

ABCs by Design: The Role of Alphabet Book Design and Children's Alphabetic Behaviours in
Emergent Literacy Skill Acquisition

by

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A Thesis
Presented to
The University of Guelph

In partial fulfillment of requirements
for the degree of Doctor of Philosophy
in
Psychology

Guelph, Ontario, Canada

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ABSTRACT

ABCs BY DESIGN: THE ROLE OF ALPHABET BOOK DESIGN AND CHILDREN'S ALPHABETIC BEHAVIOURS IN EMERGENT LITERACY SKILL ACQUISITION

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The current studies examined children's preferences for ABC book formats and relations between alphabet books and early literacy learning and behaviours. Study 1: Using a pictorial scale, page ratings of 51 junior kindergarten students (4-5 years old) revealed no preference for the amount of text nor picture complexity in alphabet books. Study 2: 94 junior kindergarten students (3-4 years old) participated in a 16 sessions reading program whereby they were read and interacted with alphabet books with research-based features, alphabet books with conventional features, or storybooks in small groups. Children across all three conditions made gains in their letter-name knowledge, letter-sound knowledge, and phonological awareness over the course of the study; however, no significant differences were seen between groups. Observations of children's behaviours while reading independently revealed that alphabet books elicited more alphabetic behaviours than storybooks, despite children in the three conditions spending the same proportion of time oriented to their books. Children's pre-test knowledge was the greatest predictor of post-test knowledge across all literacy measures, and book behaviour was positively associated with gains in letter sounds and phonological awareness. No effect of behaviour was seen for uppercase letter names; however, behaviour moderated the relation with pre-test letter-name knowledge for lowercase letter names when standard alphabet books were presented. Findings highlight the utility of using alphabet books, in a variety of formats, as part of a child's greater literacy experience.

Acknowledgements

I am sincerely grateful to my supervisor, Dr. Mary Ann Evans, for sharing her knowledge and enthusiasm for this topic, as well as her continual guidance and encouragement. I also thank Drs. Rod Barron and Alexandra Gottardo for sharing their expertise in the field of literacy and for consulting on and revising this dissertation. Further thanks is given to the Chair and examiners for being part of the defense committee.

This work would not have been possible without the strong team of researchers and research assistants involved. Thank you to Dr. Jean Saint-Aubin, for his contributions to the project design and *All the Letters Make Sounds Too*, and Elizabeth Sulima for lending her artistic talents to the illustrations of *All the Letters Make Sounds Too*. Many thanks go out to David Willoughby, Shanna Deasley, Lara Genik, Sara Newcombe-Anjo, and the many undergraduate research assistants who assisted in implementing the reading program. This work would also not have been possible without the amazing cooperation of the participants, parents, teachers, principals and schools who were part of these studies.

Finally, thank you to SSHRC for providing the funds (Grant # 410-2009-0055) to Mary Ann Evans to undertake this research.

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ABCs by design: The role of alphabet book design and children's alphabetic behaviours in emergent literacy skill acquisition

Alphabetic knowledge, such as knowing the letter names and sounds, and phonological awareness are essential precursors to learning to read (e.g., Ehri, 2005; Foulin, 2005; McBride-Chang, 1999; National Early Literacy Panel, 2008; Treiman, 2000; Whitehurst & Lonigan, 1998). The relationship between these skills is extended in that learning letter names and phonological awareness facilitate children's learning of letter sounds (Cardoso-Martins, Mesquita, & Ehri, 2011; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998).

With their explicit emphasis on the letters of the alphabet, it is not surprising that alphabet books have long been considered useful for promoting letter-name and letter-sound knowledge. Alphabet books allow children in the prealphabetic phase of reading (Ehri, 2005) to take on the role of the "reader" using salient visual features such as the pictured object (e.g., saying "hat" by looking at a picture of a hat). Furthermore, children entering the partial alphabetic phase (Ehri, 2005) can also use alphabet books in conjunction with their emerging letter knowledge to decipher words from less salient cues presented alongside the initial letter (e.g., saying "hat" when a dog wearing a hat is pictured). While the research base supporting the usefulness of alphabet books is smaller than those supporting shared book reading (see Bus, van Ijzendoorn, & Pellegrini, 1995; NELP, 2008, Chapter 4; Scarborough & Dobrich, 1994), research studies have found increases in letter knowledge (Greenewald & Kulig, 1995) and phoneme awareness (Murray, Stahl, & Ivey, 1996) when ABC books are read aloud to young children. More recently, researchers have begun to examine which components of alphabet books may be eliciting these literacy gains. For example, reading alphabet books with an emphasis on the initial phonemes, rather than the meaning of words presented, resulted in greater

gains in phoneme awareness (Brabham, Murray, & Bowden, 2006). However, as not all adults are trained in how to read ABC books in this way, it is important to further examine the characteristics of the ABC books themselves which may enhance children's early literacy learning. The current studies will contribute to this growing research area by examining children's preferences for alphabet book designs and the effect of differing these designs on young children's letter name and sound knowledge, phonological awareness, and book behaviours.

Alphabet Books

Alphabet books have been used to teach children early literacy skills for centuries. Hornbooks and primers of the 15th and 17th centuries, respectively, showcased the letters of the alphabet along with rhymes or pictures. While traditionally alphabet books have been seen as a means of showing and teaching the letters of the alphabet to young children, they now serve a variety of other functions as well (see Kiefer, 2010; Norton & Norton, 2011). Using the letters of the alphabet provides a framework for creative authors and illustrators to teach children about complex vocabulary, and academic subjects such as history, science, and math; and to entertain through puzzles, games, and stories. While these books may highlight the letters of the alphabet, such as by a salient font style or colour, the young child must have previous knowledge of the alphabet in order to understand the relevance of the letter to the topic. Thus, they do not intrinsically lend themselves to promoting letter-name and letter-sound knowledge in young children. The focus of this study is not on books such as these but rather on those whose main purpose is to illustrate the connection between the letters and sounds of the alphabet using a word or words and an accompanying illustration with an item or items that begin with that letter.

Children's Responses to Book Types and Designs

'Enjoying books' was rated as the most important goal by parents when reading books with their children in junior kindergarten through to third grade (Audet, Evans, Williamson, & Reynolds, 2008). In contrast, the goals of 'learning to read' followed by 'enjoyment and bonding' were rated as most important when reading ABC books with their children in junior and senior kindergarten (Nowak & Evans, 2013). Therefore, when selecting books to read aloud with young children it is important to consider not only the educational value of the book, but also whether the child will enjoy it. Children's reading interests play a role in encouraging children to read (Krapp, Hidi, & Renninger, 1992). However, how young children select books to read is primarily based on preference in regards to book theme, picture quality, and length based on the appearance of the front cover (Cunningham, 2001).

Early text-selection research suggests that once inside the book younger children prefer illustrations with fewer details (Stewig, 1974), more colours (Amsden, 1960), and cartoon or photographic illustration styles (Ramsey, 1982). More recent research confirms that bright, realistic illustrations are preferable to young readers (Brookshire, Scharff, & Moses, 2002). However, young readers appear to be influenced by more than illustrations in their selection of books to read. When selecting picture books to read independently, young children selected non-fiction, informational texts, and books containing animals more often than fiction, narratives, and books containing all other themes (Mohr, 2006). While the majority of males and females selected non-fiction texts, males did so almost exclusively (96%) and females less so (69%) (Mohr, 2006), suggesting some gender differences in book preferences. Topic and illustrations were of utmost importance to young readers when selecting picture books, and very few reported looking at the words or text difficulty when making their selection (Mohr, 2006).

By examining print-salient and illustration-salient texts, eye-tracking studies have confirmed that children rarely look at print when reading storybooks (Evans & Saint-Aubin, 2005; Evans & Saint-Aubin, 2013; Justice & Lankford, 2002; Justice, Pullen, & Pence, 2008; Justice, Skibbe, Canning, & Lankford, 2005). Print-salient texts are those for which illustration and design features display print in a visually prominent way which could potentially positively influence children's attention to the text (Smolkin, Yaden, Brown, & Hofius, 1992). Print may be made salient by using large or different fonts, changing the colour, or incorporating print into the illustration. However, even when print was displayed in a salient way children fixated on print only 7% of the viewing time (Justice et al., 2005). Children's fixation on print was significantly scarcer when the illustration was the salient feature on the page, only 2.7% of the viewing time (Justice et al., 2005) or approximately 8 seconds of a 5-minute viewing time.

Alphabet books designed for preschoolers are typically more print salient than storybooks as they highlight each letter of the alphabet independently. When being read an alphabet book where the target letter was approximately the same size as the two simple objects shown, preschoolers' fixations increased to 13% for the target letter and 9% for the target word of the overall viewing time (Evans, Saint-Aubin, & Landry, 2009). However, while children paid more attention to print during alphabet book reading, attention to print was still relatively low. Moreover, most ABC books for young children portray the featured letter in a font much smaller than the size of the accompanying illustration (Evans, O'Grady, & Lavoie, 2008)

Parents and teachers can encourage greater attention to print (Justice et al., 2008) and increase print knowledge (Justice, McGinty, Piasta, Kaderavek, & Fan, 2010) by verbally or non-verbally (i.e., pointing or tracking) making reference to print while reading storybooks with their preschool aged children. Similarly, Evans, Williamson, and Pursoo (2008) found that pointing at

the print while reading aloud facilitated attention to the print for three to five year olds, and increased print target recognition amongst four year olds. However, it is not clear exactly what aspect of the print children in these studies looked at. Moreover, while making verbal reference to the print can increase children's attention to print, the frequency with which parents and teachers make these comments spontaneously varies considerably (Lachner, Zevenbergen, & Zevenbergen, 2008; Stadler & McEvoy, 2003). Alphabet books tend to elicit more extratextual comments related to phonological awareness and print concepts than storybooks (Stadler & McEvoy, 2003) and comments are more evident when the child takes on the role of the reader in shared reading of an alphabet book (Davis, Evans, & Reynolds, 2010). However, ABC books often contain violations of phoneme grapheme correspondence such as C paired with chimpanzee or ambiguous pairing such as R paired with bunny rabbit (Evans, O'Grady, & Lavoie, 2008), which can interfere with children's pairing of letter names and sounds. Furthermore, it is difficult for children to isolate initial sounds, and therefore connect these sounds to the corresponding letter, when the word begins with a consonant cluster or when the word is long (Treiman & Weatherston, 1992).

What may be beneficial to young children are alphabet books with particular design features to assist them in pairing letters and phonemes. For example, in their early observations of alphabet book reading, Yaden, Smolkin, and MacGillivray (1993) suggested using more explicit language than the ambiguous "letter is for object" to provide added instructional value. In addition, while instructions or "helpful hints" for parents and teachers about how to read to their children have been included in many ABC books, alphabet books for young children are often fraught with letter sound-word violations, objects with unknown or multiple labels, and

unclear word-object pairs that can be difficult for children to decipher when interacting with these books independently.

ABC Book Interventions

Children need to develop a number of early literacy skills in order to become skilled readers. Following spoken language, one of the first major literacy tasks is for children to become familiar with the alphabetic system, including letter-name correspondence and phonics (letter-sound correspondence). Phonics, along with phonemic awareness, vocabulary, fluency, and reading comprehension, is considered one of the five essential components to becoming a successful reader (National Reading Panel, 2000). As noted above, shared reading is one way to promote these early literacy skills amongst preschool age learners. Five studies conducted in English have examined the role of alphabet books in developing these early literacy skills.

In the first small scale study of alphabet books by Greenwald and Kulig (1995), 21 five year olds were randomly assigned to two groups. Every school day for 17 days, one group listened to approximately ten minutes of alphabet book reading ($n = 10$), while the other group listened to storybook reading ($n = 11$). Even in this small scale study, Greenwald and Kulig (1995) found that children who were read alphabet books made greater gains in letter-name knowledge than those read storybooks. Observationally, they also found that children who were read alphabet books tended to gravitate towards alphabet books more during independent reading time, furthering their exposure to alphabet books and the letters of the alphabet.

In a slightly larger scale study, Murray, Stahl, and Ivey (1996) examined the literacy skills of 42 four and five year olds from three classrooms. Each class was read one of three types of books – alphabet books, letter name books (which feature the letters of the alphabet but

without example words), or storybooks. The number of children who participated in each classroom was not reported. One type of book was randomly assigned to each of the three classrooms. The children were read a book once a day for approximately 10 minutes for 15 consecutive school days. The teachers in all three classrooms were given no direction as to how the book was to be read. All reading groups made significant gains in letter-name knowledge and phoneme awareness from pre-test to post-test, and the groups differed in the amount of phoneme awareness acquired. Namely, children who were read alphabet books gained more phoneme awareness during the study than children who were read letter name books.

As mere exposure to the letters of the alphabet is not sufficient for phonological learning, as seen in the letter name book group of the Murray et al. (1996) study, Brabham, Murray, and Bowden (2006) compared whether reading typical alphabet books while emphasizing meaning or phonemes resulted in gains in early literacy skills. Through random assignment, 12 teachers were trained to read the same alphabet books, either emphasizing the meanings of the words (n students = 80) or the beginning phonemes of the words (n students = 72). Each teacher read one alphabet book a day for 20 consecutive school days to their five and six year old students. As found by Murray et al. (1996), both groups made significant gains in letter-name knowledge. Additionally, children who were read ABC books with phoneme emphasis had greater gains in phoneme awareness than those children who were read to with an emphasis on word meaning.

More recent studies examined how other features in alphabet books affect children's letter learning. Amongst younger children (2.5 - 3 years old), Chiong and DeLoache (2012) found that children learned more letters while being read relatively plain ABC books, rather than those with manipulative features (e.g., flaps, textures that were not associated with the presented letter). These features appeared to distract the children from the letters presented. Furthermore,

pairing the manipulative features with the letter (i.e., presenting the letter in sandpaper) did not enhance children's performance. A study using paper alphabet books and those in digital form with hotspots as manipulatives likewise found no advantage of alphabet e-books for children's alphabetic learning (Willoughby, Evans, & Nowak, 2015). In a third study, older Dutch speaking preschoolers (4 - 5 years old) were randomly assigned to be read an alphabet book or participate in classroom activities as usual once a week for four weeks. The same alphabet book was replicated to have either the first half or the second half of the alphabet illustrated with accompanying anthropomorphic figures and the remaining half of the letters illustrated with objects (Both-de Vries & Bus, 2014). They found that children who read the alphabet books learned more letters (2.86 on average, $n = 30$) than control participants (0.8 on average, $n = 15$) who remained in regular classroom activities. Furthermore, they found that some anthropomorphic and object pictures detracted children's attention from the letter, although the pattern was not clear.

Following their study, Brabham, Murray, and Bowden (2006) called for further experimental studies which examine the potential causal relations found between alphabet books and early learning. The goal of the current two studies was exactly that. Study 1 examined whether children have a preference for simple or complex illustrations and a little or a lot of text presented in alphabet books. If found, children's preferences for illustration complexity and amount of text would be taken into account in the alphabet books selected for the experimental work of Study 2. The second study presented alphabet books with research-based features, alphabet books with conventional features, and storybooks to groups of children to compare their effects on letter-name knowledge, letter-sound knowledge, and phonological awareness. In each

session, one book was read aloud and similar books were provided for independent reading while children's reading behaviour was observed.

