were significant differences in maternal teaching behaviours before and after child requests for help. Taken together, these findings could suggest that the degree of parent responsiveness depends on the type of child difficulty and warrants exploration in future research.

The Impact of Parent Teaching Support on a Child's Early Literacy Skills

In Aram's body of work, the researchers claimed that parent teaching quality was predictive of child literacy skills. They also suggested that it could explain why some children had stronger early literacy skills than others, implying that higher quality parent teachers produced children that knew more (Aram & Levin, 2001, 2004). However, this explanation did not account for the possibility that a mother could provide less but developmentally appropriate teaching support for her child, meaning she was still a quality teacher. Whereas Aram and colleagues considered parent teaching quality, the present study considered the match between parent teaching level and child early literacy skills (Aram & Levin, 2001, 2004). Specifically, it was hypothesised that parents that were observed teaching their child at the letter level would have children with more basic early literacy skills and parents that were observed teaching their child at the word level would have children with more advanced early literacy skills. In the present study, early literacy skills consisted of letter-name knowledge, letter-sound knowledge, early spelling and early reading.

No differences were found in letter-name knowledge for parents that were observed teaching their children at the letter versus the word level. However, this is likely attributable to most of the children performing at ceiling on this assessment. In contrast, differences were found in child letter-sound, early spelling and early reading knowledge for parents that were observed teaching their child at the letter versus the word level. That is, parents that were observed teaching their child at the letter level had children with more basic early literacy skills and parents that were observed teaching their child at the word level had children with more advanced early literacy skills. This provides further support for the notion of parent sensitivity by suggesting that parents are teaching their children about letters and words at a level that is appropriate for what they know about early literacy, or match their teaching support to what their child knows.

The Relation Between Parent Self-Report and Observed Teaching Behaviours

Concurrent and longitudinal research by Sénéchal and colleagues on the frequency of parent teaching demonstrated that the frequency of parent teaching in kindergarten predicted a child's early literacy skills concurrently (correlations between parent teaching and child early literacy skills range from $r = .22$ to $.39$) and indirectly predicted child word reading in Grade 1 after controlling for child early literacy skills (Sénéchal & LeFevre, 2002, Sénéchal, 2006). However, this body of work is entirely correlational. Therefore, it was of interest to investigate the relation between parent self-report and observed teaching behaviours.

The present study hypothesised that parents who self-reported teaching their children about letters and words more frequently should have also been observed teaching their child about letters or words respectively when doing a shared writing task

together. Although none of the analyses were significant, parents that were observed teaching at the letter-level reported teaching about the names ($M = 4.1$, $SD = 1.1$) and sounds ($M = 3.9$, $SD = 0.9$) of alphabet letters more slightly more frequently than parents that were observed teaching at the word level (letter names: $M = 3.3$, $SD = 1.2$, letter sounds: $M = 3.3$, $SD = 0.9$). For the parents that were observed teaching at the word level, they reported teaching their children to print ($M = 3.5$, $SD = 1.1$) and read ($M = 3.5$, $SD = 1.2$) words in the past more frequently than parents that were observed teaching at the letter level (print words: $M = 2.7$, $SD = 1.0$, read words: $M = 2.7$, $SD = 1.1$). This could suggest that parent self-reports of teaching about letters are consistent with observed parent teaching about letters now and in the past. The lack of significance is most likely attributable to the study's limited sample size and wide variability in child age and early literacy knowledge but this finding does suggest that this question warrants further exploration in future work.

Parent Responses to Invented Spellings

In the literature, there was conflicting information about whether or not parents would accept a child's invented, or phonological spellings. DeBaryshe et al. (1996) suggested that parents did encourage their children to use conventional spellings whereas Bindman and colleagues (2014) reported that parents were accepting of phonological spellings. In the present study, parents were just asked to "write the words for the pictures they will see as they see fit." In the case that a parent asked a question or for clarification, the researcher responded, "you can do whatever you think is right, in whatever way you feel is appropriate." These directions were designed to give the parent the freedom to decide whether they would or would not accept a child's phonological

spellings. Although the majority of children made some spelling errors during the task, 95% of the words written were spelled conventionally. This suggests that parents seemed to expect their children to spell conventionally, and corrected their children's errors in order to achieve conventional spellings. Importantly, the researcher was present for this task, which could have made the parents feel pressure to have their child produce conventional spellings as well. As a result, these findings should be interpreted cautiously.

