Preschool Children’s Early Spelling and Writing

by

Trelani Faith Milburn

A thesis submitted in conformity with the requirements for the degree of Doctorate of Philosophy
Graduate Department of Speech Language Pathology
University of Toronto

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Department of Speech Language Pathology
University of Toronto

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Abstract

This dissertation work was motivated by an attempt to better understand preschool children’s early spelling and writing. Much of the literature focuses on reading, and yet spelling and writing provide a functionally meaningful context for children to use their growing knowledge of print and their ability to analyze language into sound to recode speech to print. The primary goals of the three studies that make up this thesis were: (1) to identify the component skills that predict preschool children’s early word spelling and name writing (Study 1 found in Chapter 2), (2) to identify group differences in bilingual preschool children’s early literacy and spelling ability relative to monolingual children (Study 2 found in Chapter 3), and (3) to investigate the efficacy of professional development to support preschool educators’ ability to engage preschool children in talk related to print and phonological awareness (Study 3 found in Chapter 4). The findings of this dissertation both corroborate and add to the early spelling literature.

Word spelling involves a distinct role of phonological awareness (blending), while name writing does not. This suggests that spelling involves recoding sound to print while name writing may make use of an orthographic form acquired through repeated exposure to seeing one’s name in print. Further, bilingual children demonstrated distinct profiles in emergent literacy skills relative to a group of monolingual children depending on parent report of the amount of time
they heard or spoke a minority language at home. Finally, coaching by a speech language pathologist as part of an emergent literacy professional development program enhanced preschool educators’ use of interactions related to phonological awareness and the children’s engagement in talk related to this predictor of early literacy ability. The thesis concludes with a discussion of the limitations of the studies as well as future directions for research (Chapter 5).
Acknowledgements

As I reflect on my doctoral studies, I am mindful of both the providence that has carried me and the people who were instrumental in making this achievement a reality. To my supervisor, Dr. Luigi Girolametto, you taught me how to be a researcher. The work that I will go on to do will be because of the journey we took together and our mutual passion for early literacy. To Dr. Rena Helms-Park, without whom I would not have had the courage to go to graduate school, I am grateful for your encouragement and support that began during my undergraduate studies through to the completion of my doctorate. Others should be so fortunate to have you as their mentor. To Dr. Janette Pelletier, Dr. Elina Mainela-Arnold, and Dr. Helms-Park, the members of my Doctoral Supervisory Committee, thank you for your guidance and support throughout this dissertation work. Also, to Dr. Xi Chen and Dr. Monique Sénéchal, the external examiners for my doctoral defense, thank you for your insightful feedback regarding my research and the engaging questions during my defense.

To my departmental colleagues and friends in academia with whom I shared research successes and challenges (that often involved hours of rousing discussions), you made my experience rich. Specifically, to my lab mates, Lisa, Kathy, and Stefano, along with a small army of incredible research assistants and volunteers (you know who you are!!), thank you!

To my friends and family, who were my rocks, your collective love and support was palpable. To Sheila and Lois, your homes and the cottage provided timely escapes and long conversations that enabled me to catch my breath. To Safi, your friendship carried me through. In my whole life, I have not laughed as much I have in the last few years and it was transforming. To my sisters, Helen and Andrea, you were beside me throughout and I borrowed from your strength. No words can adequately describe the love between sisters and I have two!
Most importantly, my greatest claim to fame will always be that I am the mother of two of the most interesting and beautiful people (inside and out!). Cori, my sunshine, you have always been wide-eyed with what the world had to offer and I have had and continue to have a front row seat. What a blessing! Adam, my joy, your gentle spirit has enabled you to see the world in a unique and refreshing way while your artistic drive makes it possible for us to see it manifested on canvas! It is an honour to watch you keep setting new targets for yourself! You both have inspired me to not settle for ‘good enough’. Love you to the moon and back!!

Finally, to that younger me, who sat in the chair in the Registrar’s office and asked if I could enroll in just one course, thank you for having the courage to take that first step!
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Chapter 1

Introduction

Efforts to enhance children’s foundational literacy skills prior to school can improve their school-readiness (Duncan et al., 2007; Ramey & Ramey, 2004) and their long-term academic achievement (Doherty, 2007; National Early Literacy Panel (NELP), 2008; National Institute of Child Health and Human Development Early Child Care Research Network, 2002; Snow, Burns, & Griffin, 1998; Storch & Whitehurst, 2002). While early literacy research has focused largely on reading, early writing and spelling are important aspects of becoming literate that, for many children, begin during the preschool years (Both-de Vries & Bus, 2010; Puranik & Lonigan, 2011; Tangel & Blachman, 1992). According to the literature, learning to read and spell words follows similar and predictable stages of learning (Ehri, 2000), with both reading and spelling relying on children’s knowledge of print, letters, and the analysis of language into smaller units of sound, that is, phonological awareness (Pollo, Treiman, & Kessler, 2008). Both reading and spelling are considered more difficult in an opaque orthography, such as English, where the relationship between phonemes and their associated graphemes is not consistent (Caravolas, Hulme, & Snowling, 2001). Furthermore, reading and spelling are highly correlated with each other at 70% (Ehri, 2000). In a longitudinal study of preschool early literacy, Leppanen, Nieme, Aunola, and Nurmi (2006) used structural equation modeling to identify recursive cross-lagged effects between reading and spelling from preschool to Grade 1. Spelling ability at the beginning of preschool predicted reading ability during preschool and Grade 1, while reading ability at the end of preschool and the end of Grade 1 predicted spelling skills at those same points in time. Taken together, the findings of Ehri (2000) and Leppanen et al. (2006) suggest that efforts to promote preschool early literacy need to include spelling in order
to provide a more complete approach to literacy instruction.

1.1 Rationale for my Doctoral Work

Prior to my return to academia to complete graduate studies, I was an Early Literacy Specialist working under the province of Ontario’s Early Literacy Initiative. The mandate of this program was to promote early literacy for the benefit of children 0-6 years by ensuring families and early years professionals had access to appropriate early literacy resource materials and community-based programs, as well as effective caregiver training opportunities (i.e., including parents and educators). In my experience, I observed very little use of writing activities to engage young children in a functional use of literate behaviors. And yet, when a young child ‘wrote’ a message, the message was semantically-driven without regard for the words that child knew how to write or spell. These young children made use of what little they knew about language and print to produce ‘writing’ on the page as a complex problem-solving activity that involved both the analysis of language into sounds (i.e., phonological awareness) and the conversion of these sounds to letters (i.e., phoneme – grapheme conversion). For my doctoral work, I sought to identify the skills that enable young children to begin writing and spelling and determine if there are differences in these skills and abilities for simultaneous English language learners based on exposure to the language of instruction. Finally, given the role of adult-child interaction for literacy learning, I wanted to examine how we can support preschool educators to promote early writing and the skills that are associated with this ability.

1.2 Introduction to the Three Studies of This Doctoral Work

Preschool children’s early attempts and approximations toward conventional spelling, referred to as invented spelling, are predictive of reading and spelling ability in the higher grades
Given the importance of children’s early spelling, there are three separate yet inter-related research studies of preschool children’s early spelling and writing included in this dissertation work.

1.2.1 Introduction to Study 1 (found in Chapter 2). The first study investigated the cognitive, linguistic, and print-related knowledge that contributed to preschool children’s ability to write their names and spell words. Although a number of studies have examined the precursor skills that predict grade school children’s spelling (Caravolas, Hulme, & Snowling, 2001; Juel, Griffith, & Gough, 1986; Nation & Hulme, 1997), less is known about the component skills that predict word spelling in preschool-aged children (Otaiba et al., 2010; Puranik, Lonigan & Kim, 2011). Otaiba and her colleagues (2010) reported that at the end of kindergarten concurrent measures of phonological awareness, alphabetic knowledge, word reading, and letter writing fluency accounted for 65.6% of the variance in spelling performance after controlling for socioeconomic status and home literacy. However, these children were receiving systematic reading instruction and their results may not be representative of most children at the end of kindergarten. Furthermore, it is important to look at children’s name writing as this has been found to be the earliest word children learn to write (Bloodgood, 1999; Puranik, Lonigan, & Kim, 2012; Levin, Both de Vries, Aram, & Bus, 2005; Levin & Ehri, 2009).

Puranik, Lonigan, and Kim (2011) published a study just as this doctoral work began that indicated the component skills that predicted word spelling and name writing. In a sample of preschool children (N=296) aged 4–5 years, print knowledge and letter-writing skills predicted name writing, whereas print knowledge, letter knowledge, letter writing, and blending skills predicted word spelling. Study 1 of this dissertation (found in Chapter 2) attempted to corroborate these findings in a Canadian sample of preschoolers and proposed a conceptual
dual-route model for these two types of preschool spelling ability (i.e., writing their name versus spelling words). The specific questions of this study were: (a) what are the component cognitive, linguistic, and emergent literacy skills that predict preschool children’s word spelling? and (b) what are the component cognitive, linguistic, and emergent literacy skills that predict preschool children’s name writing? The results of Study 1 (found in Chapter 2) indicated that different skills predict these two types of early writing. These results may suggest that a more dynamic model may be needed to explain early spelling than can be accounted for by classic stage models of spelling development. For example, a dual-route model for spelling has been used to explain spelling and spelling errors in proficient adult spellers who experienced a brain injury (Houghton & Zorzi, 2003; Rapp, Epstein, & Tainturier, 2002). A dual-route model of spelling may be useful for explaining the mechanism for early word spelling and name writing.

1.2.2 Introduction to Study 2 (found in Chapter 3). Preschool and kindergarten classrooms include a number of children from diverse linguistic backgrounds, some of whom have a home language that is not the language of school instruction (Scheffner Hammer, Jia, & Uchikoshi, 2011). In the large urban setting within which this study took place, the proportion of children in childcare who spoke a minority language in the home (i.e. a language other than English) was approximately 50% (Girolametto, Weitzman, & Greenberg, 2012). Some studies have identified that these children may be ‘at-risk’ for poor academic achievement (Carrasquillo, Kucer, & Abrams, 2004; Hemphill, Vanneman, & Rahman, 2011; Kindler, 2002; Scheffner Hammer et al., 2011; Snow, Burns, & Griffin, 1998) while others claim that issues such as poverty confound the results of these studies (Cummins, 1979; Hakuta & August, 1997). Alternatively, some studies have proposed that young bilingual children possess a cognitive advantage that may lead to enhanced academic outcomes (Bialystok, 2001; Campbell & Sais,
1995). Despite a large body of research that has explored early literacy skills in monolingual children (Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2004), less is known about the development of code-related skills (e.g., letter knowledge, phonological awareness, and early word spelling) in bilingual preschoolers and whether their bilingual status may be an indicator of risk versus advantage.

Study 2 (found in Chapter 3) examined the early literacy skills of two groups of simultaneous bilingual preschool children, referred to herein as English Language Learners (ELL), relative to their monolingual peers. The two groups of ELLs were determined based on parent report of the language the children heard and spoke most often at home. One group heard and spoke a language other than English in the home, on average, 65.2% and 53.8% of the time respectively, whereas the second group heard and spoke a language other than English in the home, on average, 46.8 and 24.4% of the time respectively. This difference permitted an investigation into the code-related skills and word spelling ability of children from diverse linguistic backgrounds, some of whom arrive at preschool or kindergarten with very little English language. This study builds on our earlier study (Hipfner-Boucher et al., 2014) that identified group differences in these same children’s narrative development in which the ELL group with the greater amount of exposure to English in the home performed comparably with the monolingual English children whereas the other group lagged behind. The questions of the current study were: (a) Do the two bilingual groups of preschoolers differ in letter knowledge (i.e., letter naming and letter writing) relative to the monolingual group of children? (b) Do children in these language groups differ in phonological awareness? (c) Do children in these language groups differ in word spelling? and (d) Do children in these language groups differ in terms of their home literacy environment? The results of Study 2 (found in Chapter 3) indicated
that the ELL-group with greater exposure to English in the home performed comparably with their English monolingual peers on letter knowledge and phonological awareness but outperformed them in word spelling. The other ELL group, the children whose parents reported that the language the children heard and spoke most often at home was a minority language, lagged behind in letter naming and phonological awareness, and yet they performed comparably with their ELL peers on word spelling. The idea of an early advantage for spelling will be discussed.

1.2.3 Introduction to Study 3 (found in Chapter 4). Greater than 50% of Canadian preschoolers regularly attend childcare (Bushnik, 2006) and preschool educators are positioned to promote early literacy experiences for all children in their care. When educators frequently engage children in interactions and activities related to print, children make greater gains in early literacy skills (i.e., alphabet knowledge and spelling) (Justice, Kaderavek, Fan, Sofka, & Hunt, 2009). However, there is a great deal of variation in the frequency with which educators’ explicitly direct children’s attention to print and phonological awareness (Zucker, Justice, & Piasta, 2009). Furthermore, previous studies have indicated that professional development may have very little impact on preschool educators’ use of explicit instruction in print and phonological awareness (Piasta, et al, 2010).

Building on this author’s Master’s thesis, which examined the effects of professional development to enhance preschool educators’ ability to engage children in shared book reading conversations (Milburn, Girolametto, Weitzman, & Greenberg, 2014), this randomized controlled trial, discussed in Chapter 4, examined the effects of coaching on preschool educators’ ability to engage children in talk related to print and phonological awareness during a small group craft/writing activity. Specifically, this study examined the effects of coaching by a
speech language pathologist as part of an emergent literacy professional development to support preschool educators to talk about and promote print and phonological awareness. To do this, the educators were video-recorded while facilitating a 15-minute activity wherein they asked the children to draw their favorite part of the story just read and educators assisted the children to write captions. The videotapes were transcribed and coded for the educators’ and children’s use of utterances related to print and phonological awareness. The specific questions of Study 3 (found in Chapter 4) were: (a) Do preschool educators who participated in professional development in-service workshops plus individualized classroom coaching use more references to print and phonological awareness during a small group craft/writing activity compared to educators who received only the in-service workshops? and (b) Do children whose educators participated in professional development that included in-service workshops and individualized classroom coaching use more references to print and phonological awareness during the small group craft/writing activity relative to children whose educators received only in-service workshops? The results of Study 3 (found in Chapter 4) indicated that both the educators who received coaching and the children in their group used more explicit references to phonological awareness during the posttest craft/writing activity than those in the comparison group. The implications of coaching as part of professional development for emergent literacy training will be discussed.

1.3 Overall Methods

The overarching goal of this doctoral work was to investigate preschool children’s early spelling and writing. The three studies that comprise this dissertation work are drawn from a single database of variables collected at two time points, Time 1 and Time 2. This section describes the recruitment of the participants for this dissertation work as well as information
about all of the early childhood educators and the children who participated in this dissertation work and the measures used in data collection. Finally, this section describes the characteristics of the educators and/or the children who participated in each of the three studies and the measures used in the data analysis for each of these studies.

1.3.1 Participants

1.3.1.1 Recruitment. Early childhood educators were recruited from a number of child care agencies in Metropolitan Toronto by means of a brochure with a fax-back application. Where educators expressed interest in participating in the current research, a research assistant visited the child care centre to explain the research project in detail and obtain the educators’ written consent. The educators agreed to participate in pre- and post-intervention videotaping of an interaction with a small group of children from their class during which they would facilitate a craft/writing activity related to a story they just read. Furthermore, the educators agreed to assist in recruiting a small group of children from their classrooms by sending home an information letter related to the current research along with a parental consent form. The parents who returned a signed consent agreed to have their children participate in language and literacy assessments as well as the videotaping of the educator-child interaction during the craft/writing activity at two time points, in the fall and the spring of the year.

1.3.1.2 Early childhood educators. Once consent was obtained from the early childhood educators, they were asked to complete questionnaires requesting demographic information, details of their educational and professional history, and their current classroom literacy practices. A total of 32 early childhood educators who worked in 31 licensed child care centres took part in the study. The 32 educators were female, had at least 1.5 years of experience
working in childcare settings, and worked in preschool classrooms with 4- and 5-year old children. All educators were the lead teacher in their classroom responsible for curriculum planning and they had completed a two-year post-secondary diploma in Early Childhood Education in Canada. All participating child care programs maintained an adult-child ratio of 1:8 as mandated by law in the Province of Ontario. The ethnic composition of the educators was as follows: 38% Caucasian, 20% Asian, 18% African Heritage, 14% Southeast Asian, 7% Hispanic, and 3% Arabic. Thirteen educators spoke a language other than English at home.

1.3.1.3 Children. Once signed parental consent was received from the families, the four children in each classroom were selected with attempts to include approximately equal numbers of children on the basis of gender, grade (Junior Kindergarten or Senior Kindergarten), eligibility for child care subsidy, and language status (monolingual and bilingual English speakers). Parents completed a questionnaire eliciting demographic information, as well as information about the children’s home language and literacy environment. A total of 129 children participated in this dissertation work (three to four children from each educator’s classroom). The average age of the children was 56.4 months (Range: 41 to 71 months). The children attended English-speaking child care one half of the day five days a week and English-speaking Junior or Senior Kindergarten the other half of the time at pretest in the fall of the year. Kindergarten programs are publicly funded, school-based programs with Junior Kindergarten intended for four year olds and Senior Kindergarten intended for five year olds. Consistent with the large urban setting within which this study took place, 56% of the children in the study were exposed to a language other than English in the home (e.g. Arabic, Bengali, Cantonese, Dari, Hebrew, Hindi, Korean, Mandarin, Nepali, Portuguese, Russian, Spanish, Telugu, Turkish, Twi, and Vietnamese).
1.3.2 Data Collection

Data for the three studies that make up this dissertation work were collected at two time points, Time 1 during the Fall, 2011 and Time 2 during the Spring, 2012, approximately six months later. Upon receiving signed consent from the families, either a research assistant or I met with the children individually in a quiet area of the childcare classroom. The standardized and experimental measures were collected during two 45 minute sessions. The order of the measures was fixed for each of the two sessions but the order of the sessions for each child was counterbalanced. See Table 1 for a summary of the data collection at Time 1 and Time 2.

Table 1
Summary of Data Collection at Time 1 and Time 2

<table>
<thead>
<tr>
<th>Participants &amp; Measures</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nov-Dec, 2011</td>
</tr>
<tr>
<td>Educators (N=32)</td>
<td>Educator demographics</td>
<td>✓</td>
</tr>
<tr>
<td>Children (N = 129)</td>
<td>Demographics/Home language and literacy information</td>
<td>✓</td>
</tr>
<tr>
<td>Standard Measures:</td>
<td>-Non-verbal IQ</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-Expressive vocabulary</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-Phonological awareness</td>
<td>✓</td>
</tr>
<tr>
<td>Experimental Measures:</td>
<td>-Short-term memory</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-Letter naming</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-Letter writing</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-Word spelling</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-Name writing</td>
<td>✓</td>
</tr>
<tr>
<td>Educators &amp; Children</td>
<td>Video-recorded:</td>
<td>-15 min. craft/writing activity</td>
</tr>
</tbody>
</table>
The standardized and experimental measures are then described below.