Study 1

The goal of Study 1 was to explore what alphabet book features children prefer. Data gathered from this study were to serve as the basis for selecting books for the standard alphabet book condition in Study 2 to ensure that they constitute a sampling of books in which children would be interested. In particular, this study examined whether children have a preference for pages with a little text or a lot of text and complex or simple illustrations. Based on Stewig's (1974) earlier work, it was hypothesized that children would prefer pages with simple pictures. Children have been found to pay little attention to text in their selection of books (Mohr, 2006) and therefore likely spend little time considering the text. It was also hypothesized that children would prefer pages with little text because they may seem more accessible at this emergent reading level. A second purpose of Study 1 was to explore relations between children's alphabetic knowledge (i.e., letter-name and letter-sound knowledge) and their book preferences. Evans, Saint-Aubin, and Landry (2009) observed that four and five year old children who knew more letter names paid more attention to the print in alphabet books than those with less letter knowledge. It was hypothesized that children with more letter knowledge may prefer pages with more text. Alternatively, no relation may be observed given the young age and literacy levels of the children.

Methods

Participants

Consent forms were sent home in the backpacks of approximately 220 junior kindergarten students. Parents were given approximately two weeks to return the signed consent

form to their child's teacher. Fifty-one four- and five-year-olds ($M = 4$ years, 7 months, $SD = 3.7$ months) in junior kindergarten, at seven schools from a Southwestern Ontario public school board participated. An approximately equal number of males ($n = 27$) and females ($n = 24$) participated and the sample included both urban and rural schools. Participants had been in school for five months receiving the play-based Ontario Kindergarten curriculum. While the particular activities conducted in each classroom were unknown, curriculum expectations (Ontario Ministry of Education, 2010) suggested that these children were frequently engaged in literacy activities related to: exploring sounds and rhyme, developing print concepts, cultivating individual interests in reading materials, and recognizing letter symbols and names.

Alphabet Book Samples

Twenty (dual-page) spreads were selected from existing published alphabet books and, if necessary, were altered by changing the text or illustration to provide sample pages contrasting the amount of text appearing on the page (a little versus a lot) and complexity of illustration (simple versus complex), as described in Table 1. All samples were in colour and featured two consecutive letters in the alphabet (e.g., A and B) on left and right-facing pages. All featured letters were distinct from the rest of the text. To control for the size of the pages all selected dual-page spreads were adapted to 8.5"x11" laminated single sheets of paper. All letters of the alphabet were featured once or twice among the selected pages.

Measures

Letter-name task. All 26 uppercase letters were presented in random order, four per page (two on final page).

Table 1

Description of page features

Little Text (4 words or less)	Lot of Text (10 words or more or across 2 lines)
Letter is accompanied by single word starting with target letter; or Page uses the pattern “letter is for” word starting with target letter.	Sentence in which multiple words start with the target letter; or Multiple sentences/lines on the page
Simple Illustration	Complex Illustration
Illustrations are simple and clear. They may contain a depiction of only the target word, only the target word along with the books main character or only the target word with a few other items. The background is simple, blank or a solid colour.	Illustrations are detailed and complex. They may contain a depiction of the target word in a detailed setting or depict multiple items. Other items may or may not start with target letter. The background may be detailed or complex. There may be multiple characters or elaborate scenes.

Letter-sound task. All 26 uppercase letters were presented in a different random order from the letter-name task, four per page (two on final page). All acceptable English sounds for a given letter were considered correct (e.g., hard and soft consonant sounds, long and short vowels sounds). However, in cases where multiple letter sounds may be appropriate and the child provided the long vowel sound (which is the same as the letter name), /dʒ/ for the letter G, or /s/ for the letter C, the child was prompted to say another sound that the letter makes.

Preference rating scale. Each child was shown the alphabet book samples one at a time and asked to rate how much they liked each display. As illustrated in Appendix A, the three rating faces were spread on the floor and the researcher explained that the faces were there to help them decide if each page they were shown was ‘okay’ (while researcher points to a small neutral face), if they ‘like the page’ (while researcher points to a medium size happy face) or if they ‘really like the page’ (while researcher points to a large happy face). These categories were repeated each time a new page was presented and the child was asked to place the page below

the face they agree with. Given the high frequency of ‘really like’ selections during pilot testing, after all 20 pages had been shown, the researcher then spread out all pages which the child selected as ‘really like’ and asked them to pretend that someone was going to buy them some alphabet books, but that they could only pick five (and researcher held up five fingers). The child then selected the five books they would like to have if they could. The researcher counted down on their fingers as necessary. This secondary selection created a fourth category of alphabet book preference, with the limitation that a maximum of 25% of pages could be selected to it. Initially an average of 28.4%, 24.8%, and 46.7% of pages were selected to the ‘okay’, ‘like’ and ‘really like’ categories, with 23.4% from the ‘really like’ category being transferred to the ‘buy’ category in order to create the four point rating scale.

Procedure

Students with permission met one-on-one with a researcher at their school. They were told about the study and asked if they would like to participate. Upon agreement, the child was asked to name the letters presented. Next, the child was shown the twenty alphabet book pages, one at a time, and asked to rate each one on the children’s preference scale described above. Two orders of the pages were used to counterbalance the page stimuli. After all 20 pages had been rated, the child was shown all pages selected as ‘really like’ and asked to select the five that he or she would like to have bought for him or her. Finally, each child was asked what sound each letter makes. The entire interview took about 10-15 minutes per child.

Results

To examine whether the presentation order affected children’s ratings, independent sample t-tests were used to contrast the mean ratings for the same set of pages presented in Order 1 and Order 2. There was no significant difference between the mean ratings of the first half of

Order 1 ($M = 2.43$, $SD = 0.34$) and the second half of Order 2 ($M = 2.45$, $SD = 0.33$), $t(49) = 0.21$, $p = .835$. Likewise, there was no significant difference between the mean ratings of the first half of Order 2 ($M = 2.39$, $SD = 0.41$) and the second half of Order 1 ($M = 2.41$, $SD = 0.34$), $t(49) = 0.21$, $p = .832$. Therefore, both orders were collapsed across the remaining analyses.

Descriptive statistics for children’s preference ratings of each of the 20 page spreads is presented in Table 2. The range of ratings for each page encompassed the entire scale (i.e., 1 – 4). Means were then calculated for each participant for each of the four categories of interest: little text, lot of text, simple pictures, and complex pictures. Paired sample t-tests revealed that children did not differ in their preference for pages with little text ($M = 2.42$, $SD = 0.35$) versus a

Table 2

Descriptive statistics for children’s rating of each of the 20 page spreads presented (n =51). Book descriptors indicate the two target words presented. Scale descriptors: 1 = “Okay”, 2 = “Like”, 3 = “Really like”, 4 = “Would like to have”

Book Descriptions		Mean	SD
Little Text & Simple Illustration	Angel-Bicycle	2.75	1.07
	Clean-Dirty	2.24	1.01
	Lizard-Mouse	2.43	1.14
	Penguins-Queen	2.35	1.00
	Yoyo-Zebra	2.45	1.17
Little Text & Complex Illustration	Alligator-Bear	2.51	1.10
	Moon-Nest	2.53	1.12
	Octopus-Pig	2.12	1.05
	Rainbow-Sailboat	2.45	1.14
	Tractor-Umbrella	2.35	1.20
Lot of Text & Simple Illustration	Cherry-Dinosaur	2.39	1.23
	Golf-Hockey	2.30	1.14
	Jaguar-Kangaroo	2.47	1.17
	Uniform-Vase	2.45	1.06
	Wagon-Xylophone	2.47	1.19
Lot of Text & Complex Illustration	Eagle-Firefly	2.55	1.33
	Grandma-Haircut	2.22	1.03
	Ivy-Jelly	2.20	1.17
	Keep Left-Logging Lot	2.59	1.29
	Vacation-Wagon	2.55	1.14

lot of text ($M = 2.42$, $SD = 0.41$), $t(50) = 0.008$, $p = .993$. Similarly, children did not differ in their preference for pages with simple pictures ($M = 2.43$, $SD = 0.38$) versus complex pictures ($M = 2.41$, $SD = 0.43$), $t(50) = 0.30$, $p = .764$. Overall, the lack of significant contrasts between page formats suggests that, at this age, children's book preferences vary by child and cannot be generalized to text length or picture complexity.

Pearson correlations were calculated to examine whether children's letter and sound knowledge or age (in months) was related to their preference ratings. As presented in Table 3, neither age, letters known ($M = 18.57$, $SD = 8.20$), nor sounds known ($M = 11.94$, $SD = 8.71$), was significantly correlated with preference for any of the page types, suggesting that alphabetic knowledge is not related to children's alphabet book preferences for four and five year olds. The number of letters known by a child was positively correlated with the number of sounds known, $r = .86$, $p < .001$.

Table 3

Pearson correlations for age (in months), letter names known, sounds known, and preference for page types

	Age	Letter Names	Sounds
Age	-----		
Letter Names	- 0.06	-----	
Sounds	0.03	0.86*	-----
Preference for Little Text	- 0.02	- 0.11	- 0.12
Preference for Lot of Text	0.02	0.09	0.06
Preference for Simple Illustrations	0.10	0.20	0.09
Preference for Complex Illustrations	0.00	- 0.18	- 0.12

* $p < .001$

Discussion

Overall, no preference for a little versus a lot of text, nor simple versus complex illustrations was found. Furthermore, children's letter-name and letter-sound knowledge had no

relation to alphabet book page preferences. Spontaneous comments made by the children while providing their ratings suggested that a wide variety of factors (e.g., colour of page, featured objects, concurrent life events or classroom topics) were likely playing a role in their preference ratings. Stewig's (1974) finding that children prefer storybook illustrations with fewer details was not replicated in this study. It is possible that Stewig's findings do not extend to alphabet books or that children's preferences have changed since the 1970s as the variety and printing quality of illustrations has increased.

As topic or theme has also been found to be an important component of children's book selection (Mohr, 2006), it is possible that this aspect of the pages presented overshadowed the text length and illustration complexity. While storybooks often follow a theme or topic, this continuity is not always the case for alphabet books which focus more on presenting an object which begins with each letter. In the small sample of alphabet books used in this study, many of the dual-page spreads did not have adjacent pages with a continuous theme or topic (e.g., Penguins-Queen, Cherry-Dinosaur). This discontinuity of theme was observed more frequently in simply illustrated alphabet books as the numbers of items presented was limited. While this may deter some children from selecting an alphabet book based on the object or objects presented on the cover, it may also allow a wider variety of children to find their preferred topics within the same alphabet book as more topics may be illustrated.

The findings of this study may have been limited by the children's ability to accurately indicate their preference ratings for the pages presented. Face-based rating scales have been used successfully with slightly older children (McMurtry, Noel, Chambers, & McGrath, 2011). Harter and Pike (1984) successfully utilized pictorial scales to measure children's self-perceptions with kindergarten-aged children. However, children's preferences at age four and five are often

completed through observation or forced choice (i.e., “which do you like better, A or B?”). Using these alternate methods, in addition to the visual scale, may have provided further insight into children’s ABC book preferences. Furthermore, future studies utilizing the pictorial rating scale described here with test-retest procedures should be conducted in order to establish the reliability of this method.

As children preferences could not be isolated to a given text length or illustration complexity, it was apparent that Study 2 should provide a variety of alphabet book formats and topics to capture the interest of as many participants as possible.

Study 2

The goal for Study 2 was to evaluate the effect of alphabet book design on children’s letter-name knowledge, letter-sound knowledge, and phonological awareness development through an eight week intervention study having three conditions: recommended features alphabet books (RF), standard features alphabet books (SF), and storybooks (SB). In the RF condition, children were read a variety of alphabet books, including one designed specifically for this study (see Figure 1) exemplifying design features recommended by children’s literature experts (Bradley & Jones, 2007; Kiefer, 2010; Norton & Norton, 2011; Sutherland, 1997) and isolated in previous research (Evans & Saint-Aubin, 2005; Evans, Saint-Aubin, & Landry, 2009) as enhancing attention to print. These features included a large centered feature letter, explicit wording as to letter sound association, and an unambiguous target object that begins with the dominant phoneme associated with that letter. In the SF condition, children were read a selection of commercially available alphabet books that do not have the recommended features of the books in the first condition. Finally, in the SB condition children were read a variety of

storybooks which were similar in length to alphabet books. This condition acted as a control for the time engaged in shared book reading.

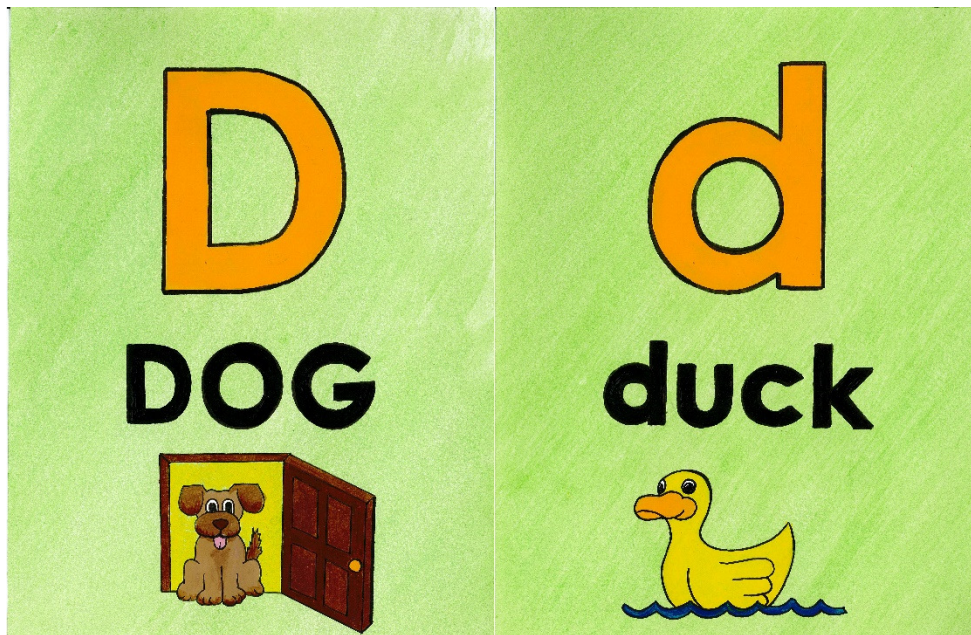


Figure 1. Two page spread from *All of the Letters Make Sounds Too* featuring the letter D.

The primary research question asked whether interacting with alphabet books having two different designs (treatment conditions: RF and SF) compared to storybook controls impacted children's letter-name knowledge, letter-sound knowledge, and phonological awareness. It was hypothesized that children who were exposed to the research based ABC book and other books having a design that approximates these features (RF condition) would gain the most letter-name knowledge, letter-sound knowledge, and phonological awareness over the course of the intervention compared to SF and SB conditions. This increase was anticipated because of the focus that these alphabet books place on letter names and sounds, as well as the lack of superfluous words and images in this format, which may distract the child from the letter-sound focus. Similarly, due to the same focus that alphabet books place on letter names and sounds, it was hypothesized that children in the SF condition would also make gains in letter-name

knowledge, letter-sound knowledge, and phonological awareness. However, given the extraneous text and picture details, the gains would be less than in the RF condition, but greater than in the SB condition. Finally, while it was probable that children in the storybook condition would make gains in letter-name knowledge, letter-sound knowledge, and/or phonological awareness, it was hypothesized that these gains would be attributable to normal development and classroom teaching. Therefore, overall it was hypothesized that the RF and SF conditions would make gains in excess of normal development and classroom teaching, with the children being read the recommended features alphabet books making the greatest gains.