Methodological Advantages of the Present Study

The following section discusses the limitations in Aram's body of work and how the present study overcame them (Aram & Levin, 2001, 2002; Bindman et al., 2014; Lin et al., 2009; Lin et al., 2011).

Advantages of the task used. First and foremost, in Aram's work, parents and their children were asked to do a structured and an unstructured writing task (Aram & Levin, 2001). For the structured writing task, they were asked to write four word pairs (that were paired based on characteristics of the Hebrew language) and a birthday party invitation list. This means that the number of letters used in their words, as well as the difficulty level of the letters used in their work was not consistent across children. However, in the present study, the children all wrote the same six words together with their parents. This allowed for controlled comparisons of parent teaching level per letter because the letters used in the study were standard.

Further, the words for this study were chosen strategically to encourage parents to use different levels of teaching support depending on the letter they were trying to help their child write. This was to try and demonstrate parent sensitivity because children

should theoretically require more teaching support when writing a two-letter phoneme that is marked by a consistent and an inconsistent letter than the same one-letter phoneme that is marked by a consistent letter alone. This approach allowed the researcher to assess parent sensitivity independent of child early literacy knowledge and phonological awareness skills, something that has never before been accomplished in Aram's body of work (Aram & Levin, 2001, 2002, 2004; Lin et al., 2009; Lin et al., 2011; Bindman et al., 2014).

Advantages of the letter boards. The second key advantage to this study's design was the use of letter boards to write words as an alternative to asking children to print the letters. Recognizing a letter is an easier skill for a child than printing the letter, which requires fine motor skills that also take time to develop (Maldarelli, Kahrs, Hunt & Lockman, 2015). By eliminating the need for the child to print the letters, we were able to gain a much better picture of the child's knowledge of writing. As a result, we were also able to gain a better picture of parent teaching strategies, unrestricted by the parents coaching the child to print the target letter.

Advantages of the scale. Third and most importantly, the scale used to assess parental graphophonemic mediation was designed for the purposes of this study. When children are learning how to read and write words, letter-name knowledge is judged to be more basic than letter-sound knowledge, which both deal with isolated letters (Worden & Boettcher, 1990). However, dealing with isolated letter-names and letter-sounds are both easier conceptual tasks for young children than dealing with a whole word, which requires breaking it down into individual units before mapping the letter name or letter sound onto the letter tiles used in this study (Burgess & Lonigan, 1998). Contrary to the

scale Aram used, this scale took an early literacy approach and captured the mother teaching her child about letter names, letter sounds or the word itself (Aram & Levin, 2001). Further, within concept, the scale ranged from the mother doing the behaviour independently to the child doing the behaviour independently, always moving from dealing with letter names to letter sounds at either the isolated letter or word level.

Parents in this study were observed using all 16 teaching strategies on this scale. Therefore, not only is the scale used in this study much more precise than the ones used in Aram's work, it was able to be used to assess movement and ultimately sensitivity in parent teaching strategies because it was ordered using theory (Aram & Levin, 2001). This was also particularly important when assessing parental responsiveness. The precise nature of the scale however brought challenges for scoring and achieving strong inter-rater reliability. Given that some of the differences in teaching behaviours observed in this study were indeed subtle, they were challenging to code at times. In future work, multiple examples of different ways parents might approach a certain teaching behaviour could help facilitate coding training and inter-rater reliability.