1.3.2.1 Measures. Non-verbal IQ. The non-verbal matrices subtest of the Kaufman Brief Intelligence Test – Second Edition (KBIT-2; Kaufman & Kaufman, 2004) was administered to assess non-verbal reasoning ability. Using a stimulus manual, the children were asked to point to one of five possible responses to identify the one that is associated with a stimulus picture or fits within a matrix. The internal consistency of this measure for four and five year olds as reported in the manual is .78.

Expressive vocabulary. The Expressive One Word Picture Vocabulary Test, Third Edition (EOWPVT; Brownell, R., 2000) was administered to assess the children’s expressive vocabulary skills. Using standardized procedures, the children were shown a series of pictures in a stimulus book and were prompted to say the names of an object actions and classifications of objects. The internal consistency of this measure for four and five year olds as reported in the manual is .95 and .96, respectively.

Phonological awareness. In order to measure children’s blending and elision ability, both the phonological awareness subtest of the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) and the blending and elision subtests of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) were administered. This was done to capture children’s ability on TOPEL, which is age-normed for three to five years of age, while avoiding ceiling effects for the older children (given that CTOPP is age-normed for five to seven years of age). The children’s scores on both measures were added to create a single blending score and a single elision score.

Short-term memory. The Memory for Digits subtest of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) was administered to
measure the children’s short-term memory. The children were asked to repeat a series of numbers beginning with three trials of two digit numbers up to eight digit numbers. The number of correct trials constituted the child’s score.

**Letter naming task.** The letter naming subtest of the Phonological Awareness Literacy Screening (PALS; Invernizzi, Sullivan, Meier, & Swank, 2004) was administered to assess the children’s knowledge of letter names. Using a fixed random order, the 26 uppercase letters were presented one at a time on 3 X 3 inch laminated white cards. The number of correctly identified letters constituted the child’s score.

**Writing tasks.** For all writing samples, the children were given an 8.5 X 5.5 inch booklet of blank paper and a primer pencil to write their responses. After the child completed all writing tasks, the examiner drew an arrow on each page to indicate how the child chose to orient the booklet during the task.

**Letter writing.** In order to assess letter writing ability, the children were asked to write each of ten letters on a separate page in the booklet. The ten letters (i.e., B, D, S, T, O, A, H, K, M, and C) were dictated one at a time with no time limit. These letters were chosen because they were used in previous studies with preschool children (Puranik & Lonigan, 2011) and have been identified as the earliest letters learned by pre-schoolers (Justice, Pence, Bowles, & Wiggins, 2006). The letter writing responses were scored using a procedure used by Puranik and Apel (2010). For each letter, the children were given a score of 0 if they did not respond, wrote an incorrect letter, or wrote an unrecognizable shape; 1 if the letter was horizontally reversed or poorly formed and would only be recognized by most adult readers in context; and 2 if the letter was written in a conventional form (i.e., upper or lowercase) and would be recognized out of context by most adult readers. A second trained research assistant independently scored 20% of
the randomly selected letter writing samples resulting in an inter-rater reliability of 93% agreement.

**Word spelling.** In order to assess the children’s word spelling ability, the children were asked to write each of nine words on a separate page in the writing booklet. The nine words (i.e., cup, bed, man, hot, pig, lady, rabbit, pretty, train) were dictated one at a time with no time limit. The first five words were consonant-vowel-consonant words with transparent grapheme-phoneme correspondence and similar to stimuli used in recent work (Puranik & Lonigan, 2012). The four additional words included more complex spelling conventions and were used in a previous study (Ouellette & Sénéchal, 2008a). The words were scored using a modified Tangel and Blachman (1992, 1995) scale used in previous studies (Puranik & Apel, 2010; Puranik, Lonigan, & Kim, 2011). Each word spelling was scored using a 9-level rubric that included a score of 0 for no attempt or scribble in a scratching fashion, 1 for a single good letter-like form, 2 for a single conventional letter not phonetically-related to the phonemes in the word, 3 for more than one random letters, 4 for the presence of at least one letter that is phonetically related to any sound in the word in any position, 5 if the first letter was correct, 6 if the first letter was correct and 50% of the consonants are present, 7 if the first letter was correct, more than half of the other letters are present and an attempt was made at representing a vowel sound, 8 if all sounds in the word are represented but in incorrect order, 9 if the word is spelled in conventional form and all letters are recognizable out of context. The children’s scores for each of the nine words were added together to make a single word spelling score. Inter-rater reliability was determined by having a second trained research assistant independently score 20% of the word spelling data. This resulted in a score of 92% agreement.

**Name writing.** In order to assess the children’s name writing ability, the children were
asked to write their name as they usually would on the front page of the writing booklet. The name writing was scored using the same 9-level rubric used for word spelling (Tangel & Blachman, 1992, 1995). Inter-rater reliability was conducted by a trained research assistant who randomly selected and independently scored 20% of the name writing samples. Inter-rater reliability was 90% agreement.

**Video-recording of educator-child interaction during craft/writing activity.** At both pre- and posttest, a research assistant travelled to the childcare centre and video recorded the small group craft/writing activity. Following a storybook reading, *Don’t Forget to Come Back* (Harris, 1978), the educator and the children were seated at a table in the classroom or library of their childcare centre. The research assistant provided the educator with large sheets of paper, crayons, primer pencils, and the storybook. The educators were instructed: "Please ask the children to draw their favourite part of the story on their paper. Please interact the way you normally would. I will video record for 15 minutes. If you are finished before then, please tell me “I’m finished.” Do you have any questions?” The interaction was video recorded for 15 minutes using a portable video camera with a directional microphone. The video recordings were transcribed for all educator and child utterances that occurred during the interaction. These utterances were coded for utterances related to phonological awareness and print talk. Between pre- and post-test recordings, all educators received intervention, that is, professional development in emergent literacy. This enabled us to identify the effects of coaching by a speech language pathologist on educator-child interactions related to phonological awareness and print-related talk when this support was added to in-service workshops.

1.4 Methods for Study 1 (found in Chapter 2)

1.4.1 Participants
Of the 129 children who participated in this dissertation work, 95 children participated in Study 1 found in Chapter 2. Twenty-nine children were excluded from Study 1 because their parents reported that the language the children heard and spoke most often in the home was a language other than English. Four additional children were excluded because they were younger than 45 months of age and one child was excluded because the non-verbal reasoning score was greater than 1.5 SD below the mean. See Table 2 for summary characteristics of the 95 children who participated in Study 1.

Table 2

Summary Characteristics of the Children in Study 1 (found in Chapter 2)

<table>
<thead>
<tr>
<th>Variables</th>
<th>(N = 95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>57.7 (6.6)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>51</td>
</tr>
<tr>
<td>Maternal education</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td>5 (college diploma)</td>
</tr>
<tr>
<td>Home language</td>
<td>English only</td>
</tr>
<tr>
<td></td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>English + other language</td>
</tr>
<tr>
<td></td>
<td>42</td>
</tr>
</tbody>
</table>

1.4.2 Measures

Data collection for Study 1 (found in Chapter 2) was conducted at Time 1 only and included measures of the children and not the educators. The measures used in the data analysis for Study 1 are listed in Table 3.
Table 3

*Measures used in the Analysis for Study 1*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Measures</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nov-Dec, 2011</td>
<td>May-June, 2012</td>
</tr>
<tr>
<td>Educators</td>
<td>Educator demographics</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Children</td>
<td>Demographics/Home language and literacy</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>(N=95)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Non-verbal IQ</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Expressive vocabulary</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Phonological awareness</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Experimental</td>
<td>-Short-term memory</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Measures:</td>
<td>-Letter naming</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Letter writing</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Word spelling</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Name writing</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Educators &amp; Children</td>
<td>Video-recorded:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-15 min. craft/writing activity</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1.5 Methods for Study 2 (found in Chapter 3)

1.5.1 Participants

Of the 129 children who participated in this dissertation work, 75 children participated in Study 2, 25 in each of the three language groups. Study 2, as described in Chapter 3, examined the emergent literacy skills of two groups of preschool-aged ELLs relative to a group of their monolingual English peers. The two groups of bilingual children were determined based on parent report of the language the child heard and spoke most often in the home. See Table 4 for
a description of how the three groups of children were selected for Study 2. From the 129 children who participated in this dissertation work, the parents of 73 of the children reported that

### Table 4

*Description of How the Three Groups of Children Were Selected for Study 2*

<table>
<thead>
<tr>
<th>Group 1 – EL1 (n = 25)</th>
<th>Group 2 – EL2 Eng (n = 25)</th>
<th>Group 3 – EL2 Other (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent reported language child heard and spoke most often at home: English</td>
<td>Parent reported language child heard and spoke most often at home: Minority</td>
<td></td>
</tr>
<tr>
<td>Minority language (n = 73)</td>
<td>Excluded: 2 children – parent did not record the language heard/spoken most at home</td>
<td>18 children – parent reported child heard the home language less than 10%</td>
</tr>
<tr>
<td>Randomly selected 25 children matching for age and gender</td>
<td>3 children – did not complete the test battery</td>
<td></td>
</tr>
<tr>
<td>English only (n = 56)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Expressive Vocabulary*: $F(2,70) = 8.586, p < .001, \eta^2=.197$

the children regularly heard and spoke a minority language in the home and the parents of 56 of the children reported that the children heard and spoke only English in the home. Of the 73 bilingual children, 23 were excluded for the following reasons: the parents of 18 of the children reported that their child heard the minority language in the home less than 10% of the time, the parents of two of the children did not report the language the child heard and spoke most often in the home, and three children did not complete the test battery. Of the remaining 50 ELL

Table 5

Summary Characteristics of the Children Across Language Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>EL1</th>
<th>ELL-English</th>
<th>ELL-Minority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months</td>
<td>56.68 (5.59)</td>
<td>58.64 (6.49)</td>
<td>55.04 (5.36)</td>
</tr>
<tr>
<td>Age in months began English childcare</td>
<td>26.52 (14.8)</td>
<td>27.83 (11.9)</td>
<td>25.42 (10.4)</td>
</tr>
<tr>
<td>Non-verbal IQ¹</td>
<td>105.16 (12.9)</td>
<td>101.40 (11.1)</td>
<td>99.68 (10.9)</td>
</tr>
<tr>
<td>Short-term memory²</td>
<td>9.16 (2.2)</td>
<td>9.12 (2.0)</td>
<td>8.60 (2.9)</td>
</tr>
<tr>
<td>Expressive vocabulary³</td>
<td>49.48 (13.8)</td>
<td>45.48 (15.4)</td>
<td>33.24 (12.6)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Maternal Education (Mdn)⁴</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Home Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%Time hear L1</td>
<td>-</td>
<td>46.80 (19.47)</td>
<td>65.20 (21.82)</td>
</tr>
<tr>
<td>%Time speak L1</td>
<td>-</td>
<td>24.44 (15.23)</td>
<td>53.80 (20.68)</td>
</tr>
</tbody>
</table>

¹Kaufman Brief Intelligence Scale II (KBIT-2; Kaufman & Kaufman, 2004); standard scores
²Memory for Digits subtest of Comprehensive Test of Phonological Processing (CTOPP; Wagner et al., 1999); raw scores
³Expressive One Word Picture Vocabulary Test – III (EOWPVT-3; Brownell, 2000); raw scores
⁴A score of 5 corresponds to a 2-year post-secondary diploma
children, the parents of 25 children reported that the children heard and spoke English most often at home (ELL-English group) and the parents of the other 25 children reported that the children heard and spoke a minority language most often at home (ELL-Minority language group). This resulted in two groups of 25 children in the two ELL groups. The group of 25 monolingual English children was selected from the 56 children whose parents reported that the children heard and spoke only English at home, matching for age and gender. See Table 5 for summary characteristics of the children in each of the three language groups.

Table 6

*Measures Used in the Analysis for Study 2*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Measures</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nov-Dec,</td>
<td>May-June, 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Educators</td>
<td>Educator demographics</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Children</td>
<td>Demographics/Home language and literacy</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>(N=75)</td>
<td>information</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard -Non-verbal IQ</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Measures: -Expressive vocabulary</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Phonological awareness</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Experimental</td>
<td>Measures: -Short-term memory</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Experimental -Name writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Letter naming</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Letter writing</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-Word spelling</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Educators &amp;</td>
<td>Video-recorded: -15 min. craft/writing activity</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.5.2 Measures

Data collection for Study 2 (found in Chapter 3) was conducted at Time 1 only and included measures of the children only and not the educators. The measures used in the data analysis for Study 2 are listed in Table 6.

1.6 Methods for Study 3 (found in Chapter 4)

1.6.1 Participants

A total of 32 early childhood educators and 125 children, that is, three to four children in each of the educators’ classrooms, participated in Study 3. The educators and the children in their small group were randomly assigned to the experimental and comparison group. See Table 7 for summary characteristics of the educators in the experimental and comparison groups who participated in this study. See Table 8 for summary characteristics of the children in the

Table 7

Summary Characteristics of the Experimental and Comparison Groups of Educators

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental (n=15)</th>
<th>Comparison (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years (SD)</td>
<td>40.6 (8.7)</td>
<td>37.2 (7.8)</td>
</tr>
<tr>
<td>Years of Post-Secondary Education</td>
<td>3.4 (1.8)</td>
<td>3.1 (1.4)</td>
</tr>
<tr>
<td>Years of Experience in Child Care</td>
<td>14.8 (7.9)</td>
<td>11.9 (7.2)</td>
</tr>
<tr>
<td>Years of Experience with Age Group</td>
<td>9.2 (5.6)</td>
<td>10.2 (7.2)</td>
</tr>
<tr>
<td>Number of Children in Classroom</td>
<td>16.5 (5.9)</td>
<td>16.7 (5.9)</td>
</tr>
<tr>
<td>Number of Adults in Classroom</td>
<td>2.2 (1.1)</td>
<td>2.6 (0.9)</td>
</tr>
<tr>
<td>Hours Read to Large Groups</td>
<td>3.3 (1.3)</td>
<td>2.8 (2.1)</td>
</tr>
<tr>
<td>Hours Read to Small Groups</td>
<td>2.6 (1.7)</td>
<td>1.9 (1.8)</td>
</tr>
</tbody>
</table>
experimental and comparison groups who participated in Study 3.

Table 8

**Summary Characteristics of the Experimental and Comparison Groups of Children**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>n</em> = 62</td>
<td><em>n</em> = 67</td>
</tr>
<tr>
<td></td>
<td><em>M</em> (SD)</td>
<td><em>M</em> (SD)</td>
</tr>
<tr>
<td>Age in Months (<em>SD</em>)</td>
<td>55.8 (6.7)</td>
<td>56.9 (6.9)</td>
</tr>
<tr>
<td>Age began child care in months (<em>SD</em>)</td>
<td>22.3 (11.7)</td>
<td>25.2 (13.3)</td>
</tr>
<tr>
<td>Maternal Education Level</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Subsidy</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>Exposure to Language other than English</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>Grade</td>
<td>JK</td>
<td>JK</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>SK</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>35</td>
</tr>
</tbody>
</table>

Note: One educator and the four children in her classroom were excluded from the data analysis due to mechanical failure that rendered the educator’s Time 1 videotape unusable. This resulted in 31 educators and 121 children who were included in the analysis for Study 3 (found in Chapter 4).

### 1.6.2 Measures

Data collection for Study 3 (found in Chapter 4) was conducted at Time 1 and Time 2 and included measures of both the educators and the children. At Time 1, demographic data for both
the educators and children were used to ensure there were no group differences on any relevant variables. Also at Time 1, child measures of non-verbal IQ, expressive vocabulary, phonological awareness, letter naming, and letter writing were collected to ensure that there were no significant differences in the children’s knowledge and skills between the experimental and comparison groups. Finally, at both Time 1 and Time 2, the educators were videotaped facilitating a 15 minute craft/writing activity with the small group of children from their

Table 9

*Measures Used in the Analysis for Study 3*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Measures</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nov-Dec,</td>
<td>May-June, 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Educators (N=31)</td>
<td>Educator demographics</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Children (N=121)</td>
<td>Demographics/Home language and literacy</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-verbal IQ</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Expressive vocabulary</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Phonological awareness</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Experimental</td>
<td>Short-term memory</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Letter naming</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Letter writing</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Word spelling</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Name writing</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Educators &amp; Children recorded:</td>
<td>-15 min. craft/writing activity</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
classroom. The videotaped interactions were transcribed and coded for educators’ and children’s utterances related to phonological awareness and print talk. See Table 9 for the list of measures collected at Time 1 and Time 2 and analyzed in Study 3.

1.6.3 Professional Development Program. Between Time 1 and Time 2, the educators in Study 3 received professional development related to emergent literacy. The professional development program utilized in this study was ABC & Beyond™ - The Hanen Program® for Building Emergent Literacy (Greenberg, 2011). All of the educators participated in seven half-day workshops for a total of 21 hours of in-service workshop training. On each of three days, two workshops were administered, one in the morning and one in the afternoon, with a final fourth half-day session at the end to review the information covered in the previous workshops. These four training dates were held once every three weeks and the topics of the sessions included shared book reading, vocabulary, story structure, inferential language, print knowledge, and phonological awareness. These workshops were co-taught by two speech-language pathologists who had extensive experience consulting with early childhood educators in child care settings. Following each of the four days of workshops, the educators in the experimental group received one 45 minute session of individualized classroom coaching with a speech language pathologist. The content of the coaching session focused on the concepts taught in the workshops that preceded the session. Fidelity was measured and reported in Study 4.
1.7 References


(Accessed on 8 July, 2010).


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dual language learners growing up in the United States: A call for research. *Child
Development Perspectives, 5*(1), 4–9. doi:10.1111/j.1750-8606.2010.00140.x


Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading:
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doi: 10.1037/0012-1649.38.6.934


print during classroom-based, large-group shared reading. *Language, Speech, and Hearing
Chapter 2

Cognitive, linguistic, and print-related predictors of preschool children’s word spelling and name writing

Abstract

Preschool children begin to represent spoken language in print long before receiving formal instruction in spelling and writing. The current study sought to identify the component skills that contribute to children’s ability to spell words and write their name. Ninety-five preschool children (Mean age = 57 months) completed a battery of cognitive and linguistic measures as well as spelling/writing tasks (i.e., letter, word, and name). All writing samples were scored using scoring matrices and inter-rater reliability was above 89%. Hierarchical linear regression was conducted for word spelling indicating that after controlling for age and IQ, the model of best fit included expressive vocabulary, working memory, blending, letter naming, and letter writing ability. Logistic regression was conducted for name writing indicating that the model of best fit, after controlling for age and non-verbal IQ, was expressive vocabulary, letter naming, and letter writing. This model correctly classified 81.7% of the preschool children who wrote their name conventionally and those who could not. Letter writing explained unique variance in both word spelling and name writing and phonological awareness explained unique variance in word spelling only. These findings suggest that different processes underlie word spelling and name writing, supporting the consideration of a dual-route model of children’s early spelling and writing ability.