The second goal of Study 2 was to discern how children interact with these three types of books, whether there is a difference in the type or number of literacy-based behaviours between conditions, and if this affects the literacy gains made over the course of the intervention. As reading the RF and SF alphabet books to the children would clearly demonstrate the behaviour of saying the letter name, it was hypothesized that both of these conditions would be observed saying letters more often than children in the SB condition. Similarly, as the RF alphabet books were the only ones to explicitly make the connection between letter names and sounds, it was hypothesized that children in this condition would be observed saying letter sounds more often than children in the other two conditions.

Methods

Participants

Information and consent forms were sent home in the backpacks of approximately 350 junior kindergarten students. Parents were given approximately two weeks to return the signed consent form to their child's teacher. Ninety-four three to four years old ($M = 4$ years, 3 months, $SD = 3.5$ months) junior kindergarten students, 47 girls and 47 boys, participated in Study 2.

Excluded from the study were three students who returned consent forms but were unable or unwilling to assent to participation and one child who completed the pre-assessment and participated in the intervention sessions, but was unavailable to complete post-assessment measures. Participants were recruited from eight schools within a Southwestern Ontario public school board and one privately operated elementary school. Over half, 67% of participants attended a school program that ran on an alternating schedule (e.g., Monday, Wednesday, and every other Friday), 30.9% attended a school program that ran every day, and 2.1% attended on a schedule that was unique to that child. The study was conducted at the beginning of the school year (October to December) to minimize the amount of formal literacy instruction the participants had previously received. Throughout the intervention children were also engaged in regularly scheduled curriculum based literacy activities in their classrooms, as previously described in Study 1.

The level of education completed by parents consisted of 2.1% of mothers and 4.3% of fathers who did not complete high school, 24.5% of mothers and 19.1% of fathers who completed high school, 23.4% of mothers and 27.7% of fathers who completed college, 33.0% of mothers and 28.7% of fathers who completed an undergraduate degree from a university, and 15.9% of mothers and 17% of fathers who completed a postgraduate degree. These education levels are consistent with other literacy research conducted in the region (Nowak & Evans, 2013) and local census data. Responses to the questions about education level were not provided for 1.1% of mothers and 3.3% of fathers. The majority of families, 77.7%, reported speaking only English within the home, 10.6% reported speaking English and another language (Bengali, Chinese, Dutch, Gujarati, Punjabi, Urdu, or Vietnamese), and 11.7% reported only speaking a non-English language (Arabic, Cantonese, Gujarati, Punjabi, Serbian, Urdu, Uzbek, or

Vietnamese) in the home. The number of participants who reported speaking English with another language or only another language at home was greater in the RF condition, $n = 12$, than in the SF, $n = 6$, or SB condition, $n = 3$; however, it only approached statistical significance, $\chi^2(2) = 5.56, p = .062$. Neighbourhood median income was determined for each child based on their postal code, where available ($n = 79, M = \$66,877, SD = \$12,778$, ranging from \$41,280 to \$84,982). Maternal ($F(2, 91) = .16, p = .85$) and paternal education ($F(2, 76) = 2.81, p = .07$), and neighbourhood median income ($F(2, 76) = .04, p = .96$) did not differ significantly between conditions.

The majority of families reported that their child engaged with books every day and alphabet books weekly. More specific home literacy behaviour is detailed in Table 4.

Table 4

Percentage of families who reported days per month that participant engages with books

	Never	1-2	3-5	6-10	11-20	21-30	Everyday
All books	0.0	2.1	8.5	7.4	13.8	11.7	56.4
Alphabet books	3.2	17.0	27.7	30.9	13.8	7.4	0.0

Measures

Demographic information. Demographic information about the child and family including child's age, sex, postal code, language spoken in the home, and maternal and paternal education levels and home literacy behaviour were collected on the consent form.

Receptive One-Word Picture Vocabulary Test (ROWPVT; Brownell, 2000). The ROWPVT is a standardized, norm-referenced measure of receptive vocabulary ($\alpha = .96$, test-retest reliability of 0.93). In this task the child was asked to point to the pictorial representation

of the orally presented word from an array of four pictures. Age-appropriate starting points, and standardized basal and ceiling rules were applied. Standard scores were used in analyses.

Letter-name tasks. Participants were first asked to name all 26 uppercase letters (pre-test, $\alpha = .96$, post-test, $\alpha = .95$) and later all 26 lowercase letters (pre-test, $\alpha = .96$, post-test, $\alpha = .95$). One point was awarded for each letter correctly named. Letters were presented in random order, four per page (two on final page). Uppercase and lowercase letter-name knowledge scores were strongly correlated (pre-test, $r = .96$, $p < .001$, post-test, $r = .96$, $p < .001$). However, at pre-test 20 children were approaching ceiling on the uppercase letter-name task, whereas only 5 were approaching ceiling on the lowercase letter-name task. Therefore, the measures remained separate for analyses.

Letter-sound task. To determine letter-sound knowledge each child was asked to say the sound that each letter makes. All 26 uppercase letters were presented in a different random order from the letter names, four per page (two on final page) and the child was awarded one point for each correct sound (pre-test and post-test, $\alpha = .96$) for a maximum score of 26. In cases where multiple letter sounds may be appropriate, the following sounds were deemed correct: short vowel sounds for all five vowels, hard sounds for the letter G and C. If the child made the soft consonant sound (e.g., /s/ for C or /dʒ/ for G) or the long vowel sound (e.g., /ā/ rather than /ã/ for A) the child was asked “What other sound does that letter make?” Both /ks/ and /eks/ for the letter X were deemed correct.

Test of Phonological Awareness –Kindergarten (TOPA-K; Torgesen & Bryant, 1994). The TOPA-K is a standardized, norm-referenced assessment of young children’s phonological awareness of beginning sounds. Since alphabet books focus primarily on the beginning letters and sounds of the objects presented, these skills are the most likely to be needed during alphabet

book reading. Two subtests in the TOPA-K, Initial Sound-Same and Initial Sound-Different, which each contained three practice items and ten assessment items, were administered. In the subtest Initial Sound-Same the child was orally presented with a target word and three word options accompanied by corresponding pictures and asked which one began with the same initial sound. During the administration of Initial Sound-Different the child was orally presented with four words accompanied by corresponding pictures and asked which one began with a different initial sound. All ten assessment items and three sample items on both subtests were administered to all participants.

Normative scores were not available for children under five; therefore, raw scores were used in all analyses. While other measures of phonological awareness with norms in our age group were available, there were no other measures with two tasks of initial sound awareness (both same and different), the most crucial aspect of phonological awareness in relation to ABC books. The test-retest reliability for the TOPA-K is .94 (for five and six-year-olds) with an alpha of .90 (for five-year-olds). With our younger sample of children, internal consistency was lower for both the Initial Sound-Same (pre-test, $\alpha = .60$, post-test, $\alpha = .76$) and Initial Sound-Different (pre-test, $\alpha = .21$, post-test, $\alpha = .54$) subtests. Due to the poor internal consistency of the Initial Sound-Different task and the observed difficulty children had in understanding this task, it was dropped from all analyses.

Word reading task. A word reading task which encompasses six commonly observed animal names and six simple words was created to evaluate the children's early reading ability. The purpose of this task was to document that this was a non-reading sample. Animal words were chosen because of their high frequency in the alphabet books and storybooks used in this study. The six animal words (cat, dog, duck, pig, rabbit, whale) were selected because they all

appear at least twice in each condition. The six simple words (is, you, and, up, stop, come) were selected from the first seven words (one of the top six is the word cat) of the word identification subtest of the Woodcock Reading Mastery Tests, Third Edition (WRMT-III; Woodcock, 2011). The animal and simple words were alternated and shown in a list to the child. The child was asked to read the words as the examiner pointed to each word. One point was awarded for each word read correctly.

Materials

For a description of the script used during each condition's read aloud, see Appendix B. For a bibliography of all books used in the study please see Appendix C.

Alphabet books with recommended features. The main book read in this condition, *All of the Letters Make Sounds Too*, was created for this study to exemplify design features recommended by children's literature experts (Bradley & Jones, 2007; Kiefer, 2010; Norton & Norton, 2011; Sutherland, 1997) and isolated in previous research (Evans & Saint-Aubin, 2005; Evans, Saint-Aubin, & Landry, 2009) as enhancing attention to print. Each letter of the alphabet had a dual-page spread. As previously shown in Figure 1, the uppercase letter was presented in large font in the upper middle of the left page. Below the letter in medium sized font was the word that corresponded to the presented picture in all uppercase letters. Finally, below the word there was a colour picture of the object that started with the represented letter. On the corresponding right side of the page, the same set-up appeared with the lowercase letter and a different object and word that corresponded with the letter presented in all lowercase letters. On one of the pages for each letter, a second object that also began with the featured letter, but was not written on the page, was pictured with the named object (e.g., door in Figure 1). The background of each page was in a bright colour. Words which began with blends, digraphs, or

letter-sound word violations (e.g., o for one, e for eye, s for ship or slip were not used). Words presented were selected from high frequency vocabulary that the children were likely to know. To make the association between letter-name and letter-sound more explicit, as was suggested by Yaden, Smolkin, and MacGillivray (1993), *All of the Letters Make Sounds Too* was read by stating the letter name and sound before the object name.

Ten other commercially available ABC books which exemplified the recommended features as much as possible were also used in this condition. These books were all simply illustrated with little text. However, due to the low frequency of this format of ABC books on the market, some vocabulary was more complex and less familiar to the children, and there was inevitably some instances of blends, digraphs, and letter-sound word violations. As no other commercially available alphabet book without these problematic features could be found, *All of the Letters Make Sounds Too* was read aloud more frequently (i.e., twice during the initial week, and four other times thereafter) to increase the children's exposure to the simplest letter-sound pairings. Five of these commercially available books were read aloud over the course of the intervention and the other five were included as novel books introduced during the independent reading time. The text was read as printed in the book. However, in instances where the initial sound of the object differed from the sound presented in *All of the Letters Make Sounds too*, (i.e., a letter-sound word violation, a long vowel, or soft consonant), the reader added a sentence which reminded the students of the other sound that the letter makes (as described in Appendix B). Finally, once per letter the reader paused before stating the name of the object in the text to allow the children to participate if they chose to do so.

Alphabet books with standard features. As Study 1 found that children's preferences for ABC books were highly variable and individual, twelve alphabet books which were used in

Study 1 that did not exemplify the recommended features were chosen for the SF condition. Eight of these books were read aloud over the course of the intervention and four were introduced as novel books during independent reading time. These books did not mirror the features of books in the recommended features condition and contained both simple and complex vocabulary and target objects whose names began with blends, digraphs, or letter-sound word violations, as is common in commercially published alphabet books. The text was read exactly as the print indicated. To allow the children to participate if they wished, once per letter the reader paused before stating the name of an object.

Storybooks. A selection of twelve commercially available children's storybooks was chosen. Eight were read aloud over the course of the intervention and four were introduced as novel books during independent reading time. Books varied in the amount of text on each page and the complexity of the pictures. They were similar in length to the ABC book conditions (approximately 1.5 to 3 minutes read aloud time) and similarly allowed for some sort of child participation (e.g., repeating phrase, guessing the object described). The text was read exactly as printed. As in the other conditions the reader paused once per page or when appropriate to allow for child participation.

Procedure

Students with permission met one-on-one with a researcher at the school. They were told about the study and asked if they would like to participate. Each child participated one-on-one with a trained research assistant in seven pre-testing activities (ROWPVT, uppercase letter-name, TOPA-K Initial Sound-Same, lowercase letter-name, TOPA-K Initial Sound-Different, uppercase letter-sound, and word reading) in a single session lasting for approximately 20 minutes.

Based on their combined pre-testing score of uppercase letter-name and uppercase letter-sound (maximum score out of 52), the students were classified into high (more than 26 correct) and low (26 or less correct) sets, then randomly assigned within classrooms to a group of 3-4 children. The mean combined score was then calculated for each group and assigned to a low, medium or high tercile. Finally, within each tercile, groups were randomly assigned to one of the three conditions. This stratified random sampling was done to reduce the possibility of pre-test differences between the conditions. In some cases there were only three or four students participating in a classroom, therefore they were automatically assigned to the same group.

The reading conditions were implemented in small groups of three to four children twice a week over eight weeks (approximately 20 minutes per session). Each session began with an alphabet related rhyme for both ABC book conditions, and a reading related rhyme for the SB condition (see Appendix B). In each session a target book (see Appendix D for book schedule) was read aloud to the students. All read-aloud books were read twice over the course of the study. The exception to this schedule is the RF ABC book created for this study, *All of the Letters Make Sounds Too*, which was read six times over the course of the intervention. All text was read as printed, with the exception of *All of the Letters Make Sounds Too* which was read according to the script described in Appendix B. The other ABC books with recommended features were read as written; however, when the letter-sound word pairing was not the same as the one taught by our book, such as violations of letter-sound pairing, a secondary sentence which reminded the children of the main sound made by that letter was added. For example, if the text stated “C is for cheetah”, the reader also said “remember, C also says /k/ in cat”. This added sentence was to expose the children to the letter-sound pairings from the created book even when other sounds were occasionally presented in the other alphabet books with

recommended features. Books in all conditions were selected and read in a standard fashion so that children could participate if they wished; however, participation was not directly prompted. For example, participation was possible in storybooks with a repetitive rhyme or phrase and in ABC books where the children could call out the letters or pictures illustrated. Readers paused at the appropriate times to allow children to respond if they desired. After the read aloud was over (approximately five minutes) the reader rated each child's level on engagement during the read aloud portion of the session as, "all/most of the time", "much of the time", "not much of the time", or "not at all". Notably, the level of "not at all" was never indicated by the reader and therefore is dropped from further discussion.

Following the read aloud, the target book for that session, as well as six others were given to the children to explore for the remainder of the 20 minute session. Appendix D describes the schedule by which the books were presented. Children were allowed to select from all the books presented and to look at them individually or with other students in the group. The research assistant did not read to the children during this time. At the end of each session the children were invited to place two small stickers, a letter and a picture, in their study participation booklet. Children took these booklets home after their final session.

During the independent reading time the children were observed by a research assistant who coded what each child was doing (see Appendix E for coding categories and Appendix F for coding descriptions). A child was observed for five seconds, the observations were recorded, and then the next child was observed. Each child in the group was observed up to 20 times over the course of each independent reading session. In order to compute inter-observer reliability, one session per group (approximately 6% of all sessions) was also coded by a second observer. The

second observer also answered six questions regarding the reader's behaviour during the read aloud portion of the session in order to evaluate treatment fidelity.

Following the eight week intervention, the children participated in seven post-testing activities which were the same as the activities completed during pre-testing.

Results

Intervention Fidelity and Inter-rater Reliability

Ratings by the second observer during 6% of all sessions confirmed that the research assistants followed the reading protocols. Readers were reported to have started each session with the rhyme, said the name of the book and shown the front cover, read the text as printed or as described earlier, read in an engaging manner but without added emphasis, not provided any additional teaching of letter names or sounds, and to have kept the book pages visible to the children at all times in 100% of the observed sessions. During the read aloud of the RF books, readers also said the reminder phrases in 100% of the observed sessions.