Advantages of measuring responsiveness. One of the major limitations of Aram's work was that they did not consider parent responsiveness, a component of sensitivity (Aram & Levin, 2001, 2002, 2004; Lin et al., 2009; Lin et al., 2011; Bindman et al., 2014). For each letter mediated, the parents in Aram's work were only assigned one score from the graphophonemic mediation scale (Aram & Levin, 2001). However, this approach ignored a crucial aspect of parent teaching and an essential component of the present study. As mentioned in this thesis' introduction, parental responsiveness is part of what makes a parent a higher quality teacher (Wood & Middleton, 1975). This

includes when the child does not respond to a parent's request, makes a mistake, or asks for help which included asking a question or guessing. By ignoring these parent teaching behaviours, a key component of parent sensitivity would not be captured. Therefore, the fact that parent responsiveness was captured using the scale in present study represents a major strength of the current work.

Further, Aram never specified which teaching behaviours were scored for each letter mediated (Aram & Levin, 2001). Specifically, in the present research, parents were observed using multiple teaching strategies for one letter (or being responsive), depending on the actions of the child. Therefore, this study also differentiated between the mother's first behaviours at both the word and letter levels, and the mother's last behaviour between the both the word and letter levels before child success. This was primarily to allow for the researcher to assess responsiveness.

Advantages of the analyses. In Aram's original work, the researchers scored each letter the mother mediated individually and then averaged them to provide the final graphophonemic mediation score even though all children presumably wrote different letters as a result of the unstructured task (Aram & Levin, 2001). However, this approach did not take into account the fact that some sounds or lack thereof are more challenging for children to write than others, and as a consequence more challenging for parents to provide teaching guidance for.

Therefore, in this study, all letters were scored and analyzed by type because parents provided different levels of teaching support for letters that varied in difficulty to write. This is a major advantage of both the design of this study and the approach taken

to analyze the data because it provides a more accurate picture of parent teaching behaviours.

Taken together, the study's design, the use of letter boards instead of asking the child to print the letters, the scale used to assess maternal teaching, assessing responsiveness and the approach to the analyses methodologically advances this field of research and should be considered in future work.

Limitations

There are a number of limitations that should be taken into consideration when considering this study's findings. First and foremost, this study was observational. To administer the task, the researcher was present when the videotapes were being collected from the families. This may have made the families feel a slight amount of pressure to perform according to their perception of what the researcher wanted. In other words, they may have altered their behaviours as a result of the pressure of social desirability bias. This is a limitation of this study and of most observational work.

This study's sample size and demographics also need to be considered. The sample included in this study was small, with a wide age range. This limits this study's power and generalizability. Given the challenges recruiting posed, it is also worthwhile to consider the type of family that was willing to participate in this research. Of the 27 parent-child dyads, only one father participated. Therefore, the present's findings are only generalizable to mothers. Not only was the mean income reported by the families higher than the mean income in Ontario, the parents in the sample were also generally well-educated, with average reading skills for adults. Although this is common in research, I believe it is especially important to consider the implications of these

particular families' participation. Most of these parents were very invested both their children and their children's education. Therefore, it is likely that it was only the parents interested in teaching their children about early literacy that chose to participate. This reality may have biased this study's findings.

Further, the present study included preschool, junior kindergarten and senior kindergarten children (because of recruitment challenges, see Appendix F) even though the scale used to assess maternal teaching and the early literacy assessments were optimized for junior kindergarten students. Future work should strive to include only junior kindergarten students, or to refine the maternal teaching scale and early literacy assessments for a wider age range.

Directions for Future Research

Based on the present study's findings, there are multiple directions for future research in this field. Parent teaching level was only observed during a shared writing task. Future work could compare and contrast parent teaching level in a shared writing task and a shared-reading task. It could also examine whether parent would adjust their teaching of reading to their child's early literacy skills.

The parents in this study were also observed referring to their child's name, or the letters in their child's name as a teaching strategy (Treiman & Kessler, 2014). These behaviours were not coded for this study. However, future research might explore how parents use the child's name to support teaching them about letter names, letter sounds and writing.

Continuing, parents were observed providing different levels of orthographic explanations and support depending on the child's knowledge level. That is, parents of

the children with minimal early literacy knowledge did not tend to explain elements of orthography such as why the *a* in *boat* was silent, whereas parents of children with stronger early literacy knowledge did. Future research could explore differences in parental orthographic explanations and their relation to child early literacy knowledge.