Keywords: spelling, name writing, preschool, dual-route model
Preschool children often begin to represent spoken language in print prior to receiving formal instruction in writing and spelling. When a four year old girl wrote in her grandmother’s birthday card “HP BrDA NNe” (Happy Birthday Nanny), she was using ‘invented spelling’ (Chomsky, 1971; Ouellette & Sénéchal, 2008b; Read, 1971; Tangel & Blachman, 1992). Examination of children’s early spelling and writing indicate that these abilities typically progress from drawing or scribbling as a means of representing language graphically to using letters to represent and spell words (Pelletier & Lasenby, 2007; Puranik & Lonigan, 2012; Tangel & Blachman, 1992, 1995; Treiman & Bourassa 2000). The skills and knowledge considered to be developmental precursors to conventional spelling are believed to change as children’s spelling becomes more accurate and refined (Kaderavek, Cabell, & Justice, 2009; Pollo, Treiman, & Kessler, 2008; Shatil, Share, & Levin, 2000). Accordingly, children’s name writing and word spelling may rely on different cognitive and linguistic skills given that name writing develops earlier than word spelling (Levin, Both, de Vries, Aram, & Bus, 2005).

Writing is a complex task that draws on children’s knowledge about language and its relation to print. Identifying the component skills that support preschool children’s ability to engage in writing tasks may provide insight into how children begin to map language to print. Studies indicate that there is overlap in the skills that underlie name writing and word spelling (Puranik, Lonigan, & Kim, 2011; Ouellette & Sénéchal, 2008a). However, few studies have simultaneously compared name writing and word spelling and little is known about the development of these skills in the same group of children (Puranik & Lonigan, 2012). Furthermore, name writing development does not appear to fit within the phase models of spelling development that describe the developmental stages children go through as they advance from early scribbles to conventional name writing. The purpose of the current study is
to identify the component cognitive, linguistic, and emergent literacy skills that contribute to preschool children’s proficiency in writing their name and spelling written words. The results of this study may have implications for a more dynamic model for spelling than phase models suggest.

A model provides us with “a way of depicting a theory’s variables, mechanisms, constructs, and interrelationships” (Singer & Ruddell, 1985; p. 620). Further, it allows us to conceptualize our understanding of a theory and make modifications if the theory is determined to be incomplete or inaccurate. Classic stage models of spelling development describe children’s systematic progression from the early use of phonology to spell words, to their gradual use of letter-sound and orthographic knowledge to achieve conventional spelling (Ehri, 1987; Frith, 1980; Gentry, 2004; Henderson, 1985). Ehri (2000) renamed stage models, ‘phase models’, to better capture the overlap in children’s knowledge that characterizes the transition between phases. A closer look at these phase models is warranted in order to highlight distinctions in preschool children’s name writing and word spelling that are not accounted for by these models.

During the first phase, referred to as precommunicative or pre-alphabetic stage (Ehri, 1987; Gentry, 2004), children demonstrate an understanding that print represents meaning through the production of scribbles, letter-like forms, or random letter strings as symbols to represent words. Although children may possess some alphabetic knowledge, they possess little or no knowledge of letter-sound correspondence. During the second phase, the semi-phonetic or partial-alphabetic stage, children show awareness that letters represent speech sounds and that specific letters are used to represent sounds in words. The third phase, the phonetic or alphabetic stage, is characterized by a total mapping of letter-sound correspondence with all or most sounds phonetically represented but the letter sequences do not include spelling conventions.
During this phase, the spelling incorporates more of the conventions of English orthography, such as use of vowels and consonants to replace the letter name strategy. Finally, the correct spelling phase or consolidated alphabetic stage is characterized by few spelling miscues and a broad knowledge of orthographic conventions.

While effective for describing the developmental progression of spelling (Gentry, 2000; Treiman, 2004), these phase models do not explain some aspects of young children’s early spelling (Reece & Treiman, 2001). Studies of children’s orthographic knowledge have shown that children have knowledge about print earlier than is suggested by phase models. For example, preschool children judge nonword spellings as words when they have double consonants in the coda but not in the onset (Cassar & Treiman, 1997). Further, young children often write their names conventionally prior to learning to spell words (Levin et al., 2005). However, given that young children often do not possess knowledge of the letters in their names (Treiman & Broderick, 1998), this early ability does not appear to be accounted for in phase models. Finally, phase models suggest a singular linear path of spelling development, whereas differences between children’s name writing and word spelling may suggest that a more dynamic model is necessary to explain early development of these skills.

2.1.1 Name writing

Literature related to young children’s name writing consistently reports that name writing progresses to conventional writing faster than word spelling (Ferreiro & Teberosky, 1982), that it promotes writing and spelling ability (Levin, et al., 2005), and that it is associated with other literacy competencies (Bloodgood, 1999; Puranik & Lonigan, 2012; Molfese, Beswick, Molnar, & Jacobi-Vessels, 2006; Welsch, Sullivan, & Justice, 2003). Often, children are able to write their names correctly without having knowledge of the individual letter names
or sounds (Drouin & Harmon, 2009; Treiman & Broderick, 1998; Villaume & Wilson, 1989). In this way, children’s initial name writing is considered to be logographic such that they produce their written name as a single orthographic form (Bloodgood, 1999; Puranik & Lonigan, 2011). Cross-linguistic studies in Hebrew and Dutch (Levin, et al., 2005) and Cantonese (Chan & Louie, 1992) also indicate that, across different writing systems, preschool children demonstrate early ability to write their names prior to other words. Phase models, as well as Share’s self-teaching model (Share, 1995), postulate that children acquire an orthographic form by first learning to recode the word from speech to print, and after repeated exposures, acquire the word as a single orthographic form. Hence, preschool children’s name writing proficiency is not consistent with the developmental progression suggested by these models and may represent a process that is uniquely different than word spelling. Identifying the component skills that support children’s ability to write their names may provide insight into early writing development.

Recent literature indicates that there are discrepancies across studies regarding the sub-skills that support children’s ability to write their names, particularly phonological awareness. Phonological awareness refers to the awareness of and ability to manipulate the sounds in language (Stanovich, Cunningham, & Cramer, 1984). This ability encompasses a number of skills, including blending (Schuele & Boudreau, 2008). Welsch, Sullivan, and Justice (2003) examined name writing samples collected from a very large sample of preschoolers (N=3546) and found that, after controlling for age, only print-related skills (i.e., alphabet and print knowledge), contributed to variance in the children’s name writing ability. Phonological awareness (i.e., rhyme awareness and initial sound awareness) made little contribution to the model. Bloodgood (1999) found that four and five year old children’s name writing was
correlated with letter writing, word recognition, and understanding of the concept of a word but not with phonological awareness skills (i.e., syllable tapping, rhyme recognition, and initial sound sorts). Puranik, Lonigan, and Kim (2011) also reported that while preschool children’s print knowledge and letter writing skills predicted their name writing, phonological awareness (i.e., blending and elision) did not. Conversely, Blair and Savage (2006) reported that letter-sound knowledge and phonological awareness (i.e., matching sounds) were strong predictors of preschool children’s name writing ability. This finding suggests that children may make use of analysis of sound to write their name. The current study seeks to identify the component skills that support preschool children’s name writing ability and to determine the role of phonological analysis in this early writing task.

2.1.2 Word spelling

Preschool children often engage in writing behaviors prior to formal instruction, such as, ‘writing’ grocery lists or letters during play. These early invented spellings often include the letters of the child’s name (Bloodgood, 1999; Treiman, Kessler, & Bourassa, 2001). As children learn the alphabetic principle, they make use of their knowledge of the letters in their name to learn about other letters (Sulzby, Barnhart, & Hieshima, 1989; Treiman & Broderick, 1998). In this way, children’s name writing provides them with a foothold to learn about print and the need to use phonological recoding of sound to spell words (Both-de-Vries, & Bus, 2008). Researchers propose that as children repeatedly recode a word using phoneme-to-grapheme conversion, they acquire an orthographic form for that word spelling (Ehri, 2000; Share, 1995, 1999). Understanding the component skills and knowledge that underlie preschool children’s word spelling as they begin to spell words can help us to understand how children learn to spell.

A key element that is expected to play a role in children’s early word spelling is
phonological awareness. Ouellette and Sénéchal (2008a) reported that after controlling for age, parental education, and cognitive ability, phonological awareness (i.e., sound matching, elision, and blending) accounted for 31% of the variance in five year old children’s invented spelling ability. McBride-Chang (1998) reported that phonological awareness accounted for 41% of the variance in spelling outcomes after controlling for age and IQ. Neither of these models included a measure of letter writing. Furnes and Samuelsson (2009) investigated the cross-linguistic differences in the cognitive and linguistic skills predicting US/Australian and Scandinavian kindergarten children’s word spelling ability. They found that print awareness and phonological awareness were the strongest predictors of kindergarten children’s spelling. Together with language ability, these skills predicted 32% of the variance in invented spelling scores. There was no statistical difference across language groups. Puranik, Lonigan, and Kim (2011) reported that alphabet knowledge, print knowledge, phonological awareness (blending), and letter writing predicted 39% of the variance in preschool children’s word spelling. This study provides support for the role of letter writing, along with other emergent literacy variables, as an important contributor to children’s early writing ability. In contrast, only one known study reported that print-related skills alone (i.e., word and print awareness) predicted preschool children’s word spelling (Niessen, Strattman, & Scudder, 2011). This study used a composite score of phoneme elision, beginning sound sort, and rhyme awareness as a measure of phonological awareness but reported that this composite measure did not contribute to word spelling. In the current study, a number of predictor variables, including cognitive factors (age, memory, non-verbal IQ), linguistic factors (expressive vocabulary, phonological awareness (blending)), and print-related skills (letter naming and letter writing) were considered.
2.1.3 Name writing and word spelling distinctions

Because young children can recognize and write their name without knowledge of all of the letters in their name, there may be a direct route to writing their name as a single orthographic form. It is conceivable that a child’s name is the first word ‘learned’ using visual cues alone and that young children can ‘acquire’ orthographic representations of words without phonological processing. Thus, if children are learning to write their name and spell words simultaneously using different processes, a more dynamic developmental process may underlie their acquisition than linear phase models suggest. An alternative model to explain the difference between name and word spelling may be a dual-route model of spelling. This dual-route model has previously focused on acquired spelling disorders, or dysgraphia in adults (Houghton & Zorzi, 2003; Rapp, Epstein, & Tainturier, 2002). Houghton and Zorzi (2003) successfully generated a computational dual-route model of spelling that produced comparable spelling results to two patients who had acquired surface dysgraphia. The extent to which this model may apply to spelling development in preschoolers has yet to be explored. Given that the literature related to preschool children’s name writing and word spelling indicates there may be differences in children’s use of phonology versus visual features of writing across these two writing tasks, it would appear that two ‘routes’ may explain the early emergence of these two writing abilities.

The current study has two primary questions. The first question investigates the component cognitive, linguistic, and emergent literacy skills that predict preschool children’s word spelling. Based on Puranik, Lonigan, and Kim (2011), our hypothesis is that word spelling will be predicted by phonological awareness (i.e., blending) and letter writing. The second question of this study examines the component cognitive and emergent literacy skills that
predict preschool children’s name writing. Based on the work of Molfese and her colleagues (2006), our hypothesis is that print-related knowledge and skills, such as letter knowledge and letter writing, will predict children’s name writing ability and not phonological awareness.

2.2 Method

2.2.1 Participants

There were 95 children (52 females), ranging in age from 46 to 71 months (M = 57.7, SD = 6.6), who participated in this study. These preschool children were part of a larger study that examined the effects of an emergent literacy professional development program on preschool educators’ classroom practice and child language and literacy outcomes (Namasivayam, Hipfner-Boucher, Milburn, Weitzman, Greenberg, Pelletier, & Girolametto, in press). There were 129 preschoolers enrolled in the larger study. Twenty-nine children were excluded from the current study because their parents reported that the language the child heard and spoke most often in the home was other than English. Additionally, five children were excluded because four were younger than 45 months of age and one scored below 1.5 SD on the non-verbal reasoning measure. The current study reports on the children’s language and literacy outcomes prior to intervention, at pretest only.

The children were recruited from 31 childcare centres throughout Metropolitan Toronto. Informed consent forms were sent home with all of the children and of those who returned signed consent forms in each class, four children were randomly selected balancing for an equivalent number of males and females wherever possible. Where only three consents were returned that met the eligibility requirements for this study, three students were included. Once consent to participate in the study was obtained from the families, parents were asked to complete a questionnaire related to child characteristics. Table 10 provides summary data of the
characteristics of the children. The median rank for maternal education was a college diploma. A total of 53 children (i.e., 56%) were receiving subsidy, indicating that they came from low-income homes. Additionally, 43% were Caucasian/White, 26% African-American/Black, 4% Hispanic/Latino, 1% Native American Indian; 20% Asian, and the remaining children’s ethnic/racial identities were multi-racial, 5%.

2.2.2 Procedure

Trained research assistants, who were blind to the design and broader goals of the study, met individually with the children in a quiet area in their preschool classroom. Given the age of the children, the measures described below were administered during two forty-five minute sessions. The order of presentation of the tests within each session was fixed; however, the order in which the two sessions were conducted was random. All children provided verbal assent to

Table 10

*Summary Characteristics of the Children*

<table>
<thead>
<tr>
<th>Variables</th>
<th>(N = 95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>M (SD) 57.7 (6.6)</td>
</tr>
<tr>
<td></td>
<td>Min-Max 46-71</td>
</tr>
<tr>
<td>Gender</td>
<td>Male 44</td>
</tr>
<tr>
<td></td>
<td>Female 51</td>
</tr>
<tr>
<td>Maternal Education</td>
<td>Median 5 (college diploma)</td>
</tr>
<tr>
<td></td>
<td>Min-Max 1-7 (less than grade 8 – graduate degree)</td>
</tr>
<tr>
<td>Subsidy</td>
<td>Yes 53</td>
</tr>
<tr>
<td></td>
<td>No 42</td>
</tr>
<tr>
<td>Home Language</td>
<td>English only 53</td>
</tr>
<tr>
<td></td>
<td>English + other language 42</td>
</tr>
</tbody>
</table>
participate prior to testing.

2.2.2.1 Measures.

Expressive vocabulary. The Expressive One Word Picture Vocabulary Test, Third Edition (EOWPVT; Brownell, R., 2000) was administered to assess the children’s expressive vocabulary skills. Using standardized procedures, the children were shown a series of pictures in a stimulus book and were prompted to say the names of an object actions and classifications of objects. The internal consistency of this measure for four and five year olds as reported in the manual is .95 and .96, respectively.

Non-verbal IQ. The non-verbal matrices subtest of the Kaufman Brief Intelligence Test – Second Edition (KBIT-2; Kaufman & Kaufman, 2004) was administered to assess non-verbal reasoning ability. Using a stimulus manual, the children were asked to point to one of five possible responses to identify the one that is associated with a stimulus picture or fits within a matrix. The internal consistency of this measure for four and five year olds reported in the manual is .78.

Phonological awareness. In order to measure children’s blending and elision ability, both the phonological awareness subtest of the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) and the blending and elision subtests of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) were administered. This was done to avoid having children ceiling on TOPEL, which is age-normed for three to five years, while CTOPP is age normed for five to seven years. The children’s scores on both measures were added to create a single blending score and a single elision score.

Letter naming task. The letter naming subtest of the Phonological Awareness Literacy
Screening (PALS; Invernizzi, Sullivan, Meier, & Swank, 2004) was administered to assess the children’s knowledge of letter names. Using a fixed random order, the 26 uppercase letters were presented one at a time on 3 X 3 inch laminated white cards. The number of correctly identified letters constituted the child’s score.

**Short-term memory.** The Memory for Digits subtest of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) was administered to measure the children’s short-term memory. The children were asked to repeat a series of numbers beginning with three trials of two digit numbers up to eight digit numbers. The number of correct trials constituted the child’s score.

**Writing tasks.** For all writing samples, the children were given an 8.5 X 5.5 inch booklet of blank paper and a primer pencil to write their responses. After the child completed all writing tasks, the examiner drew an arrow on each page to indicate how the child chose to orient the booklet during the task.

**Letter writing.** In order to assess letter writing ability, the children were asked to write each of ten letters on a separate page in the booklet. The ten letters (i.e., B, D, S, T, O, A, H, K, M, and C) were dictated one at a time with no time limit. These letters were chosen because they were used in previous studies with preschool children (Puranik & Lonigan, 2011) and have been identified as the earliest letters learned by pre-schoolers (Justice, Pence, Bowles, & Wiggins, 2006). The letter writing responses were scored using a procedure used by Puranik and Apel (2010). For each letter, the children were given a score of 0 if they did not respond, wrote an incorrect letter, or wrote an unrecognizable shape; 1 if the letter was horizontally reversed or poorly formed and would only be recognized by most adult readers in context; and 2 if the letter was written in a conventional form (i.e., upper or lowercase) and would be recognized out of
context by most adult readers. A second trained research assistant independently scored 20% of the randomly selected letter writing samples resulting in an inter-rater reliability of 93% agreement.

**Word spelling.** In order to assess the children’s word spelling ability, the children were asked to write each of nine words on a separate page in the writing booklet. The nine words (i.e., cup, bed, man, hot, pig, lady, rabbit, pretty, train) were dictated one at a time with no time limit. The first five words were consonant-vowel-consonant words with transparent grapheme-phoneme correspondence and similar to stimuli used in recent work (Puranik & Lonigan, 2012). The four additional words included more complex spelling conventions and were used in a previous study (Ouellette & Sénéchal, 2008a). The words were scored using a modified Tangel and Blachman (1992, 1995) scale used in previous studies (Puranik & Apel, 2010; Puranik, Lonigan, & Kim, 2011). Each word spelling was scored using a 9-level rubric that included a score of 0 for no attempt or scribble in a scratching fashion, 1 for a scribble with linearity, 2 for a one or more letter-like forms, 3 for a single conventional letter not phonetically-related to the phonemes in the word, 4 for more than one random letter, 5 for the presence of at least one letter that is phonetically related to any sound in the word in any position, 6 if the first letter was correct, 6 if the first letter was correct and 50% of the consonants are present, 7 if the first letter was correct and the writing contains two thirds of the related phonemes but not a repetition of the same letter, 8 if more than half of the other letters are present and an attempt was made at representing a vowel sound, 9 if the word was spelled in conventional form and all letters were recognizable out of context. The children’s scores for each of the nine words were added together to make a single word spelling score. Inter-rater reliability was determined by having a second trained research assistant independently score 20% of the word spelling data. This
resulted in a score of 92% agreement.

**Name writing.** In order to assess the children’s name writing ability, the children were asked to write their name as they usually would on the front page of the writing booklet. The name writing was scored using the same 9-level rubric used for word spelling (Tangel & Blachman, 1992, 1995). Inter-rater reliability was conducted by a trained research assistant who randomly selected and independently scored 20% of the name writing samples. Inter-rater reliability was 90% agreement.

### 2.3 Results

The results are presented in three sections. The first section examines the descriptive statistics and correlations among all predictor and outcome variables. The second section reports the component cognitive and emergent literacy skills that predict preschool children’s word spelling scores. Finally, the third section presents the component cognitive and emergent literacy skills that predict preschool children’s ability to write their name.