Inter-rater reliability was calculated using all second-rater observations, which spanned all three conditions, 86 participants, and 1147 observation points. Agreement for the children's level of engagement during the read aloud was calculated by correlating the two observers' ratings, as the engagement scale is a measure of increasing value. The level of agreement was found to be low, $r = .50$, $p < .001$. Notably, when disagreement occurred, it was always between "all/most" and "much of the time" suggesting that the difference between these two levels of engagement was likely minimal. Furthermore, observer ratings indicated that participants were engaged with the read aloud "all/most" or "much of the time" in 98% of cases, suggesting that participant engagement was strong regardless of categorical rating. Given the homogeneity of the engagement ratings, they are not considered in further analyses.

Cohen's Kappa for the two observers was calculated for children's orientation and behaviour. Inter-rater reliability of children's orientation to the book during independent reading time, was found to be outstanding, $K = .81, p < .001$. Agreement between observations of children's behaviour were also found to be substantial, $K = .74, p < .001$. Landis and Koch's (1977) guidelines suggest satisfactory agreement in both areas.

Data Diagnostics

Pre- and post-test scores were examined for the presence of outliers, data points above or below three standard deviations from the mean. No outliers were found. Skewness and kurtosis values are presented in Table 5. Pre and post-test scores for phonological awareness were normally distributed. Upper and lowercase letter-name scores at pre and post-test were platykurtic, suggesting variability amongst scores, and were somewhat bimodal, suggesting there were two groups of children, those who knew relatively few letter names, and those who knew the majority of letter names. Given the large percentage of children who knew none or very few letter sounds at pre-test, letter sound knowledge was leptokurtic. As some children gained this

Table 5

Skewness and kurtosis values for pre- and post-test assessment scores

		Skewness (SE)	Kurtosis (SE)
Uppercase letter names			
	Pre	0.51 (0.26)	- 1.29 (0.52)
	Post	- 0.29 (0.26)	- 1.43 (0.52)
Lowercase letter names			
	Pre	0.51 (0.25)	- 1.28 (0.50)
	Post	- 0.15 (0.25)	- 1.60 (0.50)
Letter sounds			
	Pre	1.60 (0.25)	1.37 (0.50)
	Post	0.54 (0.25)	- 1.26 (0.50)
Phonological awareness			
	Pre	1.05 (0.25)	1.40 (0.50)
	Post	0.76 (0.25)	- 0.59 (0.50)

knowledge over the course of the study, post-test letter sound scores became platykurtic, suggesting greater variability. To account for the non-normal nature of this data, parametric, nonparametric, and robust statistics are presented where appropriate.

At pre-test, mean scores for participants in the three conditions did not differ significantly in terms of gender, age, maternal or paternal education, reported frequency of book or alphabet book reading, mean neighbourhood family income, receptive vocabulary, letter-name knowledge, letter-sound knowledge, phonological awareness, or word reading ability but approached significance for home language.

The sample consisted of non-readers, as only nine children correctly read any (range: 1-11) of the 12 words presented during the pre-test word reading task, with four of these children reading only one word correctly. Furthermore, these nine children were removed from many of the literacy skill analyses for achieving ceiling scores at pre-intervention, as described below.

Early Literacy Skill Development

Children's knowledge of uppercase and lowercase letter names, uppercase letter sounds, and phonological awareness was assessed prior to and following the 16 session intervention. Participants who had reached ceiling at pre-test were removed from the analysis of that specific skill as there was not room for growth. The number of participants removed included 10 children for uppercase letter names, 1 child for lowercase letter names and letter sounds, and 3 children for phonological awareness. Between-subject effects of condition (RF, SF, SB) and within-subject effects of time (pre, post) were examined using split-plot ANOVAs. Descriptive statistics are found in Table 6. On all measures Levene's test revealed that the assumption of homogeneity of variance was supported.

Table 6

Descriptive statistics for early literacy skill development

Task (min. and max. scores)	Condition	Pre-test <i>M(SD)</i>	Post-test <i>M(SD)</i>	Change
Uppercase letter names (0-26)	RF (<i>n</i> = 32)	9.63 (9.59)	14.91 (9.03)	5.28
	SF (<i>n</i> = 25)	11.08 (8.32)	17.16 (8.43)	6.08
	SB (<i>n</i> = 27)	9.19 (8.61)	13.52 (8.86)	4.33
Lowercase letter names (0-26)	RF (<i>n</i> = 35)	9.26 (8.86)	14.11 (8.52)	4.86
	SF (<i>n</i> = 28)	9.79 (8.16)	15.14 (7.83)	5.36
	SB (<i>n</i> = 30)	9.17 (7.98)	12.60 (8.33)	3.43
Letter sounds (0-26)	RF (<i>n</i> = 34)	4.06 (6.60)	8.94 (8.90)	4.88
	SF (<i>n</i> = 29)	5.45 (7.17)	10.48 (9.26)	5.03
	SB (<i>n</i> = 30)	4.53 (6.44)	8.17 (8.32)	3.64
Phonological Awareness – Same Initial Sound (0-10)	RF (<i>n</i> = 34)	3.56 (1.96)	5.06 (2.63)	1.50
	SF (<i>n</i> = 28)	4.00 (2.29)	4.46 (2.85)	0.46
	SB (<i>n</i> = 29)	3.52 (1.60)	4.55 (2.28)	1.03

These analyses revealed no significant condition by time interaction effects on measures of uppercase letter-name knowledge, $n = 84$, $F(2, 81) = 0.81$, $p = .451$, $\eta_p^2 = .02$, 95% CI [0, .10], lowercase letter-name knowledge, $n = 93$, $F(2, 90) = 1.38$, $p = .258$, $\eta_p^2 = .03$, 95% CI [0, .11], letter-sound knowledge, $n = 93$, $F(2, 90) = 0.59$, $p = .559$, $\eta_p^2 = .01$, 95% CI [0, .07], nor phonological awareness, $n = 91$, $F(2, 88) = 1.74$, $p = .181$, $\eta_p^2 = .04$, 95% CI [0, .13]. Therefore only main effects are discussed below.

As seen in Figure 2, all groups increased in their uppercase letter-name knowledge, $F(1, 81) = 91.93, p < .001, \eta_p^2 = .50, 95\% \text{ CI } [.28, .90]$, lowercase letter-name knowledge, $F(1, 90) = 89.16, p < .001, \eta_p^2 = .53, 95\% \text{ CI } [.34, .60]$, letter-sound knowledge, $F(1, 90) = 61.91, p < .001, \eta_p^2 = .41, 95\% \text{ CI } [.25, .53]$, and phonological awareness, $F(1, 88) = 19.08, p < .001, \eta_p^2 = .18, 95\% \text{ CI } [.06, .31]$, from pre- to post-test resulting in a main effect of time on all measures of early literacy. This resulted in children learning an average of five additional uppercase letter names (5 in RF, 6 in SF, and 4 in SB), five lowercase letter names (5 in RF and SF, 3 in SB), and five additional letter sounds (5 in RF and SF, 4 in SB) - double their initial letter-sound knowledge - over the course of the study. For phonological awareness, on average children were able to identify one more initial same sound (1.5 in RF, 0.5 in SF, and 1 in SB) than previously for an average of 4.7 correct out of 10. This increase also indicates that overall children were beginning to acquire this skill as they were no longer answering correctly only at chance level (3-4/10).

No significant effect of condition was found for uppercase letter names, $F(2, 81) = 0.71, p = .494, \eta_p^2 = .02, 95\% \text{ CI } [0, .09]$, lowercase letter names, $F(2, 90) = 0.28, p = .754, \eta_p^2 = .01, 95\% \text{ CI } [0, .05]$, letter sounds, $F(2, 90) = 0.44, p = .646, \eta_p^2 = .01, 95\% \text{ CI } [0, .07]$, nor phonological awareness of initial sounds, $F(2, 88) = 0.15, p = .86, \eta_p^2 = .003, 95\% \text{ CI } [0, .04]$, suggesting that exposure to alphabet books twice weekly for eight weeks does not affect the amount of literacy knowledge gained any more than traditional storybooks.

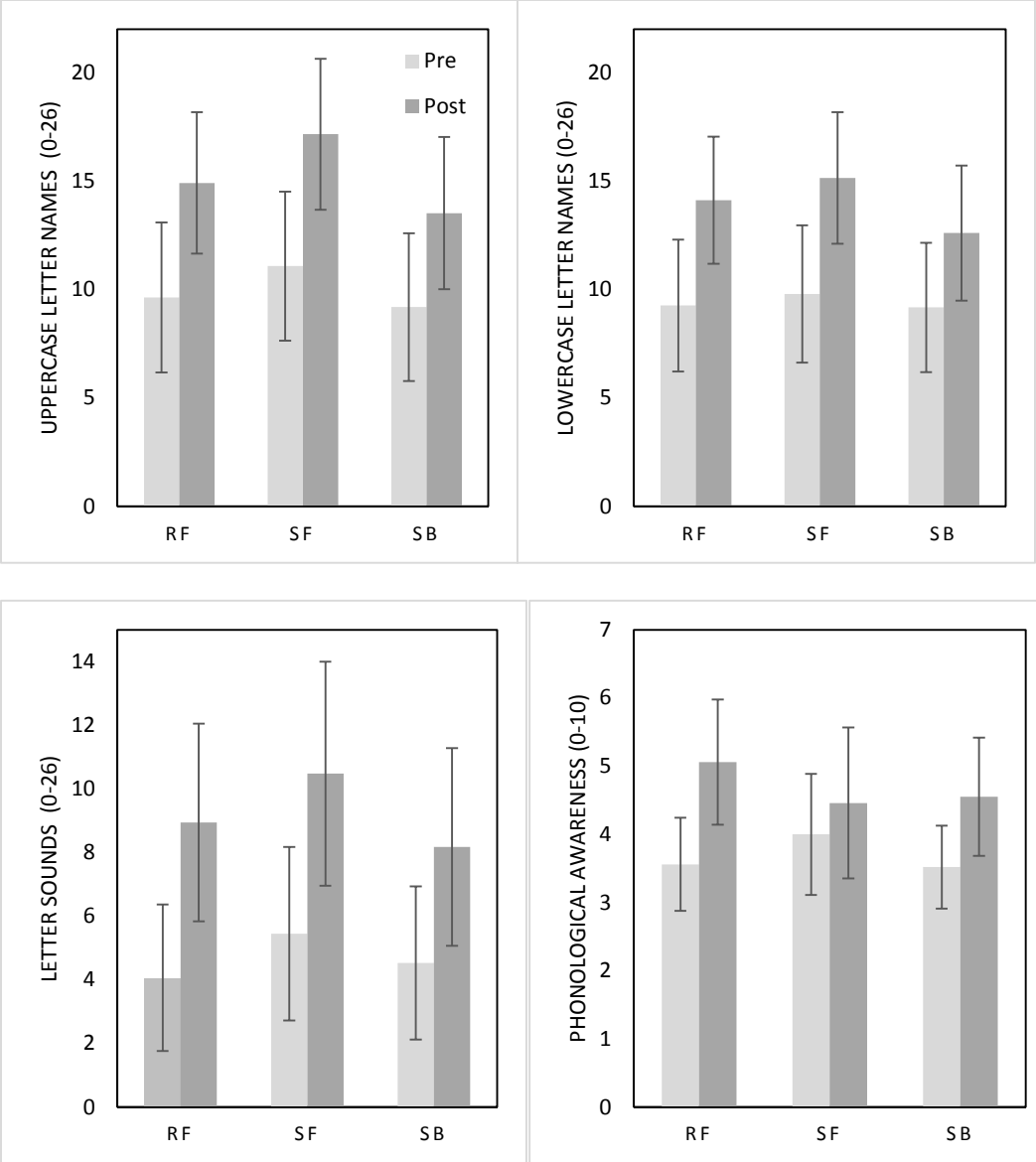


Figure 2. Average number of correct uppercase and lowercase letter names, letter sounds, and initial same sounds in each condition with 95% confidence intervals.

As the number of children who spoke another language at home was greater in the RF condition than in the other conditions, a series of one-way ANOVAs were conducted to evaluate whether children who spoke only another language, or English and another language differed from children who only spoke English within their homes. As seen in Table 7, children in these three groups did not differ significantly in their pre- or post-intervention scores of upper or

lowercase letter names, letter sounds, or phonological awareness. This suggests that home language did not significantly impact literacy skill development and it was not considered further.

Table 7

Descriptives and One-Way ANOVAs for comparison of language groups on all literacy measures

Literacy Variable		Language Group	Descriptives (<i>n</i> = 94)		One-Way ANOVA (<i>df</i> = 2, 91)					
			<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	η_p^2			
Uppercase letter names	Pre-test	English (<i>n</i> = 64)	10.33	8.97	0.31	.732	.01			
		English and other (<i>n</i> = 9)	9.11	8.46						
		Other only (<i>n</i> = 11)	8.18	8.88						
	Post-test	English (<i>n</i> = 64)	15.34	9.05				0.70	.500	.02
		English and other (<i>n</i> = 9)	16.89	5.99						
		Other only (<i>n</i> = 11)	12.45	9.45						
Lowercase letter names	Pre-test	English (<i>n</i> = 72)	9.76	8.29	0.83	.439	.02			
		English and other (<i>n</i> = 10)	10.00	9.13						
		Other only (<i>n</i> = 11)	6.36	7.65						
	Post-test	English (<i>n</i> = 72)	14.28	8.35				0.56	.572	.01
		English and other (<i>n</i> = 10)	14.20	6.68						
		Other only (<i>n</i> = 11)	11.45	8.98						
Letter sounds	Pre-test	English (<i>n</i> = 72)	5.10	6.83	1.52	.224	.03			
		English and other (<i>n</i> = 10)	5.00	8.22						
		Other only (<i>n</i> = 11)	1.36	2.23						
	Post-test	English (<i>n</i> = 72)	9.67	8.81				1.58	.211	.03
		English and other (<i>n</i> = 10)	10.40	9.43						
		Other only (<i>n</i> = 11)	4.82	7.40						
Phonological Awareness	Pre-test	English (<i>n</i> = 70)	3.81	1.82	2.21	.116	.05			
		English and other (<i>n</i> = 10)	4.00	2.82						
		Other only (<i>n</i> = 11)	2.55	1.64						
	Post-test	English (<i>n</i> = 70)	4.93	2.62				2.89	.061	.06
		English and other (<i>n</i> = 10)	5.10	2.85						
		Other only (<i>n</i> = 11)	3.00	1.27						

Observed Literacy-Based Behaviours

Up to 20 observations (*M* = 15.5, *SD* = 3.3) were recorded for all 94 children present during each of the 16 sessions. The distributions of alphabetic behaviours were negatively

skewed due to the low frequency (and therefore low proportion of observations) of these behaviours.

Book Behaviours by Group

The proportion of observations each child spent oriented to the book and engaged in each of the literacy-related book behaviours (i.e., saying letter name, saying letter sound, saying object name, and pointing to the letter) was calculated for each child in each of the sessions they attended. The proportion of observations each child spent engaged in *any* of the literacy-related behaviours was also calculated. To address whether the three conditions differed in the proportion of time spent oriented to the book or engaged in book behaviours over the course of the study, the mean and standard deviation of the 16 session proportions was calculated for each child. A summary of this descriptive information for each of the three conditions is presented in Table 8.