In regards to the scale used to code maternal behaviours, as mentioned in the limitations, inter-rater reliability could have been stronger. Future work would benefit from more clearly defining the types of behaviours that need to be coded (e.g., what differentiates a mother saying a word from sounding out a word) and especially, clearly defining the types of behaviours that do not need to be coded. This would help improve this scale's reliability.

Lastly, I discuss logistical directions for future research. Given the enormous challenges recruitment posed, it may be worthwhile partnering with a community center or library as a location to run these sessions. This strategy may make families more comfortable and more willing to participate in this type of research.

Conclusions

In sum, the present study demonstrated that parents were sensitive to what their child knew about early literacy, that is, parents adjusted their teaching to the difficulty of the task as well as to their child's early literacy knowledge. The present study also provided evidence that mothers were responsive to their children when they were experiencing difficulties. With that said, this study's findings also suggested that mothers may respond differently to the types of difficulties their child experienced during a shared writing task. Therefore, the present study provided support that mothers were

both sensitive to what their child knows about early literacy and responsive to their children when they are struggling.

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Appendix A: Invented Spelling Scoring

<i>No</i>		
0	A random string of letters that do not meet the criteria for any other score.	
1	The initial phoneme represented with a phonetically related letter. A random string of letters may follow.	
	No	m, l, t, d
2	The correct initial grapheme or long vowel marked by a letter name. A random string of letters may follow.	
	No	n, o
3	Both phonemes represented (not necessarily with phonetically related letters), with no intrusions.	
	No	e.g., po
4	Both phonemes represented (phonetically related or conventional letters). Letters must be in proper sequence for credit to be given (once intrusions are removed).	
	No	e.g., mo, mlo
5	All consonants with conventional letters and vowels marked. No additional letters present.	
	No	e.g., na
6	Correct conventional spelling.	

<i>Sit, Boot</i>		
0	A random string of letters that do not meet the criteria for any other score.	
1	The initial phoneme represented with a phonetically related letter. A random string of letters may follow.	
	Sit	c, z
	Boot	p, v, m
	OR, Some other salient part of the word is represented. A random string of letters may also be present.	
	Sit	i, t
	Boot	u, oo, t
2	The correct initial grapheme. A random string of letters may follow.	
3	More than one phoneme represented but not all (phonetically related or conventional letters). Letters must be in proper sequence for credit to be given (once intrusions are removed).	
	Sit	e.g., st, cn, sib (n, l, d, are acceptable for the final consonant)
	Boot	e.g., bt, pt, bu (d, n, l, are acceptable for the final consonant)
4	All phonemes represented, phonetically or conventionally, in proper order. May include intrusions.	
5	All consonants with conventional letters and vowels marked, in proper order. No intrusions or additional phonemes represented.	
6	Correct conventional spelling	

<i>Pretty</i>	
0	A random string of letters that do not meet the criteria for any other score.
1	The initial phoneme represented with a phonetically related letter (e.g., b, v, m). A random string of letters may follow. Or, some other salient part of the word represented by a single-letter response (r, e, t, y). A random string of letters may also be present.
2	The correct initial grapheme. A random string of letters may also follow.
3	More than one phoneme represented but not all (phonetically related or conventional letters). Letters must be in proper sequence for credit to be given (once intrusions are removed). Note that phonetically related letters for (r) are (l, y, w), and for (t) and (n, l, d). An (i) is acceptable for the first vowel, and an (e) for the final (y).
4	All phonemes from the first syllable represented, phonetically or conventionally, in proper order. May include intrusions. Or, both syllables represented with either the blend or first syllable vowel absent (e.g., pre, pete).
5	All consonants with conventional letters and vowels marked, in proper order. No intrusions or additional phonemes represented.
6	Correct conventional spelling.