Descriptive statistics for all variables are presented in Table 11. A series of independent samples t-tests indicated that there were no statistical differences between the children exposed to a second language in the home and those who were not on any of the variables of interest in this study, $t_s(72.2-93) = -0.997 - 1.663, ps = .322 - .915$. Further, independent samples t-tests indicated that there were no statistical differences in gender on any variable of interest, $t_s(91-93) = -1.324 - .595, ps = .189 - .946$. Therefore, home language experience and gender were not included in the regression model. Both bivariate and partial correlations (controlling for age) are presented in Table 12 for all variables. All the measures were significantly and positively related to the outcome variables with the exception of four variables that were not significantly
Table 11

*Descriptive Statistics for Predictor and Outcome Variables*

<table>
<thead>
<tr>
<th>Variables</th>
<th>M (SD)</th>
<th>Min-Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-verbal IQ¹</td>
<td>14.60 (3.7)</td>
<td>7 - 27</td>
</tr>
<tr>
<td>Expressive Vocabulary²</td>
<td>48.81 (13.1)</td>
<td>15 - 84</td>
</tr>
<tr>
<td>Short-term Memory³</td>
<td>9.04 (2.4)</td>
<td>3 - 16</td>
</tr>
<tr>
<td>Blending (comb TOPEL &amp; CTOPP)⁴</td>
<td>15.01 (6.6)</td>
<td>0 - 29</td>
</tr>
<tr>
<td>Elision (comb TOPEL &amp; CTOPP)⁴</td>
<td>9.91 (6.0)</td>
<td>0 - 29</td>
</tr>
<tr>
<td>Letter Naming⁵</td>
<td>21.36 (6.8)</td>
<td>1 - 26</td>
</tr>
<tr>
<td>Letter Writing</td>
<td>13.86 (5.6)</td>
<td>0 - 20</td>
</tr>
<tr>
<td>Word Spelling</td>
<td>34.07 (26.2)</td>
<td>0 - 81</td>
</tr>
<tr>
<td>Name Writing</td>
<td>7.95 (1.6)</td>
<td>0 - 10</td>
</tr>
</tbody>
</table>

²Expressive One Word Picture Vocabulary Test – III (Brownell, 2000)
³Memory for Digits subtest of Comprehensive Test of Phonological Processing (CTOPP; Wagner, et al., 1999)
⁴Blending and Elision subtests of Test of Preschool Early Literacy (TOPEL; Lonigan, et al., 2007) and CTOPP; Wagner et al., 1999
⁵Alphabet Knowledge subtest of Phonological Awareness Literacy Screen (PALS; Invernizzi, et al., 2004).

*Note*: All scores are raw scores.

correlated with name writing (non-verbal IQ, working memory, blending, and elision) and one variable that was not significantly correlated with word spelling. Children’s word spelling was moderately correlated with memory, expressive vocabulary, blending, elision, and alphabet naming ($rs = .34, .33, .37,.35, and .32$), and strongly correlated with age, and letter writing ($rs = .53$ and 52). These effect sizes were determined using guidelines from Cohen (1988). Children’s name writing was mildly correlated with age, expressive vocabulary, and alphabet naming ($rs = .28, .22, and .22$), and strongly correlated with letter writing ($r = .63$). Two independent
Table 12

*Correlations of Predictor and Outcome Variables*

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</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>1</td>
<td>.43***</td>
<td>.31**</td>
<td>.36***</td>
<td>.47***</td>
<td>.49***</td>
<td>.28**</td>
<td>.56***</td>
<td>.28**</td>
<td>.53***</td>
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<tr>
<td>2. Non-verbal IQ</td>
<td>1</td>
<td>.45***</td>
<td>.33***</td>
<td>.47***</td>
<td>.55***</td>
<td>.22*</td>
<td>.37***</td>
<td>ns</td>
<td>.38***</td>
<td>.38***</td>
</tr>
<tr>
<td>3. Phonological Memory</td>
<td>.37***</td>
<td>1</td>
<td>.38***</td>
<td>.41***</td>
<td>.49***</td>
<td>.22*</td>
<td>.36***</td>
<td>ns</td>
<td>.44***</td>
<td>.53***</td>
</tr>
<tr>
<td>4. Expressive Vocabulary</td>
<td>.37***</td>
<td>.31**</td>
<td>1</td>
<td>.53***</td>
<td>.57***</td>
<td>.36***</td>
<td>.40***</td>
<td>.27*</td>
<td>.45***</td>
<td>.45***</td>
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<td>5. Blending</td>
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<td>.44***</td>
<td>1</td>
<td>.77***</td>
<td>.26*</td>
<td>.44***</td>
<td>.44***</td>
<td>.44***</td>
<td>.44***</td>
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<tr>
<td>6. Elision</td>
<td>.33***</td>
<td>.32**</td>
<td>.44***</td>
<td>1</td>
<td>.77***</td>
<td>.26*</td>
<td>.44***</td>
<td>.44***</td>
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<td>.44***</td>
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<tr>
<td>7. Alphabet Naming</td>
<td>.37***</td>
<td>.32**</td>
<td>.44***</td>
<td>1</td>
<td>.77***</td>
<td>.26*</td>
<td>.44***</td>
<td>.44***</td>
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<td>.44***</td>
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<tr>
<td>8. Letter Writing</td>
<td>.37***</td>
<td>.32**</td>
<td>.44***</td>
<td>1</td>
<td>.77***</td>
<td>.26*</td>
<td>.44***</td>
<td>.44***</td>
<td>.44***</td>
<td>.44***</td>
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<tr>
<td>9. Name Writing</td>
<td>.37***</td>
<td>.32**</td>
<td>.44***</td>
<td>1</td>
<td>.77***</td>
<td>.26*</td>
<td>.44***</td>
<td>.44***</td>
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<tr>
<td>10. Word Spelling</td>
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<td>.32**</td>
<td>.44***</td>
<td>1</td>
<td>.77***</td>
<td>.26*</td>
<td>.44***</td>
<td>.44***</td>
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</tr>
</tbody>
</table>

* p ≤ .05, **p ≤ .01, ***p ≤ .001

Note. Bivariate correlations above the diagonal, partial correlations controlling for age below the diagonal.

variables, blending and elision, were highly correlated at $r = .70$. As a result, it was determined that only one of these phonological awareness variables would be used. Blending was selected based on the results of a previous study (Puranik, Lonigan, & Kim, 2011).

The first question of this study examined the cognitive and emergent literacy skills that predicted preschool children’s word spelling ability. Hierarchical linear regression was performed to assess the component cognitive, linguistic, and emergent literacy skills that predict preschool children’s word spelling ability. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity.

Age and non-verbal IQ were entered at Step 1 as control variables, explaining 30.2% of the variance in preschool children’s word spelling scores. After entering working memory,
expressive vocabulary, blending, letter naming, and letter writing at Step 2, the total variance explained by the model was 53.3%, \( F(7, 86) = 13.99, p < .001 \). The five variables entered at Step 2 explained an additional 23% of the variance in children’s word spelling scores. See Table 13 for a summary of the results. In the final model, only two variables explained statistically significant unique variance in preschool children’s word spelling ability, namely blending (\( \beta = .20, p = .039 \)) and letter writing (\( \beta = .42, p < .001 \)).

The second question of this study examined the cognitive and emergent literacy skills that predict preschool children’s name writing. Three children did not complete the name writing task resulting in this analysis including 92 children. Overall, the children performed well

Table 13

_Hierarchical Linear Regression Table for Word Spelling_

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-87.20</td>
<td>20.32</td>
<td></td>
</tr>
<tr>
<td>Age (months)</td>
<td>1.76</td>
<td>.39</td>
<td>.44***</td>
</tr>
<tr>
<td>Non-verbal IQ</td>
<td>1.34</td>
<td>.69</td>
<td>.19</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-59.96</td>
<td>25.02</td>
<td></td>
</tr>
<tr>
<td>Age (months)</td>
<td>.61</td>
<td>.39</td>
<td>.15</td>
</tr>
<tr>
<td>Non-verbal IQ</td>
<td>-.07</td>
<td>.65</td>
<td>-.01</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td>.06</td>
<td>.15</td>
<td>.03</td>
</tr>
<tr>
<td>Working memory</td>
<td>1.58</td>
<td>.97</td>
<td>.14</td>
</tr>
<tr>
<td>Blending</td>
<td>.81</td>
<td>.39</td>
<td>.20*</td>
</tr>
<tr>
<td>Letter naming</td>
<td>.03</td>
<td>.38</td>
<td>.01</td>
</tr>
<tr>
<td>Letter writing</td>
<td>1.99</td>
<td>.54</td>
<td>.42***</td>
</tr>
</tbody>
</table>

*Note. \( R^2 = .30 \) for Step 1, \( \Delta R^2 = .23 \) for Step 2 (\( p < .05 \)), *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \).
in name writing, that is, 52% \((n=48)\) of them were able to write their name conventionally. Consequently, the data were negatively skewed with some children unable to write all of the letters in their name and others unable to write any of the letters in their name. Attempts at transformation of the data did not result in a normal distribution. Therefore, binary logistic regression was conducted to assess the impact of cognitive and emergent literacy skills on the likelihood that preschool children would be able to write their name conventionally, that is, writing all of the letters in the correct order. See Table 14. The same independent variables were used in this model (i.e., age in months, non-verbal IQ, expressive vocabulary, blending, alphabet

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>(\chi^2)</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Age (months)</td>
<td>-.025</td>
<td>.051</td>
<td>.237</td>
<td>1</td>
<td>.626</td>
<td>.975</td>
<td>.882</td>
</tr>
<tr>
<td>Non-verbal IQ</td>
<td>-.114</td>
<td>.090</td>
<td>1.612</td>
<td>1</td>
<td>.204</td>
<td>.892</td>
<td>.748</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td>.006</td>
<td>.024</td>
<td>.070</td>
<td>1</td>
<td>.791</td>
<td>1.006</td>
<td>.961</td>
</tr>
<tr>
<td>Alphabet naming</td>
<td>-.141</td>
<td>.077</td>
<td>3.372</td>
<td>1</td>
<td>.066</td>
<td>.869</td>
<td>.747</td>
</tr>
<tr>
<td>Letter writing</td>
<td>.523</td>
<td>.117</td>
<td>20.15</td>
<td>1</td>
<td>.000</td>
<td>1.688</td>
<td>1.343</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.512</td>
<td>2.697</td>
<td>.314</td>
<td>1</td>
<td>.575</td>
<td>.220</td>
<td></td>
</tr>
</tbody>
</table>

*Note. \(R^2 = .431\) (Cox & Snell), .575 (Nagelkerke). Model \(\chi^2(1) = 52.43, p < .001.\)*
naming, and letter writing). The model containing the remaining predictors was statistically significant, \( \chi^2(6, N = 93) = 58.50, p < .001 \), indicating that the model was able to distinguish between preschool children who wrote their name using all the letters in the correct order name and those who were not yet able to write their name. The model as a whole explained between 43.1% (Cox and Snell \( R^2 \)) and 57.5% (Nagelkerke \( R^2 \)) of the variance in children name writing status, and correctly classified 81.7% of cases. As shown in Table 14, one independent variable, letter writing ability, made a unique statistically significant contribution to the model with odds ratios of 1.343 to 2.121. In the case of letter writing ability, this indicates that for each additional point the children achieved in writing the 10 dictated letters, the children were 1.69 times more likely to be able to write their name using all of the letters in the correct order.

### 2.4 Discussion

The purpose of the current study was to identify the component cognitive, linguistic, and emergent literacy skills that contributed to preschool children’s proficiency in spelling written words and writing their name. There were two important findings of this study. First, the composite skills that predicted preschool children’s word spelling ability included age, IQ, memory, expressive vocabulary, blending, letter naming, and letter writing. Blending and letter writing made a unique contribution to children’s word spelling scores. The second important finding was that the skills that predicted the likelihood that preschool children were able to write their name conventionally were age, non-verbal IQ, expressive vocabulary, letter naming, and letter writing. Only one variable made a unique contribution to the model and that was letter writing. These findings indicate that there are differences in the skills that underlie children’s ability to spell words and write their name during the preschool years.
2.4.1 Word Writing

Our first finding indicated that preschool children’s word spelling was related to a number of cognitive (age, IQ, memory), linguistic (expressive vocabulary, blending), and literacy or print-related skills (letter naming and letter writing). These findings confirm those of previous studies in that both print-related and phonological awareness ability predicted preschool children’s word spelling (Furnes & Samuelsson, 2009; McBride-Chang, 1998; Ouellette & Sénéchal, 2008a; Puranik, Lonigan, & Kim, 2011). The finding that phonological awareness makes a unique contribution to word spelling indicates that young children make use of analysis of language into sound to produce invented word spellings. Only one known study (Niessen, Strattman, & Scudder, 2011) has reported that print-related skills alone (i.e., word and print awareness) predicted preschool children’s word spelling and not phonological awareness. That study used a composite score of phoneme elision, beginning sound sort, and rhyme awareness as a measure of phonological awareness. However, the sample was younger (i.e., four years old) than the children in the current study and used measures primarily tapping phoneme-level awareness that may be difficult for younger children. The current study used more sensitive measures of phonological awareness that involved blending at the word, syllable, and phoneme level.

Our finding that blending makes a unique contribution to preschool children’s word spelling confirms the findings of a previous study (Puranik, Lonigan, & Kim, 2011). Although previous studies have used elision tasks to investigate the skills that predict preschool children’s word spelling (Ouellette & Sénéchal, 2008a), these studies have created a composite score of different phonological awareness skills. The current study used specific phonological awareness tasks, blending and elision, at the word, syllable, and phoneme levels. For example, blending at
the word level involved blending words to make compound words. By using a range of levels of
difficulty on a single phonological awareness skill rather than a composite score of different
skills, we were able to identify which phonological awareness skill was associated with word
spelling. This finding indicates that blending, as measured by a range of phonological grain-
sizes, is predictive of preschool children’s word spelling ability.

Letter writing ability also made a unique contribution to children’s word spelling. In
order to achieve a score on a word dictation task, a child must write letters or letter-like shapes
on the page. In the current study, we found that letter writing explained the same amount of
variance in children’s word spelling as letter naming plus letter writing entered into the model in
the same step. Therefore, letter naming did not explain additional variance in word spelling
beyond that of letter writing. Previous research indicated that letter naming knowledge is
predictive of early word spelling (Muter, Hulme, Snowling, & Taylor, 1997; Shatil, et al., 2000)
and greater letter naming knowledge at entry to school is associated with children’s ability to
learn to spell faster compared to classmates with less developed letter naming knowledge
(Foulin, 2005). However, in the letter dictation task, children were asked to write a specific
letter and this required them to recognize the letter name, associate it with its corresponding
shape, and write that shape on the page. A letter writing task demonstrates more advanced
knowledge of letters than a letter naming task and future studies might use a letter writing task
as a more sensitive indicator of children’s letter knowledge.

2.4.2 Name writing

The second finding of this study was that the cognitive, linguistic, and print-related skills
that predicted the likelihood that preschool children were able to write their name
conventionally were age, non-verbal IQ, expressive vocabulary, alphabet naming, and letter
writing. Given that many of the children in this sample (i.e., 52%) were able to write their name conventionally while others were in the early stages of learning to write their name, this sample was negatively skewed. Our results, based on logistic regression, corroborate findings of previous studies indicating that only language and print-related skills predict whether or not children are likely to be able to write their name (Puranik, Lonigan & Kim, 2011; Welsch, et al., 2003). Phonological awareness (i.e., blending) did not add any additional predictability in classifying children on the basis of whether they could write their name conventionally or not. In an attempt to identify the most parsimonious model, blending was dropped from the model resulting in no change to the outcome of the logistic regression. Our findings contradict those of Blair and Savage (2006) who found that letter-sound knowledge and phonological awareness, as measured by two tasks, a sound matching task and an identification of common units task were predictive of name writing. However, the authors did not include control variables in the regression, particularly important in this case because the age of the children was moderately correlated with phonological awareness and letter-sound knowledge, and strongly correlated with name writing. The current study found that print-related skills predicted preschool children’s name writing.

Importantly, letter writing explained unique variance in name writing in the current study. The distribution of the data in this study suggests that as children begin to write their name and gain experience with letter writing there is a quick progression to conventional name writing. Children’s early experience with writing letters is associated with writing their name, an activity often mediated by adults (Aram & Levin, 2001). Given that children may be motivated to spend time writing their name, this may facilitate greater amounts of time thinking about letters and print and the alphabetic principle. This feed-forward nature of ‘experience and
success’ in name writing potentially promotes interest in representing other words in print, initially making use of the letters in one’s name but also becoming aware of other letters and their associated visual shape and sound (Treiman, Kessler, & Bourassa, 2001). In so doing, name writing promotes young children’s experience with writing letters and representing words in print.

2.4.3 Theoretical Implications

The results of this study indicated that phonological awareness is associated with word spelling but not name writing. Word spelling involves analysis of the sound structure of language as indicated by the role of phonological awareness (i.e., blending) in preschool children’s invented spelling. This suggests use of the sublexical level (or at smaller units than the word level) to spell words. Name writing, on the other hand, was associated with letter writing alone suggesting that writing one’s name is learned as a single orthographic form by producing a string of letters. This suggests use of the lexical level (word level) to write names. The use of these two different strategies in pre-school children’s early writing provides preliminary support for the early emergence of a dual-route model for spelling (Houghton & Zorzi, 2008). Studies have examined a dual-route parallel processing model of reading development (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) but only a few studies have examined a serial processing model for spelling and only with proficient adult spellers who have experienced brain injury (Houghton & Zorzi, 2003; Rapp, Epstein, & Tainturier, 2002). No known studies have examined this model for young children’s spelling development.

This model assumes that spellers make use of two processes or “routes” for translating speech to print: a lexical route and a sub-lexical route. See Figure 1. The lexical route involves the speller retrieving the spelling of familiar words from long-term memory storage, referred to
as the orthographic output lexicon. A word’s phonological representation is activated in the phonological input lexicon that feeds forward to the semantic system to retrieve a semantic representation or meaning and confirm the word’s orthographic representation in the orthographic output lexicon. The grapheme output buffer facilitates access to the requisite grapheme shapes. A child’s name, in this model, is acquired as an orthographic form through frequent exposures to their name in print and this orthographic form is accessed directly through the lexical route when children write their name. Children do not first learn to recode their name using phonetic-cues and later use visual-cues as phase models and the self-teaching hypothesis propose for the acquisition of an orthographic form (Ehri, 2013; Share, 2004). Given its early acquisition, a child’s name may be the first entry in the orthographic output lexicon.

The proposed dual-route model of spelling explains how children learn to write their name with
little knowledge of the letters while also explaining the sound to spelling conversion processes used for word spelling.