Due to the non-normal distributions, differences between conditions were analyzed and reported using two methods; a series of one-way ANOVAs, which have been found to be robust to violations of normality with sample sizes greater than 15 (Boneau, 1960), and non-parametric Kruskal-Wallis tests. Results from both methods are comparable. Observations of children's orientation had an approximately normal distribution. For consistency, the results of these observations have been analyzed and reported using the same parametric and non-parametric tests. As the assumption of homogeneity of variances was violated for the book behaviours (not orientation), the significance from Welch's Test is reported with the ANOVA results. ANOVA and Kruskal-Wallis results are presented side by side in Table 8 and condition differences illustrated in Figure 3.

Table 8

Descriptives, non-parametric Kruskal-Wallis tests and One-Way ANOVAs for average proportion of observations spent oriented to the book and engaged in book behaviours during independent reading

		Descriptives (<i>n</i> = 94)			Kruskal-Wallis Test (<i>df</i> = 2)		One-Way ANOVA (<i>df</i> = 2, 91)		
		Median	<i>M</i>	<i>SD</i>	<i>H</i>	<i>p</i>	<i>F</i>	<i>p</i> *	η_p^2 [95% CI]
Oriented to book	RF (<i>n</i> = 35)	.739	.722	.164	0.26	.878	0.04	.964	.001 [0, .007]
	SF (<i>n</i> = 29)	.724	.727	.139					
	SB (<i>n</i> = 30)	.734	.717	.131					
Said letter name	RF	.096	.205	.208	58.15	<.001	15.54	<.001	.26 [.10, .38]
	SF	.129	.147	.144					
	SB	.000	.001	.003					
Said letter sound	RF	.000	.013	.028	4.95	.084	2.54	.055	.05 [0, .15]
	SF	.000	.007	.010					
	SB	.000	.003	.007					
Said object name	RF	.179	.230	.169	26.34	<.001	15.23	<.001	.25 [.10, .37]
	SF	.113	.119	.123					
	SB	.055	.060	.049					
Pointed to letter	RF	.019	.026	.027	26.77	<.001	7.19	<.001	.14 [.02, .25]
	SF	.015	.029	.037					
	SB	.000	.005	.010					
Any letter behaviour	RF	.249	.315	.206	35.14	<.001	20.70	<.001	.31 [.15, .43]
	SF	.217	.223	.151					
	SB	.057	.068	.058					

* Welch's Test significance reported for book behaviours (not orientation) due to heterogeneous variances

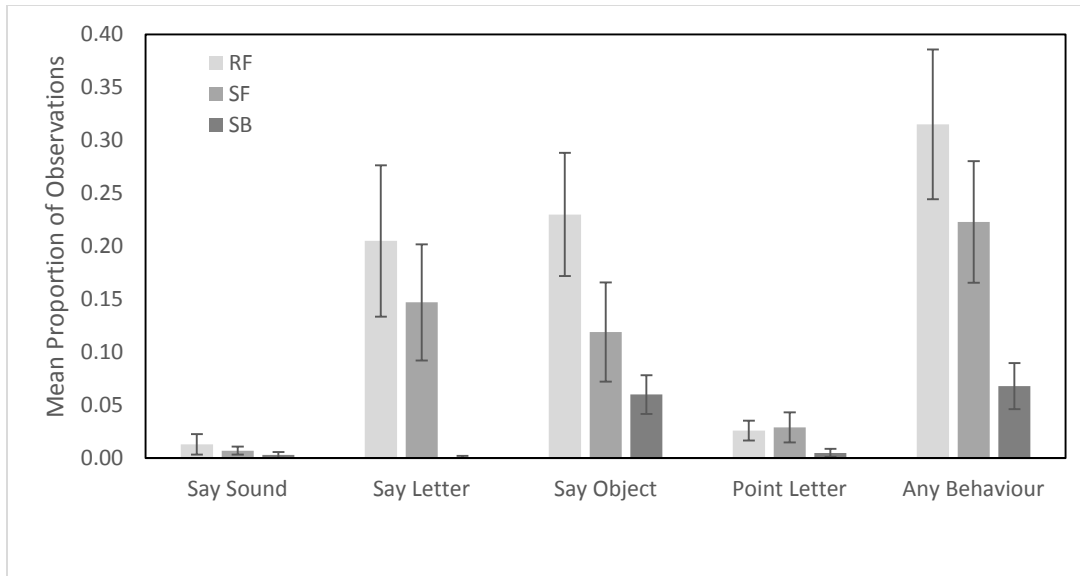


Figure 3. Mean proportion of observations where letter behaviour occurred for each condition with 95% confidence intervals.

Intervention conditions did not differ in the proportion of observations children spent oriented to the book, $F(2, 93) = 0.04, p = .964, \eta_p^2 = .001, 95\% \text{ CI } [0, .007]$, with all three conditions spending approximately 72% of the observations oriented to the independent reading book. Similarly, no significant differences were seen between conditions in the amount they said the letter sound, $F(2, 93) = 2.54, p = .055, \eta_p^2 = .053, 95\% \text{ CI } [0, .15]$, and this behaviour was seen very infrequently across all three conditions.

Significant differences, $p < .001$, were found between book conditions across all other book behaviours. To account for multiple comparisons, a Bonferroni correction of $.05/3$ was applied. Games-Howell post-hoc tests revealed that on average children in both alphabet book conditions said letter names more than children in the storybook condition, $p < .001$, Cohen's $d = 1.39, 95\% \text{ CI } [.84, 1.94]$ and Cohen's $d = 1.43, 95\% \text{ CI } [.84, 2.02]$ for RF and SF conditions respectively, but did not differ significantly from one another, $p = .392, \text{Cohen's } d = .32, 95\% \text{ CI}$

[0, .83]. Along with saying object name, saying letter name was observed most frequently, in 15-21% of observations for alphabet books, but only 0.1% of observations for storybooks.

The proportion of observations where children said the object name differed significantly across conditions, $F(2, 91) = 15.23$ $p < .001$, $\eta_p^2 = .25$, 95% CI [.10, .37]. Games-Howell post-hoc tests revealed that on average children in the RF condition said object names more --23% of observations--, than children in the SF --12% of observations--, $p = .01$, Cohen's $d = .75$, 95% CI [.23, .52], and SB --6% of observations--, $p < .001$, Cohen's $d = 1.37$, 95% CI [.82, 1.92], conditions. SF and SB conditions did not differ significantly from one another statistically, $p = .053$, Cohen's $d = .63$, 95% CI [.10, 1.17]

As with saying the letter, groups differed in the proportion of observations in which they pointed to a letter, $F(2, 91) = 7.19$ $p < .001$, $\eta_p^2 = .14$, 95% CI [.02, .25]. While behaviour was observed at a much lower frequency than saying the letter, about 3% of observations in alphabet books and less than 1% in storybooks, Games-Howell post-hoc tests revealed that on average children in the alphabet book conditions pointed at letters more, $p < .001$, Cohen's $d = 1.03$, 95% CI [.50, 1.56] for RF, and $p = .005$, Cohen's $d = .89$, 95% CI [.34, 1.43] for SF, but did not differ significantly from one another, $p = .928$, Cohen's $d = .09$, 95% CI [0, .59].

Finally, to account for alphabetic behaviour overall, the proportions of observations where any alphabetic behaviour was observed were compared. More than one behaviour could be recorded during the same observation interval. Therefore, proportions formed by collapsing across the four categories would result in a greater proportion than that for any single alphabetic behavior. There were significant differences in overall alphabetic behaviours between conditions, $F(2, 91) = 20.70$, $p < .001$. $\eta_p^2 = .31$, 95% CI [.15, .43]. Games-Howell post-hoc tests revealed that on average children in the alphabet book conditions engaged in any alphabetic behaviour

more than children in the storybook condition, $p < .001$, Cohen's $d = 1.63$, 95% CI [1.05, 2.20] and Cohen's $d = 1.35$, 95% CI [.77, 1.93] for RF and SF conditions respectively, but did not differ significantly from one another, $p = .107$, Cohen's $d = .51$, 95% C.I. [.002, 1.02].

Overall, alphabet books elicited more alphabetic behaviours than storybooks, despite children in the three conditions spending the same proportion of time oriented to their independent reading books. Of particular interest, recommended feature alphabet books, which have fewer but more salient pictured items and letters were found to elicit saying object names more than the other types of books. This particular behaviour allows young children who may not know their letter names to practice the letter sounds as the beginning of the word often requires the child to make the sound without having to identify the sound or letter individually. Saying and pointing to the letter was also found to be more frequent in alphabet books than in storybooks.

Book Behaviours over Time

Linear changes in book behaviours and orientation as observed over the 16 sessions for each condition were analyzed using Spearman's rank-order correlations as session was measured on an ordinal scale. As seen in Table 9, significant, albeit small, changes were seen over the course of the intervention for one or more conditions in regards to child orientation during independent reading time and all book behaviours except saying the letter name.

Children in both RF and SF alphabet book conditions significantly increased the proportion of observations in which they were oriented to the book, $r_s = .126$ and $.200$ respectively. Using Fischer's Z transformation to compare correlations, these groups did not significantly differ from one another, $Z = 1.16$, $p = .246$.

Table 9

Correlations of orientation and book behaviours over the 16 sessions

Book Behaviour	RF (<i>n</i> = 499)		SF (<i>n</i> = 435)		SB (<i>n</i> = 451)	
	<i>Rho</i>	<i>p</i>	<i>Rho</i>	<i>p</i>	<i>Rho</i>	<i>p</i>
Orient to book	.126*	.005	.200*	<.001	.088	.062
Say letter	.071	.112	-.004	.935	.071	.132
Say sound	.006	.895	-.142*	.003	.013	.787
Say object	.051	.257	-.062	.195	-.184*	<.001
Point to letter	.115*	.010	.072	.132	.176*	<.001
Any letter behaviour	.071	.113	-.045	.354	-.132*	.005

* Significant at $p < .05$

Children in the SF condition were found to significantly reduce the proportion of observations in which they said a letter sound, $r_s = -.142$. However as saying the sound was a rare occurrence, the practical significance of this finding is limited. Children in the SB condition significantly decreased their book behaviours overall, $r_s = -.132$, in particular this being a decrease in the amount they said object names, $r_s = -.184$, but they increased in how often they pointed to letters, $r_s = .176$. Children in the RF group also significantly increased the amount they pointed at letters, $r_s = .115$. The increases in the amount the children in the RF and SB conditions pointed to letters did not differ significantly from one another, $Z = .96$, $p = .337$.

Effect of Book Behaviours and Pre-Test Knowledge on Post-Test Knowledge

Multiple regression analysis was used to investigate the extent to which pre-test literacy knowledge, children's book behaviours (i.e., any book behaviour variable), and their combined effects (i.e., pre-test knowledge by behaviour interaction) each contributed to the prediction of post-test literacy knowledge. Both predictor variables were centered and an interaction variable computed. All three variables were entered into a simultaneous regression model. Regressions were conducted on the entire sample with children who had achieved ceiling at pre-test removed,

as well as separate regression analyses on the three individual conditions to identify whether the relationship was changed by the book type.

Across all analyses small deviations from the Normal P-P plot indicated possible violation of the assumption of normally distributed errors and some evidence of funneling on the scatterplot of standardized residuals indicated potential heteroscedascity. The effects of small sample size for the regression analyses of individual conditions and these potential assumption violations have been accounted for using bootstrapping analyses. Reported standard error and 95% confidence intervals are bootstrapped based on 1000 samples. Diagnostic tests revealed no outliers, and that all data sets met the assumptions of multicollinearity, independent errors, and non-zero variances. See Appendix G for included tests and values.

As summarized in Table 10, children's pre-test *uppercase* letter-name knowledge, book behaviour, and their combined effects explained 72.2% of the variance $F(3, 80) = 69.11, p < .001$, in post-test uppercase letter-name knowledge, with pre-knowledge, $p = .001, sr^2 = 0.63$, being the only significant predictor. Any letter behaviour, $p = .132, sr^2 = 0.01$, and their combined effects (i.e., the interaction term), $p = .082, sr^2 = 0.01$, were not significant predictors of post-test uppercase letter-name knowledge. Separate regression analyses of each condition revealed the same pattern of results, suggesting that neither type of book read, nor amount of book behaviours engaged in affected children's post-test uppercase letter-name knowledge.

Similarly, children's pre-test *lowercase* letter-name knowledge, book behaviour, and their combined effects explained 71.9% of the variance $F(3, 89) = 75.99, p < .001$, in post-test lowercase letter-name knowledge, with pre-knowledge being the only significant predictor, $p = .001, sr^2 = 0.63$ (as seen in Table 11). Any letter behaviour, $p = .131, sr^2 = 0.01$, and their combined effects, $p = .300, sr^2 = 0.004$, were not significant predictors of post-test lowercase

Table 10

Linear model of predictors of post-test uppercase letter-name knowledge for entire sample (n = 84), RF (n = 32), SF (n = 25), and SB (n = 27) with 95% confidence intervals reported in parentheses. Confidence intervals, standard errors, and significance values based on 1000 bootstrap samples

	<i>b</i>	<i>SE b</i>	<i>t</i>	<i>p</i>	<i>sr</i> ²
Entire sample $R^2 = .722$					
Constant	15.36 [14.35, 16.35]	0.52	28.65	.001	
Pre uppercase letter-name knowledge	0.82 [0.71, 0.93]	0.05	13.42	.001	.63
Any letter behaviour	5.65 [-1.16, 13.50]	3.80	1.63	.132	.01
Pre-knowledge X Behaviour	-0.54 [-1.18, 0.07]	0.32	1.62	.082	.01
RF Condition $R^2 = .701$					
Constant	15.04 [12.98, 16.92]	0.94	14.68	.001	
Pre uppercase letter-name knowledge	0.76 [0.59, 0.97]	0.09	6.88	.001	.51
Any letter behaviour	2.87 [-11.30, 15.91]	6.78	0.49	.655	.003
Pre-knowledge X Behaviour	-0.15 [-1.24, 1.01]	0.58	0.28	.794	<.001
SF Condition $R^2 = .754$					
Constant	17.63 [16.03, 19.99]	1.01	19.12	.001	
Pre uppercase letter-name knowledge	0.77 [0.52, 1.06]	0.14	6.63	.003	.52
Any letter behaviour	15.29 [-5.35, 38.85]	11.51	1.89	.197	.04
Pre-knowledge X Behaviour	-1.62 [-3.76, 0.48]	1.13	2.09	.123	.05
SB Condition $R^2 = .757$					
Constant	8.43 [6.26, 10.77]	1.17	7.73	.001	
Pre uppercase letter-name knowledge	0.89 [0.76, 1.07]	0.09	8.34	.001	.76
Any letter behaviour	-5.10 [-37.64, 38.79]	19.10	0.29	.777	.001
Pre-knowledge X Behaviour	-0.50 [-4.23, 1.96]	1.83	0.23	.715	.001