<i>Lady</i>	
0	A random string of letters that do not meet the criteria for any other score.
1	The initial phoneme represented with a phonetically related letter (e.g., r, y, w, n, t, d). A random string of letters may follow. Or, some other salient part of the word represented by a single-letter response (a, d, y, e). A random string of letters may also be present.
2	The correct initial grapheme. A random string of letters may also follow.
3	More than one phoneme represented but not all (phonetically related or conventional letters). Letters must be in proper sequence for credit to be given (once intrusions are removed). Note that phonetically related letters for (d) are (n, l, t). An (e) is acceptable for the final (y).
4	All phonemes from the first syllable represented, phonetically or conventionally, in proper order. May include intrusions. Or, both syllables represented with first syllable vowel absent (e.g., lad, lde).
5	All consonants with conventional letters and vowels marked in proper order. No intrusions or additional phonemes represented.
6	Correct conventional spelling.

Appendix B: Home Literacy Questionnaire

Thank you for taking the time to complete this questionnaire. Your answers will be kept confidential and used for research purposes only. You can choose not to answer any of the questions below. It will take you approximately 10 minutes to complete this questionnaire.

Please indicate:

- a. Child's birth date: _____ (day/month/year)
- b. Child's gender (please circle): **Male** **Female**
- c. Your relationship to the child (please circle): **Mother** **Father**
Other: _____ (please specify)
- d. The language(s) your child speaks most often at home:

- e. Does your child have exposure to a language other than English? If yes, please describe:

- f. Does your child have siblings? If so, please list them and their ages

- g. Please place an X by the highest level of education completed by you and, if applicable, the child's other parent.

Yourself		Your Child's Other Parent
	Some high-school	
	High-school graduate	
	College certificate or diploma	
	Some university	
	University undergraduate degree	
	Master's Degree	
	Doctoral Degree	

- h. Please estimate your household yearly income before taxes:

1. Please indicate how often **you and your child** engage in the following activities when you are playing during a typical week. Choose a number from 1 to 5, where 1 means *never* and 5 means *very often*.

My child and I:	Never	Rarely	Sometimes	Often	Very Often
Do arts and crafts	1	2	3	4	5
Play with puzzles	1	2	3	4	5
Play with legos, blocks, or similar toys	1	2	3	4	5
Play with toys	1	2	3	4	5
Watch TV	1	2	3	4	5
Sing songs	1	2	3	4	5
Rough and tumble play	1	2	3	4	5
Say nursery rhymes	1	2	3	4	5

2. How often do you, or other members of the family, read to your child in a **typical** week?

At bedtime:																	
Never		Once		2		3		4		5		6		7		More	

If more, please estimate: _____

Other times:																	
Never		Once		2		3		4		5		6		7		More	

If more, please estimate: _____

3. What are the titles of your child's favourite book(s) if any?

(1) _____

(2) _____

(3) _____

4. Please estimate the number of books (children's or adults') that are available in the household:

Children's books:											
none		1-20		1-40		1-60		1-80		More	

If more, please estimate: _____

Adults' books:											
None		1-20		1-40		1-60		1-80		More	

If more, please estimate: _____

5. Below is a list of activities that your child may or may not engage in. By selecting a number from 1 to 5, please indicate how often you and your child engage in the following activities, now or in the past.

	Never	Rarely	Sometimes	Often	Very Often
My child asks for help learning the letters of the alphabet	1	2	3	4	5
My child asks for help to print words	1	2	3	4	5
My child scribbles on paper to pretend they are writing	1	2	3	4	5
My child asks for paper and pencils to write with	1	2	3	4	5
My child asks for help reading words	1	2	3	4	5
My child asks for books to be read to him/her	1	2	3	4	5
My child pretends to read (i.e. holds up a book and narrates words)	1	2	3	4	5

6. By selecting a number from 1 to 5, please indicate how often you and your child engage in the following activities **now**:

I teach my child:	Never	Rarely	Sometimes	Often	Very Often
The names of alphabet letters	1	2	3	4	5
The sounds of alphabet letters	1	2	3	4	5
How to print alphabet letters	1	2	3	4	5
How to print his/her name	1	2	3	4	5
How to print words	1	2	3	4	5
How to read words	1	2	3	4	5