The sub-lexical route involves the speller applying knowledge of sound to spelling conversion to recode sound to print. This sub-lexical route is activated when the speller wants to write a word that he or she determines to be an unfamiliar word spelling (or nonsense word). In this case, the phonological representation activates individual graphemes by exploiting the speller’s knowledge of sound to spelling correspondence. Rapp, et al. (2002) proposed that this sub-lexical conversion exploits statistically high frequency combinations of phoneme to grapheme relations recoding smaller units of sound than the word level (Houghton & Zorzi, 2003). Pre-school children have received very little instruction in spelling so their invented spellings draw on what they know about language, sound, and print. Most or all word spellings are unfamiliar to them requiring that they make use of sub-lexical processes to analyze language into print. To do so, these young children draw on cognitive abilities to locate a phonological representation for the word they want to spell, and analyze language into sound. Only after repeated exposures to a word spelling, whether seeing the word in print or writing it, the word becomes an orthographic form in the orthographic output lexicon and is accessed through the lexical route. This aligns with phase models of spelling and Share’s self-teaching hypothesis in that the words are first recoded using sound to print conversions. The dual-route model of spelling is able to explain both name writing and word spelling in children’s early experiences with writing and spelling.

Examination of our data indicates that preschool children can acquire an orthographic form for their name and make use of the lexical route to write it without knowledge of the letters in their name. In the current study, a five year old named ‘Phoenix’ wrote her name
conventionally with relatively well-formed letters recognizable by adult spellers out of context. However, she was unable to name E or N in the letter naming task or write an O in the letter dictation task. (Unfortunately the letter O was the only one of the ten dictated letters that was in her name.) Together these aspects of her early writing ability indicated that, although this child had some knowledge for the letters of her name, it would be insufficient if she were recoding from sound to print. Furthermore, consistent with the literature, Phoenix wrote P, H, O, E, and N excessively in letter strings for all dictated word spellings (Both-deVries & Bus, 2010). For example, the word ‘cup’ was spelled: “POEPHhn”. Certainly this child’s name is less transparent in letter-sound correspondence than many other names given that the first phoneme of her name /f/ is written as a digraph ‘ph’ and the last letter of her name ‘x’ represents two phonemes /ks/. Further, her name has two vowel letters ‘oe’ that represent a single vowel phoneme /i/. This child’s proficiency in writing her name without knowledge of all of the letters of her name provides support for a possible dual-route model for spelling. That is, she has acquired an orthographic form for her written name without being able to phonetically decode it. Our name writing data indicate that not all orthographic forms are acquired through recoding from sound to print first.

2.4.4 Limitations

There are several limitations that should be considered when reflecting on this study and in looking ahead to future research. First, the current study did not include a measure of letter-sound knowledge. In order to minimize the testing time for our young sample, we administered letter naming and letter writing measures to represent earlier and later letter knowledge and ability. However, a measure of letter-sound correspondence might have explained additional variance in word writing ability providing additional support for the role of the sub-lexical route
for word spelling. Future studies might use letter-sound and letter writing measures as these may provide more advanced indicators of children’s alphabet knowledge. Second, the current analysis included a small sample size (\(N = 95\)). Replication of the current study with a larger group of children followed longitudinally through the preschool years into the early elementary grades would extend these findings from early writing and spelling to conventional spelling and enable us to investigate it in relation to the dual-route model. Finally, a number of the children in the current sample were able to write their name conventionally. Given that name writing progresses to the conventional form early, inclusion of younger children who are not yet able to write their name (i.e., three year olds) may have provided a normal distribution of name writing scores.

**2.4.5 Conclusion**

In conclusion, this study extends our understanding of preschool children’s early writing and spelling by differentiating the skills that underlie name writing and word spelling. The role of phonological awareness in word spelling indicates the sublexical analysis of language to perform sound-to-spelling conversions to spell unfamiliar words. However, preschool children learn to write their name conventionally as a single orthographic form without the analysis of language to print. Together, these results provide preliminary support for a dual-route model of spelling in young children that explains their earliest writing and spelling productions. Consideration of this model to explain spelling development might have implications for future research, both to explore acquisition of spelling conventions and also to possibly explain atypical spelling development. Moreover, given that name writing develops earlier than word spelling additional work is needed to understand the role of name writing in supporting children’s early word spelling. Educators and caregivers can support children’s early literacy
development by encouraging children to spend time writing, whether they are writing their name or engaged in play-based activities that promote the use of children’s invented spelling.
2.5 References


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Chapter 3

Code-related skills of bilingual preschoolers: Effects of exposure to the language of instruction

Abstract

Purpose: This study investigated the early literacy abilities of two groups of preschool-aged English Language Learners (ELLs) relative to a group of monolingual English (EL1) peers. The two groups of ELLs were determined based on parent report of the language the children heard and spoke most often at home (ELL English language users (ELL-English), ELL minority language users (ELL-Minority)). The children in all three groups were matched for age, gender, and number of years in English child care (2 years).

Method: 75 preschoolers (n=25 per group) completed measures of letter naming, letter writing, phonological awareness, and word spelling. The parents responded to questions related to the home language and literacy environment.

Results: ELL-English children performed similarly to their monolingual English peers in letter naming and phonological awareness while significantly outperforming them in word spelling. ELL-Minority children performed similarly to their ELL-English peers on word spelling despite scoring significantly lower than that group in letter naming and significantly lower than the EL1 preschoolers in phonological awareness. There were no group differences in letter writing.

Conclusions: The ELL-English group performed as well as or better than their monolingual English peers in code-related skills whereas the ELL-Minority group lagged behind in some key early literacy skills but not word spelling. These findings indicate the heterogeneity of bilingual children in terms of code-related skills and the importance of gathering information related to children’s home language environment to inform instruction. This research has implications for
future research in early literacy instruction for children from diverse linguistic backgrounds.

Keywords: preschool, bilingual, ELL, code-related skills, spelling
Increasingly, preschool and kindergarten classrooms include a number of children whose home language is not the language of school instruction (Scheffner Hammer, Jia, & Uchikoshi, 2011). Recent studies have identified that these children may be ‘at-risk’ for poor academic achievement (Carrasquillo, Kucer, & Abrams, 2004; Hemphill & Vanneman, 2011; Kindler, 2002; Snow, Burns, & Griffin, 1998). For example, Spanish-English dual-language learners in the United States often begin kindergarten considerably behind their fellow classmates (Scheffner Hammer et al., 2011) and this lag in achievement often continues throughout their academic experience (Finn, 2006). However, these studies often include children from low income homes and issues associated with poverty may confound the outcomes for children who are bilingual (Cummins, 1979; Hakuta & August, 1997). Alternatively, some researchers have proposed that young bilingual children possess a cognitive advantage that may lead to enhanced academic outcomes (Bialystok, 2001; Campbell & Sais, 1995). Given the relationship between children’s development in the preschool years and their long-term academic achievement, it is important that we understand the early literacy abilities of these young bilingual children and be able to identify literacy delay that is related to low levels of linguistic proficiency in the language of instruction (Geva, 2000).

Despite a large body of research that has explored early literacy skills in monolingual children (Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2002), less is known about the development of code-related skills (e.g., letter knowledge, phonological awareness, and early word spelling) in bilingual preschoolers and whether their bilingual status may be an indicator of risk versus advantage. The current study examines the emergent literacy skills of two groups of bilingual preschool children entering English-only school who differ in the amount of exposure to English in the home based on parent-report. The purpose of this study is
to describe English language learners’ code-related skills, including letter naming, letter writing, phonological awareness, and word spelling relative to their monolingual peers.

Emergent literacy refers to the precursor skills, knowledge, and attitudes that begin to emerge early in children’s lives, progress on a developmental continuum that extends into conventional literacy achievement (Whitehurst & Lonigan, 1998), and predict reading and spelling ability in the higher grades (Lonigan, Burgess, & Anthony, 2000; National Early Literacy Panel [NELP], 2008; Storch & Whitehurst, 2002). Classic conceptual models of literacy development have identified two strands of skills that support emergent literacy achievement, a language-based strand and a code-related strand (Hoover & Gough, 1990; Scarborough, 2001; Whitehurst & Lonigan, 1998). Hoover and Gough’s (1990) simple view of reading identified two components, linguistic comprehension and decoding, that are necessary for skilled reading with comprehension. Similarly, Scarborough (2001) identified language comprehension and word recognition as separate yet interactive abilities that underlie skilled reading. And Whitehurst and Lonigan (1998) coined the terms outside-in skills (e.g., language and conceptual knowledge) and inside-out skills (e.g., phonological awareness and letter knowledge) to explain the same components of reading. All of these models identify an independent yet interactive role of linguistic competence and print-related knowledge in learning to read. While a number of studies have examined the linguistic abilities of preschoolers who are second language learners (Genesee, Paradis, & Crago, 2004; Hipfner-Boucher et al., 2014; Scheffner Hammer, Lawrence, & Miccio, 2008), the current study extends this understanding to code-related skills, including early spelling.

This study parallels our previous work examining the linguistic abilities of two groups of English language learners in narrative ability (Hipfner-Boucher et al. 2014). Hipfner-Boucher et
(2014) examined the oral narrative ability of two groups of English Language Learners (ELLs) who were identified on the basis of parental report of the language the children heard and spoke most often at home (ELL English language users (ELL-English) and ELL minority language users (ELL-Minority)) relative to their English monolingual (EL1) peers. Specifically, this study investigated whether these groups of preschool children differed on measures of linguistic ability, that is narrative macrostructure (e.g., story grammar) and microstructure (e.g., number and mean length of utterance, number of different words, grammaticality). Based on a fictional narrative retell task, there were no group differences in macrostructure but there were differences in microstructure after partialing out age and memory. The ELL-Minority group scored significantly lower than both the ELL-English and the EL1 groups on all microstructure measures (number of different words, sentence length, and grammaticality). However, the children in the ELL-English group did not significantly differ from the EL1 group. The results of this study highlight the heterogeneity within ELL preschool children with respect to English at the discourse level (narrative). The current study examined whether there were group differences in code-related skills in the same three language groups of preschool children.

3.1.1 Code-related Skills

It is widely accepted that preschool children’s code-related skills, that is, letter knowledge, phonological awareness, and early writing attempts, are predictive of achievement in early reading (Lonigan, Burgess, & Anthony, 2000; NELP, 2008; Storch & Whitehurst, 2002) and spelling (Puranik, Lonigan, & Kim, 2011). Furthermore, the skills associated with early literacy achievement in monolingual English children are also predictive of literacy achievement for young children who are English language learners (Chiappe, Siegel, & Wade-Woolley, 2002; Lesaux, Koda, Siegel, & Shanahan, 2006). In light of the contribution code-related skills
make to later literacy, it is important that research establish the extent to which bilingual children attending English-only school have acquired these skills at entry to school compared to their monolingual peers (Ford, Invernizzi, & Huang, 2014). Bilingual children have greater variety of linguistic input that may provide greater access to the sound structure of language in their early experience (Bialystok, 1988, 1997; Campbell & Sais, 1995). However, research is needed to explore whether the amount of exposure to the language of instruction bilingual children experience in the home results in differences in these critical emergent literacy skills.

One important emergent literacy skill is letter knowledge. Specifically, letter naming has been identified as a skill that is predictive of decoding ability in children learning to read in monolingual English children (Bruck, Genesse, & Caravolas, 1997; Foulin, 2005; Lonigan, Burgess, & Anthony, 2000; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Wagner, Torgesen, & Rashotte, 1999). Furthermore, letter naming and letter writing have been shown to be strongly associated with early spelling in English monolinguals (Adams, 1990; Caravolas, Hulme, & Snowling, 2001; Puranik, Lonigan, & Kim, 2011). Stage, Shepperd, Davidson, and Browning (2001) used growth curve analysis to show that letter naming knowledge in kindergarten children from low-income families, primarily of native American or Hispanic origin, was predictive of oral reading fluency at grade one. Campbell and Sais (1995) compared the letter naming ability of preschool children who were monolingual English and Italian-English bilinguals and reported that the two groups performed comparably in this ability. These studies indicate that there may not be differences in bilingual children’s letter naming ability at preschool relative to their monolingual peers. Another component of letter knowledge is letter writing. Letter writing in monolingual children has been shown to make significant contributions to the prediction of preschool children’s word spelling after controlling for age,
parental education, print knowledge, phonological awareness, and letter naming ability (Puranik, Lonigan, & Kim, 2011). However, there are no known studies that have identified the letter naming ability of two groups of bilingual preschoolers that differed in the amount of exposure to the language of instruction in the home relative to their monolingual peers. Furthermore there are no known studies that have described the letter writing ability of these same groups of bilingual preschoolers who are English Language Learners (ELL) compared to their monolingual peers.

Phonological awareness refers to children’s ability to analyze and manipulate sounds in words at increasingly smaller units of sound (i.e., word, syllable, and phoneme) (Ziegler & Goswami, 2005; Whitehurst & Lonigan, 1998). This code-related skill emerges during the preschool years (Bryant, MacLean, & Bradley, 1990), continues along a developmental continuum (Schuele & Boudreau, 2008; Whitehurst & Lonigan, 1998), and is predictive of children’s conventional literacy outcomes (Lonigan, Burgess, & Anthony, 2000; NELP, 2008; Share, Jorm, MacLean, & Matthews, 1984; Storch & Whitehurst, 2002). Research has shown that children’s vocabulary development is associated with the development of phonological awareness, and that the relationship between the two is reciprocal (Dickinson & McCabe, 2001; Metsala, 1999; Storch & Whitehurst, 2002). Bilingual children have linguistic experience with two languages leading some researchers to propose that their metalinguistic awareness is advanced compared to their monolingual peers who have linguistic input in only one language (Bialystok, 1988, 1997; Campbell & Sais, 1995). However, a potential advantage in metalinguistic awareness may not appear until the preschool child has acquired sufficient knowledge of the language.

Some recent studies have reported that by the end of kindergarten, phonological
awareness is not language-specific (Bialystok, 2007; Genishi & Goodwin, 2008) while others have reported that, in preschool children, phonological awareness is language-specific (Goodrich, Lonigan, & Farver, 2014; Lopez, 2012; Verhoeven, 2007; Yeung & Ganotice, 2013). In a recent large scale study (N=466), Goodrich and his colleagues (2014) examined phonological awareness in Spanish-English preschoolers and found that their English oral language skills were the best predictors of their English phonological awareness, and their Spanish oral language was the best predictor of their Spanish phonological awareness. As a result, learning to read and spell in one language is dependent on children’s ability to analyze language into sound in that specific language. Verhoeven (2007) found that Turkish-Dutch sequential bilingual preschool children who demonstrated high proficiency in both languages relative to same-aged bilingual peers in kindergarten, with lower proficiency in one or both languages scored the highest on four measures of phonological awareness in Dutch, including phoneme segmentation. Wade-Woolley, Chiappe, and Siegel (1998) found that ELL kindergarten children with limited English performed poorly on measures of English phonological awareness compared to their monolingual English peers. In a longitudinal study, Lopez (2012) reported that after two years of instruction in English, Spanish-English preschoolers demonstrated higher scores in both Spanish and English phonological awareness as they got older. Furthermore, they were initially higher in Spanish at the beginning of preschool and by the end of kindergarten, scored higher in English phonological awareness. This indicated that exposure to English enhanced the children’s ability to analyze language into sound in English. Consequently, the amount of exposure to the language of instruction that ELL children experience may influence their performance on phonological awareness and as a result, enable them to benefit more fully from instruction in early reading and spelling. The current study
examines the English phonological awareness ability of two groups of bilingual preschoolers who differ in the amount of exposure to English in the home relative to their monolingual peers.

A third code-related skill is children’s early writing. Children’s early attempts at spelling words require that they draw on their knowledge of the language and its writing system, and in particular, on letter knowledge and phonological awareness abilities (Chomsky, 1971; Ehri, 1989). Although some studies have identified ELL children to be ‘at-risk’ for poor academic achievement (Carrasquillo et al., 2004; Hemphill et al., 2011; Kindler, 2002; Snow et al., 1998), others have indicated that ELL children are able to ‘catch up’ to their monolingual peers in word spelling within only a few years of English instruction (Geva & Yaghoub Zadeh, 2006; Han, Vukelich, Buell, & Meacham, 2014; Lesaux & Seigel, 2003; Wade-Woolley & Siegel, 1997; Yeong & Rickard Liow, 2011). This suggests that bilingual children may experience a delay in spelling ability that is based on their language proficiency. However, Yeong and Rickard Liow (2011) found no significant differences between Mandarin-English ELL and monolingual English kindergarten children’s spelling accuracy although the monolingual children’s performance was significantly better for spelling sophistication (e.g., ability to spell more complex words). Lesaux and Seigel (2003) reported that a sample of ELL kindergarten children from mixed minority languages were not significantly different in letter naming and three types of phonological awareness (i.e., syllable identification, phoneme identification, phoneme deletion) compared to their monolingual English peers. However, they found that these same monolingual English children significantly outperformed the ELL children in word spelling. In another study of a mixed minority language sample of children (in this case Dutch was the language of instruction), bilingual children did not differ from their monolingual Dutch peers in word reading in grade two (after two years of Dutch instruction) but lagged behind in
phonological awareness and spelling ability (Verhoeven, 2000). These differences in results across studies may simply reflect the heterogeneity of bilingual samples in terms of literacy outcomes but they may also reflect individual differences in the children’s exposure to the language of literacy instruction at home. The current study examined the word spelling of younger ELL children (i.e., preschool) and compared the outcomes of groups of bilingual children distinguished on the basis of the amount of exposure to the language of school instruction the children experienced in the home.

Only a few studies have investigated the early literacy, and specifically, the code-related skills and knowledge, of children with differing amounts of exposure to English in the home (Chiappe, Siegel, & Gottardo, 2002; Scheffner Hammer et al., 2008). Chiappe and her colleagues (2002) compared two groups of kindergartners with mixed home languages (i.e., bilingual children exposed to English in the home and children first exposed to English at entry to kindergarten) to monolingual English children on measures of emergent literacy at the beginning and end of kindergarten. They reported that although the two groups of ELLs lagged behind their monolingual peers on measures of language and phonological awareness, their performance in letter naming, spelling, and word reading was comparable to monolingual English children after only a few months of English instruction. However these two groups of bilingual children were identified as ‘bilingual’ on the basis of whether or not they were exposed to English in the home since birth without taking into account degree of exposure. Asking parents to report the proportion of time the children heard and spoke their languages in the home may provide more accurate data about children’s language exposure. Scheffner Hammer and her colleagues (2008) conducted a longitudinal study examining the language development of two groups of Spanish-English children from preschool to grade one. They
compared the children’s language development based on relative exposure to English and Spanish in the home and the timing of initial exposure to English. Using growth curve analysis over two years, Scheffner Hammer and her colleagues reported that children’s exposure to the language of instruction prior to kindergarten was a relevant factor in understanding bilingual children’s language development. However they did not examine the children’s literacy development to determine if differences in language proficiency played a part in literacy outcomes in preschool children. Thus no previous studies examining code-related skills have examined subgroups of bilingual children based on the amount of exposure to the language of literacy instruction at home.