Table 11

Linear model of predictors of post-test lowercase letter-name knowledge for entire sample (n = 93), RF (n = 35), SF (n = 28) and SB (n = 30) with 95% confidence intervals reported in parentheses. Confidence intervals, standard errors, and significance values based on 1000 bootstrap samples

	<i>b</i>	<i>SE b</i>	<i>t</i>	<i>p</i>	<i>sr</i> ²
Entire sample $R^2 = .719$					
Constant	14.07 [13.13, 15.04]	0.47	29.61	.001	
Pre lowercase letter-name knowledge	0.81 [0.72, 0.90]	0.05	14.09	.001	.63
Any letter behaviour	5.20 [-0.99, 12.10]	3.33	1.78	.131	.01
Pre-knowledge X Behaviour	-0.35 [-1.04, 0.34]	0.35	1.12	.300	.004
RF Condition $R^2 = .757$					
Constant	15.95 [14.36, 17.62]	0.84	18.60	.001	
Pre lowercase letter-name knowledge	0.84 [0.67, 1.04]	0.09	8.34	.001	.54
Any letter behaviour	5.94 [-5.97, 17.15]	5.77	1.27	.298	.01
Pre-knowledge X Behaviour	-0.15 [-1.34, 1.01]	0.61	0.30	.798	<.001
SF Condition $R^2 = .696$					
Constant	15.82 [13.97, 17.97]	1.03	17.24	.001	
Pre lowercase letter-name knowledge	0.72 [0.50, 0.91]	0.10	6.05	.001	.46
Any letter behaviour	13.63 [-0.55, 32.44]	8.50	1.84	.109	.04
Pre-knowledge X Behaviour	-1.39 [-3.14, -0.28]	0.77	2.23	.040	.06
SB Condition $R^2 = .735$					
Constant	12.61 [11.21, 14.23]	0.79	15.25	.001	
Pre lowercase letter-name knowledge	0.88 [0.70, 1.09]	0.10	8.21	.001	.69
Any letter behaviour	-8.62 [-37.46, 25.71]	15.66	0.59	.527	.003
Pre-knowledge X Behaviour	0.58 [-2.52, 4.87]	1.89	0.33	.728	.001

letter knowledge. While this pattern of results remained consistent for children in the RF and SB conditions, regression analyses revealed that in the SF alphabet book condition, pre-test lowercase letter-name knowledge, book behaviour, and their combined effects explained 69.6% of the variance $F(3, 24) = 18.29, p < .001$, in post-test lowercase letter-name knowledge, with book behaviour moderating the effects of pre-knowledge on post lowercase letter-name knowledge, $p = .040, sr^2 = 0.06$. Simple slopes for the association between pre-knowledge and book behaviour were tested for low (-1 SD below the mean) and high (+1 SD above the mean) levels of pre-test lowercase letter-name knowledge. As shown in Figure 4, the simple slope tests revealed an association between book behaviours and post-test lowercase letter-name knowledge

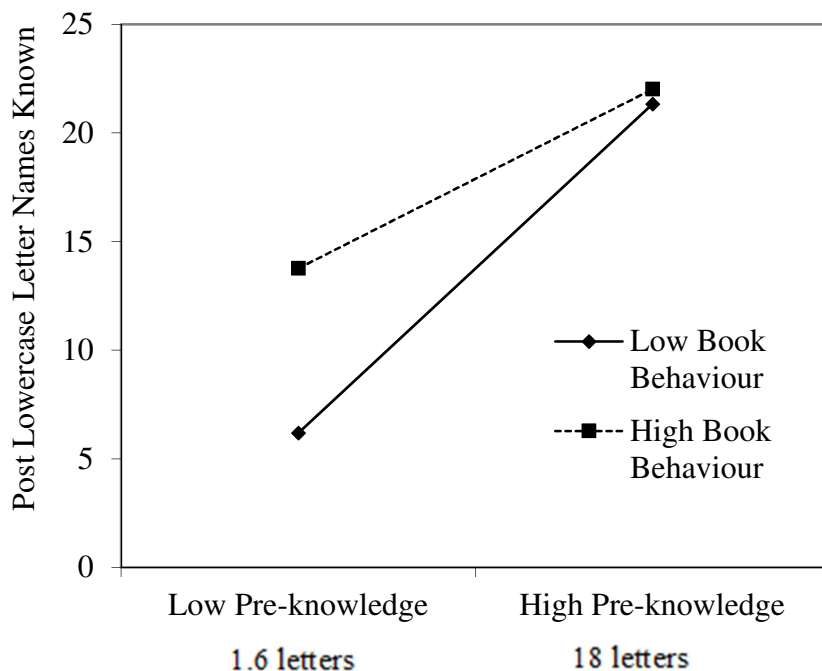


Figure 4. Moderating effect of book behaviour at low (-1 SD, $M = .08$) and high (+1SD, $M = .38$) levels of pre-lowercase letter-name knowledge on post-lowercase letter-name knowledge for Standard Features ABC condition only.

for lower levels of pre-knowledge, $b = 25.16$ [1.77, 55.55], $SEb = 13.73$, $\beta = 0.49$, $p = .082$, but not for higher levels of pre-knowledge, $b = 2.10$ [-8.93, 13.64], $SEb = 6.47$, $\beta = 0.04$, $p = .622$, suggesting that book behaviours play a more important role in letter knowledge development when children have relatively little letter knowledge.

As summarized in Table 12, children's pre-test letter-sound knowledge, book behaviour, and their combined effects explained 63.5% of the variance $F(3, 89) = 51.52$, $p < .001$, in post-test letter-sound knowledge, with pre-knowledge, $p = .001$, $sr^2 = 0.59$, and book behaviour, $p = .020$, $sr^2 = 0.02$ significantly predicting post-scores. No significant effect of their combined effects was found, $p = .099$, $sr^2 = 0.01$. While separate regression analyses of each condition revealed the same pattern of results for the RF alphabet book group, regression analyses for SF and SB groups indicated that only pre-knowledge of sounds significantly predicted sound post-knowledge. This pattern suggests that book behaviours play a unique role in acquiring sound knowledge when simple alphabet books, such as those presented in the RF condition, are read aloud and independently.

Finally, children's pre-test phonological awareness, book behaviour, and their combined effects explained 38.5% of the variance $F(3, 87) = 18.17$, $p < .001$, in post-test phonological awareness knowledge, with pre-knowledge, $p = .001$, $sr^2 = 0.27$, and book behaviour, $p = .008$, $sr^2 = 0.07$ significantly predicting post-scores (see Table 13). No significant effect of their combined effects was found, $p = .411$, $sr^2 = 0.003$. As was seen in the results of sound knowledge, separate regression analyses of each condition revealed the same pattern of results for the RF alphabet book condition. However, regression analyses for SF and SB conditions indicated that only pre-knowledge of phonological awareness significantly predicted phonological awareness post-knowledge, although the SF condition approached

Table 12

Linear model of predictors of post-test letter-sound knowledge for entire sample (n = 93), RF (n = 34), SF (n = 29) and SB (n = 30) with 95% confidence intervals reported in parentheses. Confidence intervals, standard errors, and significance values based on 1000 bootstrap samples

	<i>b</i>	<i>SE b</i>	<i>t</i>	<i>p</i>	<i>sr</i> ²
Entire sample $R^2 = .635$					
Constant	9.24 [8.26, 10.48]	0.56	16.44	.001	
Pre letter-sound knowledge	1.18 [0.90, 1.21]	0.08	11.95	.001	.59
Any letter behaviour	14.46 [1.88, 14.80]	3.16	2.44	.020	.02
Pre-knowledge X Behaviour	0.25 [-1.15, 0.79]	0.46	1.37	.099	.01
RF Condition $R^2 = .617$					
Constant	9.01 [7.30, 11.41]	1.08	9.02	.001	
Pre letter-sound knowledge	0.96 [0.70, 1.60]	0.25	6.09	.002	.47
Any letter behaviour	10.48 [0.70, 20.33]	5.11	1.96	.035	.05
Pre-knowledge X Behaviour	-0.35 [-1.69, 2.29]	1.03	0.55	.590	.004
SF Condition $R^2 = .582$					
Constant	10.59 [8.59, 14.52]	1.44	8.96	.001	
Pre letter-sound knowledge	0.98 [0.74, 2.01]	0.27	5.77	.002	.56
Any letter behaviour	7.36 [-6.44, 37.60]	11.64	0.80	.456	.02
Pre-knowledge X Behaviour	-0.76 [-3.05, 5.10]	1.81	0.90	.290	.03
SB Condition $R^2 = .734$					
Constant	8.27 [6.66, 10.09]	0.89	9.92	.001	
Pre letter-sound knowledge	1.17 [0.86, 1.45]	0.17	8.01	.001	.66
Any letter behaviour	-3.04 [-31.39, 39.59]	19.76	0.21	.814	<.001
Pre-knowledge X Behaviour	-2.41 [-8.34, 4.31]	3.65	1.10	.177	.01

Table 13

Linear model of predictors of post-test phonological awareness for entire sample (n = 91), RF (n = 34), SF (n = 28) and SB (n = 29) with 95% confidence intervals reported in parentheses. Confidence intervals, standard errors, and significance values based on 1000 bootstrap samples

	<i>b</i>	<i>SE b</i>	<i>t</i>	<i>p</i>	<i>sr</i> ²
Entire sample $R^2 = .385$					
Constant	4.73 [4.29, 5.15]	0.22	21.75	.001	
Pre phonological awareness	0.72 [0.49, 0.94]	0.11	6.16	.001	.27
Any letter behaviour	3.85 [0.80, 6.32]	1.39	3.10	.008	.07
Pre-knowledge X Behaviour	-0.36 [-1.58, 0.88]	0.61	0.69	.411	.003
RF Condition $R^2 = .510$					
Constant	5.05 [4.35, 5.76]	0.36	14.91	.001	
Pre phonological awareness	0.75 [0.38, 1.47]	0.26	4.26	.004	.30
Any letter behaviour	4.21 [0.02, 7.38]	1.72	2.41	.022	.09
Pre-knowledge X Behaviour	0.09 [-1.26, 4.04]	1.33	0.13	.898	<.001
SF Condition $R^2 = .442$					
Constant	4.54 [3.42, 5.36]	0.50	10.59	.001	
Pre phonological awareness	0.78 [0.12, 1.12]	0.24	3.67	.009	.31
Any letter behaviour	7.90 [-3.36, 13.27]	4.34	2.45	.067	.14
Pre-knowledge X Behaviour	-1.76 [-7.07, 1.66]	2.18	1.71	.201	.07
SB Condition $R^2 = .302$					
Constant	4.55 [3.68, 5.28]	0.40	12.18	.001	
Pre phonological awareness	0.76 [0.15, 1.43]	0.32	3.02	.017	.25
Any letter behaviour	0.79 [-18.93, 16.06]	8.93	0.12	.911	<.001
Pre-knowledge X Behaviour	0.79 [-11.71, 10.25]	5.34	0.26	.831	.002

significance for book behaviour as a predictor, $p = .067$, $sr^2 = 0.14$. This pattern suggests that book behaviours play a unique role in learning phonological awareness when alphabet books are read.

Discussion

Study 2 examined the extent to which alphabet book design impacted children's early literacy skill development (i.e., letter-name knowledge, letter-sound knowledge, and phonological awareness) and independent reading behaviours (i.e., saying letter name, sound or object, and pointing to letter) over 16 sessions in eight weeks in comparison to traditional storybooks. Findings revealed that children were engaged with all three types of books while being read to, and continued to be oriented to their independent reading materials during the majority of observations. These strong levels of engagement and orientation suggest that young children readily participate in read-aloud and independent reading activities.

Gains in Early Literacy Skills

As is common for young children and was seen in Study 1, variability across all measures (except engagement and orientation) was extensive, making statistically significant differences between conditions of this size difficult to detect. Results indicated that children in all conditions made significant gains across all early literacy skills (i.e., upper and lowercase letter names, letter sounds, and phonological awareness) over the course of the study. Differences observed in literacy skills such that children in the alphabet book conditions learned 1-2 more uppercase letter names, 1-2 more lowercase letter names, and 1 more letter sound than children in the control storybook condition did not reach statistical significance and the effect size was small. However, given the information gained from this study, power analyses suggest that more children per condition would be needed for this small effect size to be statistically significant.

While, as hypothesized, all conditions made gains over the course of the study, there was no waitlist condition, therefore, it cannot be speculated whether these gains are in excess of the gains that would have been made by classroom and home literacy experiences alone.

Recent research suggests that dose and dose frequency are important factors to consider in early literacy intervention (McGinty, Breit-Smith, Fan, Justice, & Kadervek, 2011; Schmitt & Justice, 2012). It is possible that this 16 session, twice weekly intervention (five hours and 20 minutes total) was too small of a dose or dose frequency in comparison to the other literacy rich experiences happening in the children's classrooms and homes. This intervention was within the optimal range of between 5 and 18 hours of intervention for phonological awareness suggested by the National Reading Panel (2000); however, this intervention also included letter-name and letter-sound knowledge and would be considered a more passive form of knowledge transmission than typically seen in more active literacy interventions which engage young children in structured modelling and practice activities. Notably, other alphabet book interventions of similar length (Brabham, Murray, & Bowden, 2006; Greenewald & Kulig, 1995; Murray, Stahl, & Ivey, 1996) saw significant group differences over the course of their interventions. However, all of these interventions were done within the classroom either by or in the presence of the regular teacher, which would allow for techniques to spill over into other areas of teaching, and were executed on consecutive schooldays, a difference in dose and dose frequency. These differences may explain why variation between conditions was not detected in our research assistant guided and more dispersed intervention. These three studies were also conducted in three to four weeks, in contrast to the eight week intervention offered here, which may have minimized the effect of classroom-based growth on the post-test scores. Furthermore, the children in this study were slightly younger than those in the three alphabet books studies

noted above, suggesting that age, and by extension, amount of formal schooling, may be an important factor in children's ability to use alphabet books as a literacy learning tool. More intensive alphabetic experience than that provided in this study may be necessary to have relatively fast and visible effects on young children's alphabetic knowledge.

Book Behaviours

While significant differences were not seen between conditions at post-test, children's interactions with the books during the intervention varied by condition. As alphabet books present the names of letters when being read aloud, it was correctly hypothesized that children in both alphabet book conditions said letter names more frequently than children in the storybook condition. While the alphabet books in the recommended features condition pictured the letters in a more salient manner, this did not appear to impact children's letter naming behaviour. Children almost never spontaneously named the letters in storybooks, likely because this behaviour was not demonstrated in the read aloud, highlighting the importance of adult reading behaviours in young children's literacy development.

Pointing to the letter, which was not demonstrated by adult readers in this study, was seen much less frequently than saying the letter name. Given the saliency of the individual letters in alphabet books, it is logical that children interacting with ABC books also pointed at the letters more frequently than children interacting with storybooks.

Along with saying the letter name, read-alouds of alphabet books also demonstrated the names of objects presented on the page (e.g., *c* is for *cat*). Saying the object name is an early literacy skill as it allows children to practice the sounds of the alphabet without having to identify the letter name or sound based on the alphabetical symbol. Naming the object also allows children to practice saying some letter names as the letter names are heard within the

word itself and knowing these letter names facilitates letter-sound knowledge (e.g., Share, 2004; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998). When only one or two objects were presented with the accompanying letter, as was seen with the RF condition, children named the object almost twice as often as when there were numerous objects presented on the page in the SF condition, and almost four times as often than when viewing a traditional storybook. Interestingly, both the standard alphabet books and storybooks presented the children with more objects that could be named than those ABC books presented in the RF condition, yet object naming occurred less frequently among the children using these books.