7. By selecting a number from 1 to 5, please indicate how often you and your child engaged in the following activities **in the past**:

I taught my child:	Never	Rarely	Sometimes	Often	Very Often
The names of alphabet letters	1	2	3	4	5
The sounds of alphabet letters	1	2	3	4	5
How to print alphabet letters	1	2	3	4	5
How to print his/her name	1	2	3	4	5
How to print words	1	2	3	4	5
How to read words	1	2	3	4	5

[illegible][illegible]

Appendix C: Instructions to the Mothers and Children for the Shared writing Task

WRITING TASK: The parent and child will be asked to write a series of words together. For each word, place the appropriate blank letter board with the appropriate set of letters in front of the parent and their child. Place the blank board on the side of the parent and the board with the letters on the side of the child, ensuring that the parent, child and boards can all be seen in the camera's view.

To the parent and the child: *“Please write the words for the pictures you will see as you see fit. I have given you some letters you can use to write with. Go ahead when you are ready.”*

If the parent asks a question such as, “can I do it this way?” the researcher must reply: *“You can do whatever you think is right, in whatever way you feel is appropriate.”*

When they are finished with the first word, replace the completed letter-board with the next letter board. Leave all letters where they are to verify the response sheet.

Provide the dyad with the next set of letter boards: *“Here is the next picture.”* (if necessary)

Repeat procedure for all six words.

Appendix D: Revised Graphophonemic Mediation Scale

Topic	Code	Maternal Behaviour
Letter name	1	D
		... points to, or places the correct letter(s) on the board for her child, or for her child to copy (<i>includes pointing to general board "area" in which the correct letter can be found</i>)
	2	<ul style="list-style-type: none"> ○ Mom puts the letter 'a' on the board ○ Mom points to the letter 'e' and tells the child to put it on the board ○ Mom takes a pen and paper and draws a letter for the child to find ○ Mom traces the letter shape on the board or in the air for the child to find ○ Mom points towards/hovers over a smaller area of the letter board, prompting "it's near here"
	2	C
		...says a letter-name
		<ul style="list-style-type: none"> ○ Mom says, "ape starts with the letter 'a'" OR "the first letter in ape is 'a'" ○ Mom says, "this says 'bit'; if you want to make it 'bite' you need to add an 'e'" (incl. ortho. expl.) ○ Mom uses another word as an example, "'a' like 'apple'" or "remember the 'a' from other words?"
	3	R
		... encourages her child to link the letter-name with the correct letter(s)
		<ul style="list-style-type: none"> ○ Prompts child by asking "Can you find 'a' for me?" OR "Hmm... where's that 'e' gone?" ○ Mom points to 't' and asks, "What is this letter?" ○ After providing spelling sample, mom prompts "Now you put the same letters underneath"
	4	F
		... asks the child to say a letter
		<ul style="list-style-type: none"> ○ "What letter does ape start with?" ○ "What letter comes next?" ○ "There's one more letter."
		V
		Other
		<ul style="list-style-type: none"> ○ "We already have the (letter name prev. used)" ○ Following-up on a letter-name prompt, "Just like in [previous target word]"
Letter Sound	5	T
		...makes the letter sound
		<ul style="list-style-type: none"> ○ Mom makes the letter sound once or repeatedly (independent from the word)
	6	G
		...links a letter sound and a letter for the child
		<ul style="list-style-type: none"> ○ "the letter 'a' makes the /a/ sound"
	7	B
		...provides her child with a clue to link the letter-sound (or lack thereof) with the correct letter(s)
		<ul style="list-style-type: none"> ○ "find the letter that makes /y/ like in yoyo"