### 3.1.2 Home Literacy

Given that young children’s knowledge of code-related skills is dependent on instruction, the home literacy environment may play an important part in preschool children’s early literacy development. Controlling for parental education, Sénéchal (2006) reported that parent teaching of literacy skills in kindergarten was a significant predictor of children’s early literacy skills (i.e., alphabet knowledge and phoneme awareness), which in-turn predicted word reading in Grade 1 and reading fluency in Grade 4. Scheffner Hammer and her colleagues (2011) proposed that additional research was needed to examine characteristics of bilingual children’s home language and literacy environment, such as the language(s) spoken in the home, parental educational status, and home literacy experience to examine the relationship between the children’s environment and their language and literacy outcomes. To do so would enable researchers to identify relevant factors in children’s environment that contribute to early academic achievement.

One such important factor often not reported is the children’s exposure to the language
of classroom literacy instruction in the home. This information will help describe the role of exposure to language for children’s literacy outcomes. Yeo, Ong, and Ng (2014) investigated the relationship between the home literacy environment (e.g., parent self-report of reading beliefs and home literacy practices), and preschool monolingual children’s word reading and reading interest. A hierarchical linear regression revealed that family literacy activities contributed more unique variance to children’s reading and reading interest than parent reading beliefs. In particular, parent-child engagement in reading and writing activities in the home was the strongest predictor of children’s reading ability and their motivation to read. Taken together, the results of Sénéchal (2006) and Yeo et al. (2014) indicate that the home literacy environment may be a relevant indicator of children’s early experience with code-related skills. The current study examines the home literacy experience as reported by parents in order to explain group differences in the children’s code-related skills.

3.1.3 The Current Study

This study examined the code-related skills of two groups of preschool children, a group of bilingual children whose home language was primarily English (ELL-English), and a group of bilingual children whose home language was primarily a minority language (ELL-Minority), relative to a group of monolingual English children (EL1). First, this study examined letter knowledge, that is, letter naming and letter writing, in these two groups of bilingual preschool children. It was hypothesized that exposure to English would play a part in the children’s experience with English print resulting in the EL1 group outperforming the ELL-English group who would outperform the ELL-Minority group. Second, the current study explored the phonological awareness abilities of these groups of preschoolers. Based on the findings of Goodrich and his colleagues (2014) indicating that phonological awareness was language-
specific in preschool children, it was hypothesized that greater exposure to English would result in higher proficiency in English phonological awareness. Therefore, it was expected that the monolingual English children would outperform both groups of ELL children with and the ELL-English outperforming their ELL-Minority peers. Third, this study examined the word spelling abilities of these groups of preschool children. It was hypothesized that, based on both letter knowledge and phonological awareness abilities, the EL1 group and the ELL-English group would perform better on word spelling compared to the ELL-Minority group, children exposed to very little English prior to entering English preschool (Genesee et al., 2004). Finally, this study investigated the home literacy environment of the children in these three language groups to examine differences in home literacy experiences. Because there is no extant literature on this area, no specific hypothesis was formed.

3.2 Method

3.2.1 Participants

A total of 75 children (52 females), ranging in age from 46 to 69 months ($M = 58, SD = 6.6$) participated in this study. These children were part of a larger study that examined the effects of an emergent literacy professional development program on preschool educators’ classroom practice and child language and literacy outcomes. The current study reports on the language and literacy measures of three groups of preschool children at pretest. These three groups included: (1) bilingual children whose parents reported that the language their child heard and spoke most often at home was a minority language, (2) bilingual children whose parents reported that the language their child heard and spoken most often in the home was English, the societal language, (3) and a group of monolingual English children.
The children were recruited from 31 childcare centres throughout Metropolitan Toronto. Informed consent forms were sent home with all of the children in each participating classroom and of those children who returned signed consent forms, four were randomly selected, balancing for an equivalent number of males and females wherever possible. Where only three consents were returned that met the eligibility requirement of age, those three children were included in the study. Once consent to participate in the study was obtained from the families, the parents were asked to complete a questionnaire related to child characteristics and the home language and literacy environment. From the total sample (n=129), the children were assigned to groups based on parent report of home language use.

Initially, the children were identified as those who had a second language in the home (n=73) and those whose home language was solely English (n=56). Of the 73 children who were regularly exposed to a second language in the home, 23 were considered ineligible for the current study for the following reasons: 18 of these children heard the minority language less than 10% of the time, three children did not complete the test battery, and for two of the children, the parent did not report the amount of time the child heard and spoke the minority language in the home. Next, two groups of English Language Learners (ELL) were identified on the basis of parent report of the proportion of time the child heard and spoke the minority language in the home. The first group of ELLs were children whose parents reported that the language their child heard and spoke most often in the home was a minority language (ELL-Minority, n=25). These children heard the minority language in the home a minimum of 20% of the time and spoke the language a minimum of 10% of the time. Children in the ELL-Minority group included children who heard and spoke the following minority languages: Cantonese (n = 2), Dari (n=1), French (n=1), Hebrew (n = 2), Hindi (n=1), Korean (n = 2), Mandarin (n = 6),
Nepali (n=1), Russian (n = 2), Serbian (n = 2), Spanish (n=1), Telugu (n=1), Turkish (n=1), Twi (n=1), and Vietnamese (n=1). The second group of ELLs were children whose parents reported that there was a language other than English spoken in the home but the language their child heard and spoke most often in the home was English (ELL-English, n=25). Again, group inclusion was confirmed by ensuring that parent report of the percentage of time the child heard the minority language in the home was greater than 20% of the time and the percentage of time the minority language was spoken by the child was greater than 10% of the time. Children in the ELL-English group spoke the following minority languages in the home: Albanian (n=1), Amharic (n=1), Arabic (n=1), Bengali (n = 2), Cantonese (n=1), Farsi (n=2), French (n=3), Italian (n=2), Russian (n=2), Mandarin (n=4), Marathi (n=1), Nepali (n=1), Spanish (n=2), Urdu (n=1), and Uyghur (n=1). The children in the monolingual English group (EL1; n = 56) were grouped based on parent report that English was the only language heard and spoken by the child in the home. The children in the EL1 group were randomly selected and matched for age and gender with the children in the two ELL groups. Importantly, children in all three groups had been attending English preschool programs for a minimum of two years. Table 15 provides summary data of the characteristics of the children in each of the three groups. Finally, the parents confirmed that the children had no uncorrected vision and hearing deficits or developmental delays that might have affected typical literacy development or the ability to participate in the test battery.

### 3.2.2 Procedure

Trained research assistants, who were blind to the design and broader goals of the study, met individually with the children in a quiet area in their classroom. Given the age of the children and the number of tasks, the measures described below were administered during two
sessions that were approximately thirty to forty-five minutes in length. The order of administration of the tests within each session was fixed; however, the order in which the two sessions were conducted was counter-balanced. All measures were collected in English, the language of instruction for all children. Previous research has determined that testing children who have minimal English proficiency using English early literacy measures can have predictive validity (Ford et al., 2014). All children provided assent to participate prior to testing. Three measures were used to describe the characteristics of the children in the groups: a) expressive vocabulary, b) non-verbal IQ, and c) short-term memory.

3.2.2.1 Measures. **Expressive vocabulary.** The Expressive One Word Picture Vocabulary Test, Third Edition (EOWPVT; Brownell, R., 2000) was administered to assess the children’s expressive vocabulary skills. Using standardized procedures, the children were shown a series of pictures in a stimulus book and were prompted to say the names of an object (e.g., bird), actions (e.g., writing/drawing), and classifications of objects (e.g., fruit). The internal consistency of this measure for four and five year olds as reported in the manual is .95-.96 respectively.

**Non-verbal IQ.** The non-verbal matrices subtest of the Kaufman Brief Intelligence Test – Second Edition (KBIT-2; Kaufman & Kaufman, 2004) was administered to assess non-verbal reasoning ability. Using a stimulus manual, the children were asked to point to one of five possible responses to identify the one that is associated with a stimulus picture or fits within a matrix. The internal consistency of this measure for four and five year olds as reported in the manual is .78.

**Short-term memory.** The Memory for Digits subtest of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) was administered to
measure the children’s phonological short-term memory. The children were asked to repeat a series of numbers beginning with three trials of two digit numbers up to eight digit numbers for a total of 21 trials. Testing stopped after three consecutive incorrect responses and the number of correct trials constituted the child’s score. Additionally, the following standardized and experimental measures were collected.

**Phonological awareness.** The phonological awareness subtest of the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) was administered to assess blending of sounds into words and elision of sounds in words. The TOPEL was designed for use with children aged three to six years. The first six of fifteen items for both the blending and elision tasks involved the child looking at four pictures in the stimulus manual and pointing to the picture that represented the word answer. The remaining questions were oral-only items not supported by visuals. The blending task required the children to blend sounds to make words, including blending words to make compound words (e.g., “What word do these make? Star … fish.”), syllables to make words (e.g., “What word do these sounds make? num … ber”), and the onset and rime (e.g., “What word do these sounds make? b … ear”). The elision task required the children to delete sounds in words, including deleting words in compound words (e.g., “Say sunflower.” “Now say sunflower without saying flower”), and deleting the phoneme in the onset (e.g., “Say bold.” “Now say bold without saying /b/”) and coda position of words (e.g., “Say heat.” “Now say heat without saying /t/”). Testing stopped when the children made three consecutive incorrect responses. The internal consistency of this measure as calculated by Cronbach’s alpha for children ages three to five as reported in the manual was between .86 and .88.

**Letter naming.** The letter naming subtest of the Phonological Awareness Literacy
Screening (PALS; Invernizzi, Sullivan, Meier, & Swank, 2004) was administered to assess the children’s knowledge of letter names. Using a fixed random order, the 26 uppercase letters were presented one at a time on 3 X 3 inch laminated white cards with typed bold-faced font. The number of correctly identified letters constituted the child’s score.

For all writing samples, the children were given an 8.5 X 5.5 inch booklet of blank paper and a primer pencil to write their responses. After the child completed all writing tasks, the examiner identified the orientation of the booklet for each page by drawing an arrow pointing upwards on the bottom of the page.

**Letter writing.** In order to assess letter writing ability, the children were asked to write each of ten letters on a separate page in the booklet. The ten letters (i.e., B, D, S, T, O, A, H, K, M, and C) were dictated one at a time with no time limit. These letters were chosen because they had been used in previous studies with preschool children (Puranik & Lonigan, 2011) and because they were identified as some of the earliest alphabet letters learned by preschool children (Justice, Pence, Bowles, & Wiggins, 2006). The letter writing responses were scored using a procedure used by Puranik and Apel (2010). For each letter, the children were given a score of 0 if they did not respond, wrote an incorrect letter, or wrote an unrecognizable shape. A score of 1 was awarded if the letter was horizontally reversed or poorly formed and would only be recognized by most adult readers in context. A score of 2 was awarded if the letter was written in a conventional form (i.e., upper or lowercase) and would be recognized out of context by most adult readers. A second trained research assistant independently scored 20% of the randomly selected letter writing samples resulting in an inter-rater reliability of 93% agreement.

**Word spelling.** In order to assess the children’s word spelling ability, the children were asked to write each of nine words on a separate page in the 8.5 X 5.5” booklet. The nine words
(i.e., cup, bed, man, hot, pig, lady, rabbit, pretty, train) were dictated one at a time with no time limit. The first five words were chosen because they were similar to stimuli used in previous research (Puranik & Lonigan, 2012) and were consonant-vowel-consonant words with transparent grapheme phoneme correspondence for the consonant sounds and short vowels. The four additional words were chosen because they included more complex spelling conventions and were also used in previous research (Ouellette & Sénéchal, 2008). The words were scored using a modified Tangel and Blachman scale (Tangel & Blachman, 1992, 1995) used in previous research (Puranik & Apel, 2010; Puranik et al., 2011). The word spelling was scored using a 9-level rubric that included a score of 0 for no attempt or scribble in a scratching fashion to 9 if the word was spelled in conventional form and all letters were recognizable out of context. See Appendix 1. Inter-rater reliability was conducted by having a second trained research assistant independently score 20% of the randomly selected word writing samples. This resulted in a score of 92% agreement.

*Home literacy questions.* In addition to questions related to the home language environment, the parents were asked to answer questions related to the home literacy environment. See Appendix 2 for questions related to home literacy practices.

### 3.3 Results

The results are presented in five sections. The first section presents the summary characteristics of the children in the three language groups. The second section reports the group comparisons of the children’s letter knowledge as measured by letter naming and writing. The third section presents the group comparisons in performance in phonological awareness. The fourth section presents the group comparisons of word spelling on a word dictation task. Finally,
the fifth section examines the parents’ report of the amount of time they engaged in print-related activities and instruction with their children at home across the three groups. A preliminary examination of the data indicated that a number of the variables were not normally distributed across the language groups. Attempts to transform the variables did not result in a normal distribution and consequently, a series of nonparametric Kruskal-Wallis tests were used to conduct the group comparisons. Mann Whitney U tests were used to follow-up significant findings and a Bonferroni correction was applied resulting in all effects reported at a .0167 level of significance (i.e., p value of .05/3 planned comparisons).

Summary characteristics of the children in each language group are given in Table 15. Univariate Analyses of Variance (ANOVA) indicated that there were no significant group differences with respect to the age of the children, $F(2, 72) = 2.39, p = .10$ or the age at which the children began attending childcare, $F(2, 68) = 0.23, p = .80$. Chi-Square Tests of Independence indicated that there were no significant group differences in gender, $\chi^2(2, n = 75) = 0.11, p = .95$, or maternal level of education, $\chi^2(2, n = 75) = 13.1, p = .52$. Furthermore, univariate ANOVA’s indicated that there were no significant group differences in the children’s non-verbal IQ, $F(2, 72) = 1.44, p = .24$, or short-term memory, $F(2, 72) = 0.42, p = .66$. However, a univariate ANOVA of the expressive vocabulary scores was significant, $F(2, 72) = 9.18, p = .001$. Planned comparisons revealed that the ELL-Minority group (minority language users) had significantly lower vocabulary scores than the EL1 group, $t(70) = -4.13, p = .000$ and the ELL-English and the EL1 group did not significantly differ from each other, $t(70) = -1.71, p = .092, ns$. Summary data describing the children’s exposure to English as reported by the parents across the two ELL groups are also included in Table 15. There were significant group differences in the percentage of time children heard and spoke a language other than English
Table 15

**Summary Characteristics of the Children Across Language Groups**

<table>
<thead>
<tr>
<th>Variable</th>
<th>EL1 ((n = 25))</th>
<th>ELL-English ((n = 25))</th>
<th>ELL-Minority ((n = 25))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months</td>
<td>56.68 (5.59)</td>
<td>58.64 (6.49)</td>
<td>55.04 (5.36)</td>
</tr>
<tr>
<td>Age in months began English childcare</td>
<td>26.52 (14.8)</td>
<td>27.83 (11.9)</td>
<td>25.42 (10.4)</td>
</tr>
<tr>
<td>Non-verbal IQ (^1)</td>
<td>105.16 (12.9)</td>
<td>101.40 (11.1)</td>
<td>99.68 (10.9)</td>
</tr>
<tr>
<td>Short-term memory (^2)</td>
<td>9.16 (2.2)</td>
<td>9.12 (2.0)</td>
<td>8.60 (2.9)</td>
</tr>
<tr>
<td>Expressive vocabulary(^3)</td>
<td>49.48 (13.8)</td>
<td>45.48 (15.4)</td>
<td>33.24 (12.6)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Maternal Education (Mdn)(^4)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Home Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%Time hear L1</td>
<td>-</td>
<td>46.80 (19.47)</td>
<td>65.20 (21.82)</td>
</tr>
<tr>
<td>%Time speak L1</td>
<td>-</td>
<td>24.44 (15.23)</td>
<td>53.80 (20.68)</td>
</tr>
</tbody>
</table>

\(^1\)Kaufman Brief Intelligence Scale II (KBIT-2; Kaufman & Kaufman, 2004); standard scores

\(^2\)Memory for Digits subtest of Comprehensive Test of Phonological Processing (CTOPP; Wagner et al., 1999); raw scores

\(^3\)Expressive One Word Picture Vocabulary Test – III (EOWPVT-3; Brownell, 2000); raw scores

\(^4\)A score of 5 corresponds to a 2-year post-secondary diploma

spoken at home, \(ts (2, 48) = -3.15 - 5.72, ps = .000 - .003\). The data in Table 15 indicate that

the ELL-Minority group heard and spoke a language other than English at home significantly

more often than the ELL-English group.

The first question of this study examined whether there were group differences in the

children’s letter knowledge as measured by letter naming and writing. See Table 16 for
descriptive statistics. First, with regard to letter naming knowledge, a Kruskal Wallis test
indicated that there was a significant difference among the three groups, \( H(2) = 6.785, p = .034 \). Mann Whitney \( U \) follow-up comparisons indicated that the ELL-English children significantly outperformed the ELL-Minority children in letter naming ability (\( U = 187.0, z = -2.47, p = .013 \)). However, the letter naming scores were not significantly different between EL1 children and ELL-English children (\( U = 280.5, z = -0.64, p = .52 \)) or EL1 children and ELL-Minority children (\( U = 217.5, z = -1.88, p = .06 \)). Second, with regard to letter writing, there were no significant group differences in the children’s ability, \( H(2) = 4.88, p = .087, ns \), indicating that the three language groups performed comparably in letter writing ability.

The second question of the study investigated differences in the phonological awareness ability of the children in the three language groups. A Kruskal-Wallis test indicated that phonological awareness scores were significantly different across language groups, \( H(2) = 11.70, p = .003 \). Mann Whitney \( U \) follow-up comparisons indicated that the EL1 children significantly outperformed the ELL-Minority group of children in phonological awareness (\( U = 138.5, z = -3.38, p = .001 \)). However, the phonological awareness scores were not significantly different between the EL1 and ELL-English language groups (\( U = 256.0, z = -1.1, p = .27 \)) or between the ELL-English and ELL-Minority language groups (\( U = 200.0, z = -2.19, p = .029 \)). The EL1 group outperformed the ELL-Minority group of children but performed comparably to the ELL-English group of children.

The third question of this study examined the differences in the word spelling scores of the children in the three language groups. See Table 16 for descriptive statistics. The children’s word spelling scores on a dictation task were significantly different across language groups, \( H(2) = 6.412, p = .041 \). Mann-Whitney \( U \) follow-up comparisons indicated that there was a significant group difference in the word spelling scores of the ELL-English group and the EL1
Table 16

Summary Characteristics of Code-Related Skills across Language Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>EL1 (n = 25)</th>
<th>ELL-English (n = 25)</th>
<th>ELL-Minority (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td>Letter Naming¹</td>
<td>20.48 (7.4)</td>
<td>21.52 (7.4)</td>
<td>16.08 (9.7)</td>
</tr>
<tr>
<td>Letter Writing</td>
<td>12.20 (5.8)</td>
<td>15.28 (5.4)</td>
<td>12.32 (7.4)</td>
</tr>
<tr>
<td>Phonological awareness²</td>
<td>19.0 (6.0)</td>
<td>16.5 (8.0)</td>
<td>12.5 (5.7)</td>
</tr>
<tr>
<td>Word spelling</td>
<td>24.8 (25.9)</td>
<td>43.7 (23.8)</td>
<td>28.6 (26.6)</td>
</tr>
</tbody>
</table>

¹Phonological Awareness Literacy Screening (PALS; Invernizzi, Sullivan, Meier, & Swank, 2004); raw scores
²Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007); raw scores

group with the ELL-English children outperforming the EL1 group, \( U = 187.5, z = -2.44, p = .015 \). However, the word spelling scores were not significantly different between the EL1 group of children and the ELL-Minority group, \( U = 280.5, z = -0.63, p = .53 \), or between the ELL-English group and the ELL-Minority group, \( U = 221.0, z = -1.78, p = .075 \). The ELL-English group outperformed the EL1 group but performed comparably with the ELL-Minority group in word spelling.