Saying letter sounds was only demonstrated during the readings of *All of the Letters Make Sounds Too* and is one of the more advanced literacy skills acquired before formal reading (Whitehurst & Lonigan, 1998). Therefore, it is not surprising that across all three groups, children rarely said the letter sounds. This pattern is consistent with findings that the sounds of the letters are rarely discussed in parent-child conversations (Robbins, Treiman, & Rosales, 2014) suggesting that this behaviour was also infrequently being modeled outside of the intervention. Greater scaffolding of the behaviour and/or more prerequisite knowledge is likely necessary to facilitate this literacy behaviour, which has been found to be a key predictor of later word reading (McGeown & Medford, 2014).

Overall, children reading alphabet books engaged in alphabetic behaviours more than three times as often as children interacting with storybooks suggesting that alphabet books are a useful tool for having children practice early reading skills. The demonstration of saying letter and object names during the read aloud portion of the sessions likely modeled these behaviours for the children as adult contributions to the read aloud have been found to be important to shared reading of both alphabet books (e.g., Davis, Evans, & Reynolds, 2010; Lachner,

Zevenbergen, & Zevenbergen, 2008) and storybooks (e.g., Evans, Williamson, & Pursoo, 2008; Justice, Pullen, & Pence, 2008). Future research should investigate the extent to which different formats of ABC books elicit unprompted extratextual comments and gestures from adult readers, such as parents and teachers.

Children's book behaviour in some conditions changed slightly over the course of the study. Overall, children reading alphabet books increased the proportion of time they spent oriented to the books, and no relation between session and overall book behaviours was found. In contrast, for children in the storybook condition, no relation between session and time spent oriented to the book was found; however, their overall book behaviours decreased. A similar pattern was seen by Burek, Evans, Nowak, and Willoughby (2014) in their examination of electronic alphabet books, whereby children remained oriented to the eBooks, but decreased their alphabetic behaviour over time. In congruence, Moody, Justice, and Cabell (2010) found that children communicated more during traditional book reading than eBook reading. This pattern suggests that there is something particular about paper alphabet books which keeps children engaged and practicing alphabetic behaviours over time. In addition, research with 10th graders suggests that readers are more deeply cognitively engaged with text on paper than on screens (Mangen, Walgermo, & Brønncic, 2013).

Contributions to Literacy Gains

As book behaviours were found to differ by condition, it was important to investigate whether book behaviours, in collaboration with children's pre-existing literacy knowledge, had an effect on children's post-intervention literacy knowledge. Across all four literacy measures, children's pre-intervention knowledge was the greatest predictor of post-intervention knowledge. Book behaviours were also found to be a significant, albeit small in comparison, predictor of

post-intervention knowledge of sounds and phonological awareness. However, when these predictors were investigated for each condition only the recommended features ABC books produced the same pattern of results suggesting that book behaviours play a unique role in acquiring sound knowledge and phonological awareness when simple alphabet books, such as those presented in the RF condition, are read aloud and independently.

A unique relationship was found for lowercase letter names. Overall and in the RF and SB conditions, pre-knowledge remained the only significant predictor of post lowercase letter-name knowledge. However, when standard ABC books were presented, book behaviour moderated the effect of pre-knowledge on post-knowledge scores. When children began the intervention knowing more lowercase letter names, their behaviour did not impact their post-knowledge. In contrast, for children who knew relatively few lowercase letter names before the intervention, children who engaged in greater proportions of alphabetic behaviours made greater gains than those who engaged in fewer book behaviours. This unique finding highlights that the alphabet book alone is unlikely to bring about growth in literacy skills in very early readers. Rather, it is the combination of a book which allows and, ideally, promotes practicing of early literacy behaviours and it is the child's participation in these behaviours that stimulates literacy skill acquisition. As this pattern was not seen for the simpler ABC books presented in the RF condition, it may be hypothesized that the increased complexity of the SF alphabet books played a role in engaging some children in these literacy behaviours. Further investigation is necessary to understand this finding.

There were, of course, children in this study who did not make gains in letter names, letter sounds, or phonological awareness over the course of the intervention. While the reasons for this remain unknown, alphabet books may still be of benefit to this group. Of promise, but

requiring further research, is the use of embedded picture mnemonics which have been found to be an effective way to teach grapheme-phoneme (i.e., letter shape to sound) connections to early readers (Shidman & Ehri, 2010). The standard design of alphabet books lends itself well to using pictures to represent letter shapes and sounds. Adopting the recommended features of alphabet books discussed in this study will further minimize other potentially distracting stimuli for this group of struggling early readers.

Limitations

As noted earlier, and consistent with other literacy studies with this age-group (e.g., McGinty et al., 2011), children varied considerably in their literacy skills both at pre- and post-test. Differences in age and literacy exposure and experience prior to beginning school likely contributed to this variability. While conditions were found to be equivalent in regards to gender, age, maternal or paternal education, reported frequency of book or alphabet book reading, and mean neighbourhood family income, the large variability in literacy knowledge reduced the power of the statistical tests used. Maintaining the intervention as is, a larger sample size may have found statistically significant differences between conditions.

The measures themselves may have also limited our ability to see differences between conditions. There is a finite number of letters in the English alphabet thereby providing a natural ceiling for the letter-name and letter-sound measures. Likewise, the phonological awareness task of the TOPA-K only provided 10 items. While the effect of this ceiling was minimized by removing the children who had already achieved ceiling at pre-test, there were some children (7 for uppercase letter-names, 1 for lowercase letter-names, 1 for letter-sounds, and 1 for phonological awareness) who, at post-test, had reached ceiling on one or more measures. While it is possible that these children maximized the amount of growth they were going to achieve

over the course of the study, there is no way of knowing whether these children would have gained more literacy knowledge if more letters of the alphabet existed. This ceiling effect may have truncated the effect that was seen overall. Similar interventions conducted with groups of children who have received less exposure to literacy materials and teaching prior to entering school may reduce this potential ceiling effect; however, variables such as socio-economic status or parental education may confound the results.

Summary and Implications

The current studies find that alphabet books are an important part of a wider literacy-rich environment for children in the early stages of learning to read. In particular, alphabet books are a tool that can be used to increase independent practice of early literacy behaviours such as letter and object naming, and to a lesser extent, pointing to letters and saying letter sounds. Increasing the practice of these behaviours appears particularly important for children with lower literacy knowledge. The modelling of letter and object naming by adult readers during shared reading may further promote these alphabetic behaviours amongst early readers. Educators and parents should continue to read ABC books with young children and offer these books during independent reading opportunities. However, alphabet books are only one instrument among many (e.g., storybook reading, storytelling, rhyming, letter writing, in vivo letter recognition and identification; see Aram, 2006 as an example) that can be used to promote, teach, and improve alphabetic knowledge and phonological awareness. As was seen across both studies, children vary extensively in their book preferences and alphabetic knowledge, therefore, selecting alphabet books for a particular child or class remains more of an art than a science. Offering a variety of alphabet books amongst other literacy rich materials and opportunities will help

children, parents, and educators to navigate this unique and critical period of literacy development.

References

- Amsden, R.H. (1960). Children's preferences in picture story book variables. *Journal of Educational Research*, 53, 309-312.
- Aram, D. (2006). Early literacy interventions: The relative roles of storybook reading, alphabetic activities, and their combination. *Reading and Writing*, 19, 489-515. doi: 10.1007/s11145-006-9005-2
- Audet, D., Evans, M.A., Williamson, K., & Reynolds, K. (2008). Shared book reading: Parental goals across the primary grades and goal-behaviour relationships in junior kindergarten. *Early Education and Development*, 19, 112-137. doi: 10.1080/1040928071839189
- Boneau, C.A. (1960). The effects of violations of assumptions underlying the *t* test. *Psychological Bulletin*, 57, 49-64. doi: 10.1037/h0041412
- Both-de Vries, A.C. & Bus, A.G. (2014). Visual processing of pictures and letters in alphabet books and the implications for letter learning. *Contemporary Educational Psychology*, 39, 156-163. doi: 10.1016/j.cedpsych.2014.03.005
- Brabham, E. G., Murray, B. A., & Bowden, S. H. (2006). Reading alphabet books in kindergarten: Effects of instructional emphasis and media practice. *Journal of Research in Childhood Education*, 20, 219-234. doi:10.1080/02568540609594563
- Bradley, B.B. & Jones, J. (2007). Sharing alphabet books in early childhood classrooms. *The Reading Teacher*, 60, 452-463. doi: 10.1598/RT.60.5.5
- Brookshire, J., Scharff, L.F.V., & Moses, L.E. (2002). The influence of illustrations on children's book preferences and comprehension. *Reading Psychology*, 23, 323-339. doi: 10.1080/02702710290061391
- Brownell, R. (2000). *Receptive One Word Picture Vocabulary Test*. Novato, CA: Academic Therapy Publications.
- Burek, B., Evans, M.A., Nowak, S., & Willoughby, D. (2014). *The effect of paper and digital alphabet books on preschoolers' behaviour: An analysis over repeated readings*. Manuscript submitted for publication.
- Bus, A. G., van Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research*, 65, 1-21. Retrieved from https://openaccess.leidenuniv.nl/bitstream/handle/1887/1484/168_150.pdf
- Cardoso-Martins, C., Mesquita, T., & Ehri, L. (2011). Letter names and phonological awareness help children learn letter-sound relations. *Journal of Experimental Child Psychology*, 109, 25-38. doi: 10.1016/j.jecp.2010.12.006
- Chiong, C. & DeLoache, J.S. (2012). Learning the ABCs: What kinds of picture books facilitate young children's learning? *Journal of Early Childhood Literacy*, 13, 225-241. doi: 10.1177/1468798411430091
- Cunningham, S. J. (2001). Children in the physical collection: Implications for the digital library. *Proceedings of the American Society for Information Science and Technology*, 48, 1-10. doi: 10.1002/meet.2011.14504801203
- Davis, B. J., Evans, M. A. & Reynolds, K. P. (2010). Child miscues and parental feedback during shared alphabet book reading and relations with child literacy skills. *Scientific Studies of Reading*, 14, 341-364. doi:10.1080/10888431003623504

- Ehri, L. (2005). Development of sight word reading: Phases and findings. In M. Snowling & C. Hulme (Eds.). *The science of reading: A handbook* (pp. 135-154). Malden, MA: Blackwell.
- Evans, M. A., O'Grady, B., & Lavoie, M. (June, 2008). A survey of alphabet books. In M. A. Evans, (Chair), *the alphabet and children's alphabetic knowledge: Challenges in learning and application*. Symposium, Canadian Psychological Association, Halifax.
- Evans, M. A. & Saint-Aubin, J. (2005). What children are looking at during shared storybook reading: Evidence from eye movement monitoring. *Psychological Science, 16*, 913-920. doi: 10.2307/40064338
- Evans, M.A., & Saint-Aubin, J. (2013). Vocabulary acquisition without adult explanations in repeated shared book reading : An eye movement study. *Journal of Educational Psychology, 105*, 596-608. doi : 10.1037/a0032465
- Evans, M. A., Saint-Aubin, J., & Landry, N. (2009). Letter names and alphabet book reading by senior kindergarteners: An eye movement study. *Child Development, 80*, 1824-184. doi: 10.1111/j.1467-8624.2009.01370.x
- Evans, M. A., Williamson, K., & Pursoo, T. (2008). Preschoolers attention to print during shared book reading. *Scientific Study of Reading, 12*, 106-129. doi: 10.1080/10888430701773884
- Foulin, J. N. (2005). Why is letter-name knowledge such a good predictor of learning to read? *Reading and Writing: An Interdisciplinary Journal, 18*, 129–155. doi:10.1007/s11145-004-5892-2.
- Harter, S. & Pike, R. (1984). The pictorial scale of perceived competence and social acceptance for young children. *Child Development, 55*, 1969-1982. doi: 0009-3920/84/5506-00
- Greenwalde, M. J. & Kulig, R. (1995). Effects of repeated readings of alphabet books on kindergartners' letter recognition. In K.A. Hinchman, D.J. Leu, & C. K. Kinzer (Eds.), *Perspectives on literacy research and practice: 44th yearbook of the National Reading Conference*. Chicago: National Reading Conference.
- Justice, L. M., & Lankford, C. (2002). Preschool children's visual attention to print during storybook reading: Pilot findings. *Communication Disorders Quarterly, 24*, 11–21. Retrieved from <http://readitonceagain.com/articles/Preschoolers%20attention%20to%20Print.pdf>
- Justice, L. M., McGinty, A. S., Piasta, S. B., Kaderavek, J. N., & Fan, X. (2010). Print-focused read-alouds in preschool classrooms: Intervention effectiveness and moderators of child outcomes. *Language, Speech, and Hearing Services in Schools, 41*, 504-520. doi: 10.1044/0161-1461(2010/09-0056)
- Justice, L.M., Pullen, P.C., & Pence, K. (2008). Influence of verbal and nonverbal references to print on preschoolers' visual attention to print during storybook reading. *Developmental Psychology, 44*, 855-866. doi: 10.1037/0012-1649.44.3.855
- Justice, L. M., Skibbe, L., Canning, A., & Lankford, S. (2005). Pre-schoolers, print, and storybooks: An observational study using eye-gaze analysis. *Journal of Research in Reading, 28*, 229-243. doi: 10.1111/j.1467-9817.2005.00267.x
- Kiefer, B. Z. (2010). *Children's literature* (10th ed.). New York, NY: McGraw Hill.
- Krapp, A., Hidi, S., & Renninger, K. A. (1992). Interest, learning, and development. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 1–26). Hillsdale, NJ: Erlbaum.