Word			<ul style="list-style-type: none"> “what magic letter makes that an /o/?” [silent e, also coded as orthographic explanation]
	8	Y	...encourages her child to link an isolated letter sound (explicitly) with the correct letter(s) <ul style="list-style-type: none"> “what letter makes /a/?” “what letter makes the /n/ /n/ /n/ sound?”
		H	Other
	9	N	...breaks the word into letters <ul style="list-style-type: none"> “Ape. A-P-E” OR “Ape. A-P-...” (prompts child to identify next letter)
	10	U	... encourages her child to break the word down into its letters <ul style="list-style-type: none"> “what letters are in ‘ape’?” “what other letters do you think are in ‘bite’?”
	11	J	...emphasizes a letter sound in a word (can incl. repeating up to 3x provided there is no pause) <ul style="list-style-type: none"> “Ape. /A/-PE” OR “BI- /t//t//t/”
	12	M	...encourages her child to make (a) letter sound(s) in the word, or break down the word into sounds <ul style="list-style-type: none"> “what sound comes first/next?” “what (other) sounds do you hear?” “what else do you hear?”
	13	I	... sounds out the word <ul style="list-style-type: none"> “APE. /A/-P/”
	14	K	... encourages her child to sound the word out <ul style="list-style-type: none"> “sound it out” “say the word ‘ape’ <u>slowly</u>”
	15	O	... says the whole word <ul style="list-style-type: none"> “this is ape” “let’s spell the word ‘tie’” (*not encouraging the CHILD to do it alone; just saying the target word)
	16	L	... encourages the child to INDEPENDENTLY say or spell the word <ul style="list-style-type: none"> “say the word” “spell ‘tie’”
		P	Other
			<ul style="list-style-type: none"> Examples of rhyming words, “It rhymes with ‘grape’” [ape]

Other Codes	
+	Correct Spelling
-	Incorrect Spelling
*	Orthographic Explanation

Appendix E: Child Behaviour Scale

Codes	Child Behaviours
Q	... does not respond or says, "I don't know"
A	... guesses
Z	... makes a mistake
W	... asks for help or asks a question
S	... succeeds or does the action independently
X	... child self-corrects
E	Other

Appendix F: Recruitment Details

Recruitment strategies were wide reaching and varied, but largely unsuccessful. To start, a newspaper ad was sent to 15,000 homes in Renfrew and surrounding area. Twenty-three daycares and 52 churches were approached by phone or email. Twenty community posters were put up at consenting community centers with children's programming and athletic facilities, and four local libraries were approached. From these efforts, three of the 23 daycares approached agreed to distribute recruitment letters to the parents of 4- and 5-year old children. However, few local churches responded and of those that did none agreed to post recruitment posters in their facility. In addition, four local libraries agreed to display recruitment materials. One of the libraries distributed 23 letters to a kindergarten reading group, and one other allowed the researcher to attend multiple story time groups to invite parents to participate in this study. All of these efforts only resulted in consent from two families; one from the newspaper ad, and one from one of the local libraries.

Fifty-two letters were sent to daycare parents and of the six that were returned, only three families provided consent to participate. At this point, I changed my recruitment strategy from asking parents for consent to asking interested parents to provide their contact information and give me permission to contact them with more information about my study.

Permission was requested and granted from Renfrew County Catholic District School Board (RCCDSB) and the Renfrew County District School Board (RCDSB) to distribute recruitment letters to the parents of junior and senior kindergarten students. Ten school principals were contacted in the RCCDSB and nine school principals were

contacted in the RCDSB. In the RCCDSB, three of the ten school principals consented to participate and in the RCDSB four of the nine school principals consented to participate. However, in the RCDSB, letters were only distributed to two schools; one principal consented but none of the teachers did, and the other never provided permission to enter the school and distribute letters.

In total, 182 letters were sent to junior and senior kindergarten families in the RCCDSB and 124 letters were sent to junior and senior kindergarten families in the RCDSB. Ten letters were returned from the RCCDSB and four letters were returned from the RCDSB. Of the 14 letters returned, only 10 of those families agreed to participate in this study and booked a session. In sum, 20 of the 381, or five percent, of recruitment letters distributed were returned, and of those returned, 65% of families consented to participate and booked a session.

Therefore, most of the families in this study were recruited by word of mouth, or by asking parents who did consent to participate whether they knew anyone else that might be interested in participating.