The fourth question of this study examined the time the parents spent engaging in print-related activities with their children across the language groups. Table 17 provides summary characteristics of the parents’ responses to questions on the home literacy questionnaire. There were two significant findings. First, a Kruskal-Wallis test indicated that there were significant differences across the three language groups in the age when the parents began reading to their children, \( H(2) = 14.86, p = .001 \). Mann Whitney \( U \) follow-up comparisons indicated that the EL1
group differed significantly from both the ELL-English group \((U = 163.5, z = -3.41, p = .001)\) and the ELL-Minority group \((U = 156.5, z = -3.54, p = .000)\) in the age at which the parents began to read to their children. There was no difference between the two ELL groups in the age at which the parents began reading to their children, \((U = 282.0, z = -0.63, p = .529)\). The parents in the EL1 group began reading to their children at an earlier age than parents of ELL children. Second, the Kruskal-Wallis test indicated that there were significant differences across

Table 17

*Summary Responses of Parents’ Report of Home Literacy Environment*

<table>
<thead>
<tr>
<th>Variable</th>
<th>EL1 (n = 25)</th>
<th>ELL-English (n = 25)</th>
<th>ELL-Minority (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age began reading to child(^1)</td>
<td>Median 4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Min-Max 2-4</td>
<td>0-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Median frequency of:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>parent teaches letter names when reading(^2)</td>
<td>Median 3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Min-Max 0-4</td>
<td>0-4</td>
<td>1-4</td>
</tr>
<tr>
<td>parent writes letters/words child(^2)</td>
<td>Median 3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Min-Max 0-4</td>
<td>1-4</td>
<td>0-4</td>
</tr>
<tr>
<td>child names letters(^2)</td>
<td>Median 4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Min-Max 2-4</td>
<td>2-4</td>
<td>1-4</td>
</tr>
<tr>
<td>child writes letters/words(^2)</td>
<td>Median 3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Min-Max 1-4</td>
<td>0-4</td>
<td>0-4</td>
</tr>
<tr>
<td>child asks parent to spell words(^2)</td>
<td>Median 3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Min-Max 0-4</td>
<td>0-4</td>
<td>0-4</td>
</tr>
</tbody>
</table>

\(^1\)Likert scale A: 0 – over 4 years old; 1 – 3 to 4 years old; 2 – 2 to 3 years old; 3 – 1 to 2 years old; 4 – under 1 year of age.

\(^2\)Likert scale C: 1 - never, 2 - almost never, 3 - sometimes, 4 - often, 5 - very often
language groups for the frequency with which the children asked the parent to spell words at home, $H(2) = 9.30, p=.01$. Mann Whitney U tests indicated that both the EL1 group, ($U = 164.0, z = -2.63, p = .009$) and the ELL-English group, ($U = 174.0, z = -2.60, p = .009$) differed from the ELL-Minority group in the parents’ report of how often the children asked the parent to spell words. There was no difference between the two ELL groups for this item, ($U = 284.5, z = -0.328, p = .743$). Examination of the data indicated that the median score reported by the parents of the EL1 and ELL-English group was 3 or ‘sometimes’ while the median score for the ELL-Minority group was 2 or ‘almost never’. The other variables did not indicate significant statistical differences (i.e., parent teaches letter names when reading to the child, parent writes letters/words with child, child names letters, child writes letters/words).

3.3.1 Post hoc Analysis

The finding that the ELL-English group of children outperformed the EL1 group in English word spelling prompted a closer look at the data to see if there were differences in the words that these bilingual children were able to spell. Univariate ANOVAs indicated that the ELL-English group consistently scored higher on average for the spelling of each of the nine words; however, after Bonferroni correction none of the analyses held up to the revised level of significance, $p = .0045$. Total scores were calculated for regular words or transparent consonant-vowel-consonant words (e.g., pig) and for irregular words (e.g., train). Comparison of regular consonant-vowel-consonant words across language groups approached significance, $F (2, 74) = 2.97, p = .058$, with the ELL-English achieving the highest scores on average ($M = 21.80$), followed by the ELL-Minority group ($M = 16.00$), and finally, the EL1 ($M = 12.36$). Comparison of the irregularly spelled words was significantly different across the three language groups, $F (2, 74) = 4.32, p = .017$. Again, the ELL-English group achieved the highest
score on average (M = 16.88), followed by the ELL-Minority group (M = 10.08), and finally the EL1 group (M = 9.64).

3.4 Discussion

The current study investigated differences in code-related skills in two subgroups of bilingual preschool-aged children relative to a group of same-aged monolingual English children (EL1). The two subgroups were determined based on parent report of the language the child heard and spoke most often at home. This descriptive study revealed two distinct profiles in relation to code-related skills for the two groups of bilingual preschool children. Furthermore, our results suggest that differences in ELL children’s profiles were not explained by distinctions in the home literacy environment.

The ELL-English children’s profile was characterized by strengths in letter naming, and phonological awareness, two code-related skills they performed comparable to their monolingual peers. Importantly, these bilingual children who were primarily exposed to English in the home significantly outperformed their ELL-Minority peers in letter naming and their monolingual English peers in word spelling. Post-hoc analysis of the children’s spelling of individual words indicated that on average, the ELL-English children scored consistently higher than the EL1 or ELL-minority children each of the nine words and that they significantly outperformed their monolingual peers in spelling irregular words in English.

The profile of the ELL-Minority children was more complex than the profile of their ELL-English counterparts. This group of bilingual preschoolers lagged behind in letter naming compared to their ELL-English bilingual peers and they lagged behind in phonological awareness compared to their monolingual peers. However, their performance on the measure of word spelling was comparable to that of the ELL-English group. The children in all three
language groups performed comparably in letter writing ability.

Exploration of the parent’s responses to home literacy environment questions revealed only two aspects of the children’s home literacy experience that differed across language groups. Parents of EL1 children reported that they began to read to their children earlier than the parents in both ELL groups. Furthermore, parents of children in the EL1 and ELL-English groups reported that their child asked them to spell words more often at home compared to the parents of their ELL-Minority peers.

Preschool children acquire letter knowledge, that is, letter naming and writing, through adult-child interactions and instruction related to print and letters (Mol, Bus, & de Jong, 2009). Given that all of the children in the current study had participated in at least two years of English childcare, they would have received comparable instruction in letter naming and letter writing. In the current study, the bilingual children whose parents reported that their child heard and spoke English in the home most often performed comparably to their monolingual English peers in letter naming. The bilingual children whose parents reported that the children heard and spoke predominantly a minority language in the home (ELL-Minority) named significantly fewer letters than those children who had greater access to the English in the home. This might suggest that a certain threshold of English proficiency was acquired through this exposure that enabled the children to gain letter knowledge. The children’s home literacy experience does not account for these differences in letter naming knowledge as there were no significant differences in the parents’ report of the frequency with which they named alphabet letters while reading to their child or how often their child named alphabet letters in the home generally. Letter naming knowledge has been found to be predictive of oral reading fluency at grade one for low-income Native-American and Hispanic kindergarten children (Ford et al., 2014; Stage et al., 2001).
Although Campbell and Sais (1995) reported that Italian-English and monolingual English preschool children performed comparably in letter naming knowledge, they did not identify ELL subgroups on the basis of the amount of exposure the children had to the language of instruction in the home. Our findings suggest that bilingual children differ in their letter naming ability based on this home language experience.

Few studies have investigated bilingual children’s letter writing ability, an important extension of letter naming knowledge. Young children’s letter writing ability explained greater unique variance in preschool children’s word spelling in monolingual children than did letter knowledge (Puranik et al., 2012). The current study employed a letter dictation task wherein the children wrote ten dictated letters of the alphabet, a task that required that they recognize the name of the dictated letter and produce the written letter on the page. The children in the three language groups performed comparably on this task despite a significant difference in the bilingual children’s letter naming ability. Additionally, there were no significant group differences in the parent report of how often the children wrote letters across groups. This might suggest that letter writing is an outcome of preschool instruction that, at this young age, may not be as closely related to language proficiency as letter naming in preschool. Future studies are needed to examine the contribution of letter writing to bilingual preschool children’s word spelling ability.

Phonological awareness is a critical skill that is predictive of children’s ability to learn to read and spell in English (Lonigan et al., 2000; Storch & Whitehurst, 2002). The performance of the English monolingual children in phonological awareness was comparable to the bilingual children who had regular exposure to English in the home (ELL-English) whereas it was significantly better than the bilingual children whose home language was predominantly a
minority language. These results coincide with the findings of Goodrich and his colleagues (2014); that is, phonological awareness appears to be language-specific during the preschool years. The children who had greater proficiency in English, as seen in the expressive vocabulary scores, demonstrated greater ability to analyze language into sound in English. Previous studies have indicated that children learning English as a second language demonstrated poorer performance on phonological awareness measures in kindergarten compared to native English speakers (Chiappe et al., 2002; Wade-Woolley et al., 1998). Wade-Woolley and her colleagues (1998) found that bilingual kindergarteners learning English performed significantly more poorly than monolingual English children in phonological awareness but this difference might have been indicative of little exposure to English in the home. These authors reported that, after one year of instruction, there was no difference in the bilingual children’s performance in phonological awareness. Studies have reported that bilingual children were able to benefit from instruction in phonological awareness (Yeung, Siegel, & Chan, 2013) and it may be exposure to the language that accounts for these children’s ability to catch-up within a short time. Moreover, these findings might suggest that at preschool, metalinguistic ability is related to proficiency in the language and that a bilingual advantage for phonological awareness may not yet be evident in such young children. In light of this finding, studies investigating early literacy abilities of bilingual children may need to consider the amount of exposure the children have to the language of instruction.

Preschool-aged children begin to write and spell words prior to formal instruction and these invented spellings are reflective of what children know about the language and its writing system (Puranik et al., 2011). The ELL-English children performed comparably to the ELL-Minority children in word spelling yet outperformed the monolingual English children. This
finding was surprising given that the ELL-English children and the EL1 children performed comparably on measures of letter naming, letter writing, and phonological awareness. Post-hoc examination of the children’s word spelling data indicated that the bilingual group exposed to English in the home consistently scored highest, on average, across the nine words and significantly outperformed the EL1 children in spelling irregular words in English. Our findings differ from those of Chiappe and her colleagues (2002) who compared two groups of bilingual kindergartners to their monolingual English peers on measures of emergent literacy. These two bilingual groups included children exposed to English in the home and children first exposed to English at entry to kindergarten. In that study, the two bilingual groups lagged behind their monolingual peers on measures of language and phonological awareness, however the three groups of children were not significantly different in letter naming or spelling. The current study corroborates the findings of Chiappe and her colleagues (2002) indicating that bilingual preschool children possess considerable code-related knowledge despite lower language proficiency. In the current study, the two groups of bilingual children differed in their letter naming and yet they were not significantly different in word spelling. Furthermore, the ELL-English group outperformed the monolingual English group in word spelling. Exposure to English in the home resulted in the ELL-English group of children having sufficient proficiency in English to acquire comparable phonological awareness with their monolingual counterparts and to be able to make use of their ability to analyze language into sound to consistently produce advanced spellings at preschool age. These findings may support the early appearance of a bilingual advantage in code-related abilities.

Previous studies have reported that parental literacy teaching in the home makes a significant contribution to children’s literacy outcomes (Sénéchal, 2006; Yeo, et al., 2014). The
current study found no differences across the three language groups in the frequency of parent teaching of letter names, writing letters, or writing words for their children. Nor were there group differences in the frequency with which the children named or wrote letters at home. There was, however, a difference in the age at which the parents began reading to their children. Parents of the monolingual English children began reading to their children before the age of one year while parents in both ELL groups did so between the ages of one to two years. However, this difference did not correspond to differences in the children’s code-related outcomes across language groups. Overall, parent report of home literacy provided some insight into the children’s home literacy experience in relation to print but it did not account for differences across language groups.

This study builds on our understanding of early literacy in bilingual children. The two subgroups of bilingual preschool children from mixed language backgrounds were enrolled in English-only school and would receive literacy instruction in English alone. Although a number of studies have examined literacy abilities in older children (August & Shanahan, 2006; Bruck et al., 1997; Cummins, 1979; Geva & Yaghoub Zadeth, 2006; Verhoeven, 2000), the current study focused on the code-related skills of bilingual children prior to grade one and highlighted the impact of differences in home language experience on their early code-related skills. Cummins’ threshold hypothesis postulates that “those aspects of bilingualism which might positively influence cognitive growth are unlikely to come into effect until the child has attained a certain minimum or threshold level of competence in a second language” (Cummins, 1979; pg. 227). In the current study, bilingual children who had greater exposure to English in the home achieved comparable outcomes to their monolingual peers on letter naming and writing, and phonological awareness, and yet outperformed their monolingual peers in word spelling. In line
with Cummins’ threshold hypothesis, these results suggest that bilingual children who are exposed to English in the home may have sufficient competence in English to demonstrate an early advantage in the use of their code-related skills to spell words. Furthermore, bilingual children whose home language is primarily a minority language are able to make use of lower levels of phonological awareness and letter naming ability to achieve comparable word spelling scores comparable to their bilingual peers. Additional research is needed to explore this potential advantage in bilingual children’s early spelling.

Although the results of the current study emphasized the achievement of the ELL-English children relative to their monolingual English peers, it also highlights the heterogeneity of bilingual children in preschool that results from differing levels of exposure to the language of school instruction at home. The current study revealed that children whose parents reported that they heard and spoke a minority language in the home most often (ELL-Minority) had significantly poorer letter naming ability than their ELL-English peers and significantly poorer phonological awareness than their monolingual English peers. Despite this, these bilingual children had comparable word spelling ability to the ELL-English and EL1 children. Yeong and Rickard Liow (2011) postulated that bilingual children may not follow the same path in achieving English literacy and in particular, they may not develop phonological awareness in the same time course, initially relying more on letter knowledge. This may indirectly facilitate the acquisition of phonological awareness in English (Chiappe et al., 2002). Moreover, this might provide an explanation for the ELL-Minority children’s ability to spell words as well as their ELL-English and EL1 peers despite weak phonological awareness skills. Future studies are needed to identify the longitudinal development of spelling in children with limited proficiency in the language of instruction.
In our earlier study, Hipfner-Boucher et al. (2014) investigated whether these three groups of preschool children differed on measures of linguistic ability using a fictional narrative retell task. While there were no group differences in narrative macrostructure, there were significant differences in measures of microstructure (number of different words, sentence length, and grammaticality). The children in the ELL-English group were not significantly different from the EL1 group whereas both these groups outperformed the ELL-Minority group.

In the current study, we investigated whether there were group differences in code-related skills including word spelling in the same language groups of preschool children and found, again, that the ELL-English group performed comparably to the EL1 group on all code-related measures, even outperforming the EL1 group on word spelling. The ELL-minority language children, on the other hand, demonstrated weak letter naming and phonological awareness compared to the ELL-English and EL1 groups respectively, and yet performed comparably with the ELL-English group on word spelling. The results of both these studies highlight the heterogeneity of ELL preschool children with respect to English in both a linguistic task and code-related measures. The current study was able to demonstrate a potential bilingual advantage for ELL-English preschoolers in the use of code-related skills to perform word spelling. These findings are in-line with Cummins’ threshold hypothesis that would indicate that ELL children require a sufficient amount of English proficiency as a result of exposure to the language, in order to indicate an advantage.

3.4.1 Limitations

There are several limitations that should be considered when reflecting on the outcomes of this study and in looking ahead to future research. First, the current study did not test the bilingual children’s language and literacy in the minority language. Although doing so would be
ideal, testing in the minority language is not always feasible given limitations in available assessment tools that would be comparable across languages and writing systems (Geva, 2000). Furthermore, young children can gain proficiency in their second language quickly as a result of exposure to classroom instruction and social interaction and often this is accompanied by reduced proficiency in the first language making age-normed measures in the minority languages unreliable. Other studies have reported on samples of children from diverse language backgrounds (Lesaux & Seigel, 2003; Muter & Diethelm, 2001; Wade-Woolley & Seigel, 1997). Although examination of specific minority languages would be preferable in order to measure children’s ability in that language, the children in this diverse linguistic sample were characteristic of the classroom composition of children in metropolitan cities. Given that all children had attended English childcare for two years, their English proficiency was sufficient to test in English. Second, the current study did not collect data related to the children’s ability to write in the writing system of their home language. In future studies, this might provide insight into the children’s early experience with writing systems. Further, we did not specifically ask the parents for information related to home literacy practices in the minority language (e.g., how often they read to the child in the L1). Third, the current study included small samples in all three language groups and future research that includes a larger sample may enable the use of more advanced statistics for analysis (e.g., regression). Finally, the current study examined the children’s abilities in code-related skills at a single point in time. Following the literacy development of children in different language groups over several years of schooling may yield growth trajectories for literacy to indicate risk versus advantage.

3.4.2 Implications

The current study highlights the need to collect information related to bilingual
preschool children’s home language and literacy environment, in particular, the amount of
exposure children have to the language of school-based literacy instruction at home. To do so
would provide educators and clinicians with insight into bilingual children’s learning needs.
Children whose home language includes little of the language of instruction may require
additional language-learning opportunities in order to acquire early phonological awareness and
letter naming. Furthermore, these children may perform well on early measures of spelling,
possibly making use of other abilities to achieve these spellings. However, caution should be
taken to assess children’s foundational code-related skills to provide the necessary supports.
Conversely, preschool children who have greater access to the language of literacy instruction at
home may not demonstrate the same lag in some code-related skills and these children may not
require remediation. Overall, the outcomes of this study may reflect the early appearance of
advantage in code-related skills for preschoolers who have linguistic input in two languages and
exposure to the language of instruction at home. Importantly, these two groups of children
possess different profiles in early literacy abilities that, in the current study, were not accounted
for by home literacy practices.
3.5 References


hypotheses concerning the order by which 4-year-old children learn the alphabet letters.

*Early Childhood Research Quarterly* 21, 374–389.


Psychology, 33(6), 734-754.


differences in reading acquisition. *Journal of Educational Psychology, 76*(6), 1309-1324.