- Lachner, W., Zevenbergen, A. & Zevenbergen, J. (2008). Parent and child references to letters during alphabet book reading: Relations to child age and letter name knowledge. *Early Education and Development, 19*, 541-559. doi: 10.1080/104092802230981
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*, 159-174.
- Mangen, A. Walgermo, B.R., & Brønncik, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research, 58*, 61-68. doi: 10.1016/j.ijer.2012.12.002
- McGinty, A.S., Breit-Smith, A., Fan, X., Justice, L.M., & Kaderavek, J.N. (2011). Does intensity matter? Preschoolers' print knowledge development within a classroom-based intervention. *Early Childhood Research Quarterly, 26*, 255-267. doi: 10.1016/j.ecresq.2011.02.002
- McGeown, S.P. & Medford, E. (2014). Using method of instruction to predict the skills supporting initial reading development: Insight from a synthetic phonics approach. (2014). *Reading and Writing, 27*, 591-608. doi: 10.1007/s11145-013-9460-5
- McMurtry, C. M., Noel, M., Chambers, C. T., & McGrath, P. J. (2011). Children's fear during procedural pain: Preliminary investigation of the Children's Fear Scale. *Health Psychology, 30*, 780-788. doi:10.1037/a0024817
- Mohr, K.A.J. (2006). Children's choices for recreational reading: A three-part investigation of selection preferences, rationales, and processes. *Journal of Literacy Research, 38*, 81-104. doi: 10.1207/s15548430jlr3801_4
- Moody, A.K., Justice, L.M., & Cabell, S.Q. (2010). Electronic versus traditional storybooks: Relative influence on preschool children's engagement and communication. *Journal of Early Childhood Literacy, 10*, 294-313. doi: 10.1177/1468798410372162
- Murray, B. A., Stahl, S. A., & Ivey, M. G. (1996). Developing phoneme awareness through alphabet books. *Reading and Writing: An Interdisciplinary Journal, 8*, 307-322. doi: 10.1007/BF00395111
- National Early Literacy Panel (2008). *Developing early literacy: A scientific synthesis of early literacy development and implications for intervention*. Retrieved from <http://lincs.ed.gov/publications/pdf/NELPReport09.pdf>
- National Reading Panel (2000). *Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. Rockville, MD: NICHD Clearinghouse.
- Norton, D. E. & Norton, S. E. (2011). *Through the eyes of a child: An introduction to children's literature* (8th ed.). Upper Saddle River, NJ: Pearson Education, Inc..
- Nowak, Sarah N. & Evans, Mary Ann (2013). Parents' goals for and perceptions of alphabet books. *Reading and Writing: An Interdisciplinary Journal, 26*(8), 1265-1287. doi: 10.1007/s11145-012-9417-0.
- Ontario Ministry of Education. (2010). *The full-day learning early learning – Kindergarten program: Draft version*. Retrieved from http://www.edu.gov.on.ca/eng/curriculum/elementary/kindergarten_english_june3.pdf
- Ramsey, I.L. (1982). Effect of art style on children's picture preferences. *Journal of Educational Research, 75*, 237-240. Retrieved from <http://www.jstor.org/stable/27539901>
- Robins, S., Treiman, R., & Rosales, N. (2014). Letter knowledge in parent-child conversations. *Reading and Writing, 27*, 407-429. doi: 10.1007/s11145-013-9450-7

- Scarborough, H. S., and Dobrich, W. (1994). On the efficacy of reading to preschoolers. *Developmental Review, 14*, 245–302. doi: 10.1006/drev.1994.1010
- Schmitt, M.B. & Justice, L.M. (2012). Optimal intervention intensity for emergent literacy: What we know and need to learn. *International Journal of Speech-Language Pathology, 14*, 451-455. doi: 10.3191/17549507.2012.687057
- Share, D. (2004). Knowing letter names and learning letter sounds: A causal connection. *Journal of Experimental Child Psychology, 88*, 213-233. doi: 10.1016/j.jecp.2004.03.005
- Shidman, A. & Ehri, L. (2010). Embedded picture mnemonics to learn letters. *Scientific Study of Reading, 14*, 159-182. doi: 10.1080/10888430903117492
- Smolkin, L.B., Yaden, D.B., Brown, L., Hofius, B. (1992). The effects of genre, visual design choices, and discourse structure on preschoolers' responses to picture books during parent-child read alouds. In C.K. Kinzer & D.J. Leu (Eds.), *Forty-First Yearbook of the National Reading Conference: Literacy research, theory, and practice: Views from many perspectives* (pp. 291-301). Chicago: National Reading Conference.
- Stadler, M. A. & McEvoy, M. A. (2003). The effect of text genre on parent use of joint book reading strategies to promote phonological awareness. *Early Childhood Research Quarterly, 18*, 502-512. doi:10.1016/j.ecreq.2003.09.008
- Stewig, J.W. (1974). Children's picture preferences. *Journal of Instructional Psychology, 1*, 2-8.
- Sutherland, Z. (1997). *Children and books* (9th ed.). NY: Addison-Wesley Educational Publishers Inc.
- Torgesen, J. K. & Bryant, B.R. (1994). *Test of Phonological Awareness*. Austin, TX: Pro-Ed Inc.
- Treiman, R. (2000). The foundations of literacy. *Current directions in psychological science, 9*, 89-92. doi: 10.1111/1467-8721.00067
- Treiman, R., Tincoff, R., Rodriguez, K., Mouzaki, A., & Francis, D. J. (1998). The foundations of literacy: Learning the sounds of letters. *Child Development, 69*, 1524–1540. doi: 0009-3920/98 /6906-0014
- Treiman, R. & Weatherston, S. (1992). Effects of linguistic structure on children's ability to isolate initial consonants. *Journal of Educational Psychology, 84*, 174-181. doi: 10.1037/0022-0663.84.2.174
- Willoughby, D., Evans, M.A., & Nowak, S. (2015). Do ABC eBooks boost engagement and learning in preschoolers? An experimental study comparing eBooks with paper ABC and storybook controls. *Computers and Education, 82*, 107-117. doi: 10.1016/j.compedu.2014.11.008
- Whitehurst, G.J. & Lonigan, C.J. (1998). Child development and emergent literacy. *Child Development, 69*, 848-872. doi: 10.2307/1132208
- Woodcock, R.W. (2011). *Woodcock Reading Mastery Tests, Third Edition*. Circle Pines, MN: American Guidance Service
- Yaden, D.B., Smolkin, L.B. & MacGillvray, L. (1993). A psychogenetic perspective on children's understanding about letter associations during alphabet book readings. *Journal of Reading Behavior, 25*, 43-68. Retrieved from <http://jlr.sagepub.com/content/25/1/43.full.pdf>

Appendix A

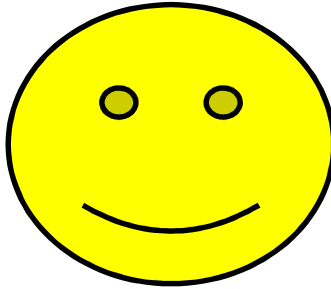
Rating options provided to child in Study 1 with verbal descriptors below.



“Okay”



“Like”



“Really Like”

Appendix B

Script for reading *All of the Letters Make Sounds Too* (RF condition)

Rhyme - Cats say meow and cows say moo. The letters of the alphabet make sounds too.

Introduction - Today we will be reading *All of the Letters Make Sounds Too* (*Show cover*).

E.g. A says /ă/ in (*3 second pause*) APPLE.
A says /ă/ in axe.

B says /b/ in BED.
B says /b/ in (*3 second pause*) in bird.

Repeat for all pages, alternating pause between upper and lowercase

Script for reading other Recommended Features ABC books (RF condition)

Rhyme - Cats say meow and cows say moo. The letters of the alphabet make sounds too.

Introduction - Today we will be reading (title of the book). (*Show cover*).

Read text as written. When the sound presented is not the short vowel or hard consonant sound as used in the main experimental book, the page will be read as follows:

E.g., I says /Ī/ in ICE CREAM. Remember I also says /Ī/ in igloo

Script for reading standard ABC books (SF condition)

Rhyme - Cats say meow and cows say moo. The letters of the alphabet make sounds too.

Introduction - Today we will be reading (title of the book). (*Show cover*).

Read text as written. No modifications/additions. Pause once per letter to allow for participation.

Script for reading storybooks (SB condition)

Rhyme - Stories to listen to, books to see. Won't you come and read with me.

Introduction - Today we will be reading (title of the book). (*Show cover*).

Read text as written. No modifications/additions. Pause where appropriate to allow for participation.

Appendix C

Bibliography of Books Used in Study

Letter identifies book in book reading schedule in Appendix D

Recommended Features Condition

- A. Evans, M.A., Saint-Aubin, J., & Nowak, S. (2012). *All of the Letters Make Sounds Too*. Created for study.
- B. McDonnel, F. (2001). *Flora McDonnel's ABC*. London: Candlewick.
- C. Carle, E. (2007). *Eric Carle's ABC*. New York, NY: Silver Lining Productions.
- D. Blake, P. (2009). *Peter Blake's ABC*. United Kingdom: Tate.
- E. de Man, B. (2012). *Mix and Match ABC: A Touch-and-Trace Alphabet Book*. Hauppauge, NY: Barron's Educational Series
*Note. Split pages were sealed together with clear tape and black strip placed over non-target words.
- F. Campbell, R. (2004). *ABC Zoo*. London: Macmillan Children's Books.
- G. Wildsmith, B. (1996). *Brian Wildsmith's ABC*. Cambridge, MA:Starbright Books.
- H. Autumn Publishing. (2009). *Flip Flash Alphabet*. United Kingdom: Autumn Publishing.
- I. Coirault, C. (2008). *Alphabet Gymboree*. Toronto, ON: Key Porter Books Limited.
- J. Birkett, G. (2011). *A is for Apple*. Wilton, CT: Tiger Tales.
- K. Midda, S. (1998). *How to Build an A*. New York, NY: Artisan.

Standard Features Condition

- A. Miller, R. (1994). *Richard Scarry's Chipmunk's ABC*. New York, NY: Golden Books.
- B. Boynton, S. (1987). *A is for Angry: An Animal and Adjective Alphabet Book*. New York, NY: Workman Publishing Company.
- C. Aylesworth, J. (1995). *Old Black Fly*. New York, NY: Henry Holt & Company.
- D. Compestine, Y.C. (2007). *D is for Dragon Dance*. New York, NY: Holiday House.
- E. Amery, H. & Cartwright, S. (1990). *Stephen Cartwright ABC*. London: Usborne.

- F. Edwards, W. (2008). *Alphabeasts*. Toronto, ON: Kids Can Press.
- G. Hays, A.J. (2002). *Happy Alphabet*. New York, NY: Random House.
- H. Cline-Ransome, L. (2006). *Quilt Alphabet*. New York, NY: Holiday House.
- I. Eastman, P.D. (1974). *The Alphabet Book*. New York, NY: Random House.
- J. Jay, A. (2005). *ABC: A Child's First Alphabet Book*. New York, NY: Dutton Books.
- K. Lobel, A. (2005). *Animal Antics*. Scarborough, ON: Greenwillow Books.
- L. McLeod, B. (2008). *Superhero ABC*. New York, NY: Sterling.

Storybook Condition

- A. Schlatter, J.C. (2010). *If I had Stripes*. Linden, NJ: Just for Kids Press.
- B. Numeroff, L. (2006). *When Sheep Sleep*. New York, NY: Abrams.
- C. Campbell, R. (2007). *Dear Zoo*. Toronto, ON: Little Simon.
- D. Robart, R. (1991), *The Cake that Mack Ate*. New York, NY: Little, Brown Books for Young Readers.
- E. Graves, K. (1994). *I Can't Sleep*. Cypress, CA: Creative Teaching Press
- F. Klassen, J. (2011). *I Want My Hat Back*. Somerville, MA: Candlewick.
- G. Shoshan, B. (2007). *Cuddle*. United Kingdom: Parragon Publishing.
- H. Rosen, M. & Langley, J. (2003). *Snore*. Scarborough, ON: Harper Collins.
- I. Clark, L.A. (2012). *Peepsqueak*. Scarborough, ON: Harper Collins.
- J. Szekeres, C. (2009). *Puppy Too Small*. New York, NY: Sterling.
- K. Gore, L. (2009). *Mommy, where are you?* Toronto, ON: Simon & Schuster.
- L. Mack, J. (2013). *Hush Little Polar Bear*. New York, NY: Roaring Book Press.

Appendix D

Books read aloud (target) and presented during independent reading time each week in each condition. Letters correspond to bibliography information presented in Appendix C.

Condition		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
RF	Target	AA	BC	AB	AC	DD	AE	EF	AF
	Independent Reading	ABCD FGH	ABCD FGH	ABCE IJK	ABCE IJK	ABDE FGH	ABDE FGH	ACDE IJK	ACDE IJK
SF	Target	A	B	C	D	E	F	G	H
	Independent Reading	ABCD EFI	ABCD EFI	ABCD GHJ	ABCD GHJ	ABEF GHK	ABEF GHK	CDEF GHL	CDEF GHL
SB	Target	A	B	C	D	E	F	G	H
	Independent Reading	ABCD EFI	ABCD EFI	ABCD GHJ	ABCD GHJ	ABEF GHK	ABEF GHK	CDEF GHL	CDEF GHL

Appendix E

Observation Coding

Date: _____

Book read aloud: _____ Session # _____

School: _____

Reader: _____

Record at every 5 second interval. After recording, observe next child.

Name of Child																				
Time interval	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Composition																				
Alone																				
1 other child																				
2 other children																				
3 other children																				
Book (Names provided on sheet)																				
Book A																				
Book B																				
Book C																				
Book D																				
Book E																				
Book F																				
Book G																				
None																				
Letter(s) of Page																				
Orientation																				
Oriented to book																				
Oriented to child																				
Researcher oriented																				
Off-task																				
Book behaviour																				
Letter sound																				
Letter name																				
Object name																				
Pointing to picture																				
Pointing to letter																				
Telling a "story"																				
Unknown verbalization																				
None																				

During the read aloud this child was engaged:

All/most of the time

Much of the time

Not much of the time

Not at all

Appendix F

Coding Categories for Observations

Composition – Refers to how many children are involved in the observed activity

Book – Which book the child currently has with them (whether using it or not)

Letter(s) of Page – Which letter of the alphabet the observed child is currently at in their book

Orientation – The observed activity. Is the child:

- Engaged with the book?
- Engaging another child in their group?
- Talking with one of the researchers?
- or none of the above ('off task')?

Book behavior – If you checked 'orientated to book', check all behaviours that apply:

- Letter sound: The child is making the sound of a letter (e.g. /c/ as in cat)
- Letter name: The child is naming a letter
- Object name: The child is naming the object shown on the book page (e.g. Apple)
- Pointing to picture: The child is pointing at the picture on the page
- Pointing to letter: The child is pointing at the letter on the page
- Telling a "story": The child is talking about something while using the book
- Unknown verbalization: The child said something that cannot be interpreted
- None: None of the above behaviors

Appendix G

Summary of diagnostic tests for multiple regression analyses.

	Durbin Watson ¹	Average VIF ²	Range of Tolerances ³	Cook's Distances ⁴
Uppercase letter names				
Entire sample	2.17	1.24	0.74-0.92	0.15
RF only	2.26	1.34	0.66-0.84	0.48
SF only	1.57	1.12	0.85-0.93	0.60
SB only	2.12	1.16	0.82-0.97	0.20
Lowercase letter names				
Entire sample	1.95	1.24	0.73-0.93	0.16
RF only	1.93	1.29	0.71-0.82	0.56
SF only	1.98	1.42	0.61-0.83	0.22
SB only	2.04	1.04	0.94-0.98	0.43
Letter Sounds				
Entire sample	1.79	1.10	0.87-0.99	0.07
RF only	1.73	1.17	0.81-0.94	0.99
SF only	1.60	1.25	0.73-0.97	0.31
SB only	1.45	1.16	0.81-0.98	0.31
Phonological Awareness				
Entire sample	1.86	1.14	0.83-0.91	0.13
RF only	1.29	1.11	0.85-0.95	1.32 ⁵
SF only	2.02	1.35	0.65-0.81	4.12 ⁵
SB only	2.54	1.14	0.83-0.91	0.32

Note.

1. Durbin-Watson values close to 2 deemed acceptable for assumption of independent errors
2. Average variance inflation factor (VIF) not substantially greater than 1 deemed acceptable for assumption of no or little multicollinearity.
3. Tolerance values above 0.2 deemed acceptable for assumption of no or little multicollinearity.
4. Highest Cook's distance reported. Distances less than 1 indicate no undue influence on model.
5. Re-analysis with single case with elevated Cook's distance removed revealed same pattern of results.