<table>
<thead>
<tr>
<th>Score</th>
<th>Stage</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>No response or scribble produced by scratching or a picture</td>
<td>pig</td>
</tr>
<tr>
<td>1</td>
<td>Graphic</td>
<td>A scribble with linearity (vertical or horizontal)</td>
<td>pretty</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>A single form not produced just by scratching but in a more controlled manner</td>
<td>s ͣ</td>
</tr>
<tr>
<td>3</td>
<td>Literate</td>
<td><strong>Conventional symbol</strong>: at least one real letter not phonetically related to the letters in the word</td>
<td>L, W</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td><strong>Random letter string</strong>: More than one random letter (not phonetically related)</td>
<td>aon, cx0</td>
</tr>
<tr>
<td>5</td>
<td>Early Phonetic</td>
<td><strong>Early phonetic representation</strong>: one or more letter phonetically related to the word in any position</td>
<td>tip, nai,</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td><strong>Correct first letter of the word</strong>: correct first letter in initial position and/or with other phonetically related letters</td>
<td>P, pnn</td>
</tr>
<tr>
<td>7</td>
<td>Phonetic</td>
<td><strong>Multiple phonetic representation</strong>: writing contains 2/3 related phonemes but not a repetition of the same letter. First letter must be correct</td>
<td>pg</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td><strong>Invented spelling</strong>: Writing contains 2 or 2+ letters that represent most of the words phonemes along with attempt to represent the vowel</td>
<td>pegg, pgi</td>
</tr>
<tr>
<td>9</td>
<td>Correct</td>
<td><strong>Conventional spelling</strong> (no reversals allowed)</td>
<td>pig, pretty</td>
</tr>
</tbody>
</table>

Note: The nine words the children were asked to spell were cup, bed, man, hot, pig, lady, rabbit, pretty, and train.
Appendix 2 *Home Language and Literacy Questions*

1. At what age did your child start to attend this or another child care centre? _________
2. Is your child regularly exposed to a language other than English? Yes _____ No _____
   If yes, what language(s)? _____________________________________________
3. What percentage of the time does your child hear these languages spoken? _________
4. What percentage of the time does your child speak these languages? ______________
5. What language does your child hear and speak most often at home? ______________
6. At what age did you or another family member begin to read to your child?
   - ☐ under 1 year
   - ☐ 1 to 2 years
   - ☐ 2 to 3 years
   - ☐ 3 to 4 years
   - ☐ over 4 years
7. Please place a check mark in the box that best applies to you or your child.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Almost never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very often</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How often do you try to teach the names of the letters of the alphabet when you are reading to your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. How often do you write letters or words for your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. How often does your child name letters of the alphabet?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. How often does your child try to write letters or words on his or her own (such as his or her name)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. How often does your child ask you how to spell words?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4

Effects of coaching on educators’ and preschoolers’ use of references to print and phonological awareness during a small group craft/writing activity

Abstract

Purpose: The current study investigated the effects of coaching as part of an emergent literacy professional development program to increase early childhood educators’ use of verbal references to print and phonological awareness during interactions with children.

Methods: Thirty-one educators and four children from each of their classrooms (N=121) were randomly assigned to an experimental group (21 hours of in-service workshops plus five coaching sessions) and a comparison group (workshops alone). The in-service workshops included instruction on how to talk about print and phonological awareness during a post-story craft/writing activity. All educators were video-recorded during a 15-minute craft/writing activity with a small group of preschoolers at pretest and posttest. All videotapes were transcribed and coded for verbal references to print and phonological awareness by the educators and children.

Results: Although at posttest, there were no significant group differences in the educators’ or the children’s rate per minute references to print, both the educators and the children in the experimental group used a significantly higher rate per minute in references to phonological awareness relative to the comparison group.

Conclusion: Professional development that included coaching with a speech-language pathologist enabled educators and children to engage in more phonological awareness talk during this activity.

Keywords: preschool, print referencing, professional development, educators
There is growing consensus among researchers and policymakers that efforts to enhance children’s foundational literacy skills prior to school can improve their long-term academic achievement (National Early Literacy Panel [NELP], 2008; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2002, 2005; Snow, Burns, & Griffin, 1998; Storch & Whitehurst, 2002). Preschool-aged children learn that print has meaning and that spoken language can be represented in print through adult-child interactions that draw their attention to the sounds in words as well as the relationship between sounds, letters, and words (Moats, 1995; Pianta, 2006). Considering that between one-half to two-thirds of preschoolers participate in several hours of non-parental childcare each week (Barnett & Yarosz, 2007; Bushnik, 2006) early childhood educators can be a rich source of interaction for these children to learn about sounds in language and print. Research indicates that the quality of educator-child interactions is a key feature of early childhood education settings that support early literacy learning (Hamre & Pianta, 2007).

However, classroom interactions that promote preschoolers’ knowledge of print and awareness of sounds in language (i.e., phonological awareness) require that early childhood educators have specific knowledge of foundational literacy as well as the ability to individualize instruction to meet the diverse needs of young learners. With ever-increasing expectations placed on educators to promote children’s literacy development, it is important to determine the features of professional development that support early childhood educators to successfully meet these expectations (Sheridan, Edwards, Marvin, & Knoche, 2009). To this end, the current study investigated the benefits of individualized classroom coaching by a speech-language pathologist as part of an emergent literacy professional development program designed to enhance educators’ ability to verbally talk about print and phonological awareness during a
Longitudinal studies have established the importance of preschool children’s print knowledge and phonological awareness, in predicting children’s achievement in early reading (Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2002). Lonigan, Burgess, and Anthony (2000) conducted a longitudinal study from preschool to grade one to investigate the contribution of early oral language, print, and phonological awareness skills to later reading ability. Using structural equation modelling, these authors reported that phonological sensitivity and letter knowledge accounted for 54% of the variance in children's decoding ability in both kindergarten and grade one. Storch and Whitehurst (2002) investigated children’s oral language and “code-related skills”, including print concepts and phonological awareness, in a longitudinal study from preschool to grade four to determine the role of these skill areas in early reading ability. Again, using structural equation modeling, they found that children’s print knowledge and phonological awareness at preschool accounted for 38% of the variance in these same skills at kindergarten which in-turn was predictive of their reading ability at grades one and two. Together, these findings indicate the importance of ensuring that preschool children are engaged in activities that promote the development of print knowledge and phonological awareness.

Although a number of studies have examined the effects of interventions that directly train preschool children in print knowledge and phonological awareness (Bus & van IJzendoorn, 1999; NELP, 2008), training early childhood educators to promote these skills through explicit interactions has the potential to reach a number of children, including some who might be at-risk for poor academic outcomes (Foorman & Torgesen, 2001; Phillips, Clancy-Menchetti, & Lonigan, 2008). When young children are involved in adult-child interactions related to print, they are likely to spend more time asking questions about its meaning and engaging in reading
and writing behaviours that support literacy learning compared to children with fewer adult-child interactions related to print (Cunningham & Stanovich, 1991; Whitehurst & Lonigan, 1998). Accordingly, children’s understanding of phonological awareness and their competent use of print are acquired through interaction with adults (Aram & Levin, 2001, 2002; Justice, McGinty, Piasta, Kaderavek, & Fan, 2010). Aram and Levin (2001) found that the quality of mother-child interactions during kindergarten children’s print use predicted these children’s word reading, word writing, and phonological awareness. Early childhood educators are also in a position to engage young children in talk related to print and phonological awareness, however, they may be ill-prepared to promote these skills within preschool programs and examination of these interactions is warranted (Justice, Mashburn, Hamre, & Pianta, 2008a; Phillips et al., 2008; Powell, Diamond, Bojczyk, & Gerde, 2008).

Recent observational studies have indicated that some educators in preschool programs use low levels of references to print and phonological awareness skills (Connor, Morrison, & Slominski, 2006; Justice, Mashburn, et al., 2008; Piasta, Dynia, Justice, Pentimonti, Kaderavek, & Schatschneider, 2010; Zucker, Justice, & Piasta, 2009). Connor et al. (2006) observed the amount of time preschool educators typically interact with the children related to print during whole classroom instruction. They reported that, in some classes, print-related talk accounted for less than three minutes of class time on average per day and small group or individualized interactions related to print accounted for only 0.07 minutes on average per day. Zucker and her colleagues (2009) observed preschool educators’ video-recordings to determine the amount of print-related utterances used during book reading with their whole class. Although the educators had received 2.5 hours of training in shared reading, the authors reported that this was not expected to have altered the way educators typically read to children (Garet, Porter, Desimone,
Birman, & Yoon, 2001). Zucker and her colleagues reported that the educators’ videotaped recordings indicated that the educators referenced print on average 1.14 times per minute, a rate they considered too low for enhancing child literacy outcomes. Justice et al. (2008) observed 83 preschool educators’ literacy activities within preschool classrooms and reported that instruction related to alphabet knowledge and phonological awareness was low quality (44% of educators achieved low ratings). These low levels of adult-child interactions related to print and phonological awareness indicate that some children hear very little talk related to these important precursors to conventional literacy. The current study will investigate the effects of an emergent literacy professional development program designed to train educators to use verbal references related to print and phonological awareness.

4.1.1 Socio-Cultural Theory of Child Development

The theoretical basis for this study is grounded in Vygotsky’s socio-cultural theory of child development (Vygotsky, 1978). According to this theory, social interaction is critical for children’s learning to occur. When adults engage children in explicit talk about alphabet letters, their associated sounds, and the link between sounds and words, children can construct their own learning as a result of this enriched environment (John-Steiner & Mahn, 1996). Early childhood educators increase the likelihood that children will benefit from instruction by talking about print and phonological awareness within the children’s zone of proximal development (ZPD) (Justice & Ezell, 2004; Rogoff, 1990). A child’s ZPD is the level of instruction that is slightly above the individual child’s knowledge and skill level (Vygotsky, 1978). For example, a child who “writes” words using random letter strings would benefit from an educator who encourages her to think about and identify the initial sound in a word and associate it with the letter that represents that sound. In the current study, adult-child interactions that engage the
children to talk about the sounds in words are referred to as phonological awareness talk or verbal references to phonological awareness while interactions that engage children to talk about letters and printed words are referred to as print talk or verbal references to print.

### 4.1.2 References to Phonological Awareness

Phonological awareness, or the ability to analyze and manipulate sounds in words at increasingly smaller units of sound (i.e., word, syllable, and phoneme) is a metalinguistic skill that emerges during the preschool years and has been shown to be predictive of children’s literacy outcomes (Lonigan et al., 2000; Storch & Whitehurst, 2002). Adult-child interactions that explicitly direct children’s attention to the sounds in words may enhance children’s phonological awareness (Burgess & Lonigan, 1998). These verbal references to phonological awareness may include identification of syllables in words, rhyme, alliteration, onset-rime, segmentation of initial/final sounds, blending of sounds to make words, segmentation of words into sounds, elision or removal of sounds in words, and substitution of sounds in words. The NELP’s meta-analysis reported that phonological awareness interventions that train children made a considerable impact on children’s phonological awareness, with large effect sizes (i.e., average of 0.82), indicating the potential benefits from instruction in phonological awareness in preschool classrooms. Despite the fact that many preschool programs include regular curricular activities that provide opportunities to promote phonological awareness, such as storybook reading and writing centers, observational studies of preschool classrooms indicate that many preschool educators do not have sufficient knowledge of phonological awareness and how to promote the development of this skill during daily interactions with the children in their care (Justice, Mashburn, et al., 2008a; Phillips et al., 2008). The current study investigated the effects of professional development in emergent literacy to support early childhood educators to
explicitly engage children in talk that promotes phonological awareness to facilitate children’s print use during a small group craft/writing activity.

4.1.3 References to Print

Verbal references to print can help to promote children’s knowledge of print, its form, and its function (Justice et al., 2010; McGinty, Breit-Smith, Fan, Justice, & Kaderavek, 2011). Specifically, children’s letter knowledge (e.g., letter-sound correspondence), print conventions (e.g., top to bottom directionality), and early writing attempts (e.g., name writing) are skills included under the umbrella term of print knowledge (Storch & Whitehurst, 2002). Educators’ explicit use of verbal references to print is an instructional technique whereby adults direct children’s attention to print for the purpose of enhancing their awareness and knowledge of letters and written language (Girolametto, Weitzman, Lefebvre, & Greenberg, 2007; Girolametto, Weitzman, & Greenberg, 2012; Justice & Ezell, 2002). These verbal strategies include asking explicit questions about print (e.g., inquiring about the meaning of a question mark), commenting on print (e.g., explaining the use of an uppercase letter), inviting children to engage in print talk (e.g., asking for words that begin with the letter B), and instructing children to write letters and words (e.g., making a snake shape for the letter “S”) (Ezell & Justice, 2000; Justice et al., 2008). In an observational study, Connor and her colleagues (2006) conducted regular observations of 34 preschool classrooms throughout a school year. Using hierarchical linear modeling, these investigators reported that the frequency of educators’ explicit interactions related to print and phonological awareness positively predicted children’s alphabet knowledge and word recognition. Consequently, the authors suggested that educators’ behaviour might have a positive outcome on children’s literacy outcomes. Justice and her colleagues (2010) conducted a randomized controlled trial to determine the effectiveness of educators’ use
of a print-referencing style of book reading during whole-class read-alouds on preschool children’s print knowledge outcomes compared to a group of educators using a business-as-usual reading style. After controlling for fall print knowledge, child age, and classroom quality, the children whose educators used a print-referencing style of reading scored significantly higher on measures of print knowledge (i.e., print concepts, alphabet knowledge, and name writing ability) in the spring relative to the children in the comparison group. Furthermore, these improvements were associated with reading, spelling, and comprehension scores two years later (Piasta, Justice, McGinty, & Kaderavek, 2012).

A number of studies have investigated educators’ use of strategies to promote children’s print-related knowledge and phonological awareness within the context of shared book reading, an interactive method of reading books aloud to children that encourages their active participation in book-related talk (Flowers, Girolametto, Weitzman, & Greenberg, 2007; Girolametto et al., 2012; Piasta et al., 2010; Zucker et al., 2009). Given that book reading is a regular curricular activity in preschool classrooms, it provides a context for educators to explicitly talk about the print on the page and phonological awareness. However, a number of studies have reported that educators in preschool programs rarely reference print or phonological awareness during shared book reading even when the books include salient print and phonological features (Hindman, Connor, Jewkes, & Morrison, 2008; van Kleeck, 2003; Zucker et al., 2009). Furthermore, experimental studies have indicated that educators in preschool programs rarely engaged children in conversation related to print and phonological awareness during shared book reading (Girolametto et al., 2012). In a randomized controlled trial, Girolametto and his colleagues (2012) examined the efficacy of professional development that included in-service workshops and coaching on early childhood educators’ use of emergent
literacy strategies compared to a no-treatment control group. Examining educator-child interactions across two classroom contexts, shared book reading and a craft/writing activity, the authors reported that more than 85% of the references to print and phonological awareness occurred during the craft/writing activity relative to shared book reading. Given Justice and Ezell’s (2004) recommendation that adults need to use moderation in the number of interruptions during storybook reading with preschool children to enable them to follow the story and engage in conversation related to it, book reading may provide limited opportunities for educators to talk about print and phonological awareness. Furthermore, it may be difficult for educators to provide enough individualized instruction in print and PA in this latter context. Alternatively, activities that include opportunities for writing may provide a more focused context for adult-child references to print and phonological awareness to assist children to write (Aram, 2005; Aram & Biron, 2004; Girolametto et al., 2012). The current study seeks to expand on the findings of Girolametto et al. (2012) by examining the effects of professional development that includes coaching on educators’ use of references related to print and phonological awareness during a small group craft/writing activity.

4.1.4 Professional Development

Closer examination of professional development is warranted in order to provide the most effective and efficient instruction possible. Sheridan and her colleagues (2009) identified three broad models of professional development for educators of preschool-aged children that include specialized in-service training or coursework, coaching, and consultation. Specialized in-service training and coursework focuses on specific skill building delivered by an expert and includes activities that have direct application to recommended practice. This training can be in the form of workshops, that are often brief in duration and do not include sustained contact
between the instructor and the educators, or coursework, a term used to describe a series of workshops that are spread out over an extended period of time, such as a year (Landry, Anthony, Swank, & Manseque-Bailey, 2009; Neuman & Wright, 2010). Coaching and consultation are closely related but distinct forms of professional development for educators. Coaching consists of frequent interactions over a brief period of time between a more experienced or knowledgeable expert and an individual who desires to learn a specific skill or behaviour. Consultation includes the provision of indirect problem-solving between an expert and educator regarding a third party, such as a child or classroom of children that present some challenge with regard to the educators’ skill or ability. Empirical evidence is needed to identify the type of professional development that best enhances educators’ ability to adopt the use of verbal references to print knowledge and phonological awareness in preschool classrooms. The current study builds on the literature that seeks to identify effective professional development for early childhood educators by examining the effects of coaching when added to emergent literacy in-service workshops.

4.1.5 Coaching

A recent shift in the method of providing emergent literacy professional development for educators indicates that a coaching model within the classroom context can enhance educator-child interactions to promote children’s literacy (Hsieh, Hemmeter, McCollum, & Ostrosky, 2009; Landry et al., 2009; Mashburn et al., 2008; Neuman & Cunningham, 2009; Powell, Diamond, Burchinal, & Koehler, 2010; Sheridan et al., 2009), social-emotional competence, and address challenging behaviour (Fox, Hemmeter, Snyder, Binder, & Clarke, 2011). Coaching provides a means of individualizing information for an educator or team of educators to implement specific strategies within an applied setting (Powell et al., 2010; Wasik & Hindman,
In some cases coaching is offered concurrently with workshops and involves the ‘coach’ observing the educator interacting with children in her classroom followed by conferencing to discuss the interaction and provide feedback (Girolametto et al., 2012; Landry et al., 2009; Raver et al., 2008). In other cases, web-based coaching has been offered to provide educators with sample videos of interactions that demonstrate the use of strategies to support curricular goals (Powell et al., 2010). However, little is known about the unique benefits of coaching to enhance educator practice and whether coaching coupled with in-service workshops may offer an effective form of professional development.

Experimental studies of the effects of professional development that include coaching have resulted in inconsistent outcomes. Neuman and Wright (2010) assessed the effects of coaching to promote language and literacy in a large randomized controlled trial that included three groups of preschool educators, those who received only coursework, those who received only individualized classroom coaching, and a no-treatment control group. The coaching group of educators made significant improvements in structural features of the classroom, such as enhanced literacy centers (e.g., the addition of a writing center). However, there were no significant differences in educators’ use of teaching strategies among all of the groups. In re-examining the coaching sessions in light of this outcome, the authors reported that the coaches, who were experienced early childhood educators, had focused mainly on structural improvements to the environment rather than on enhancing teaching strategies. Furthermore, the educators who received only classroom coaching may not have had the foundation in emergent literacy that in-service workshops or coursework would provide. Landry and her colleagues (2009) compared teaching behaviours in preschool educators following year-long participation in one of four types of professional development (two of which included coaching or mentoring)
relative to a no-treatment control group of educators. Along with small group online training, the four types of professional development were (1) mentoring with detailed feedback of children’s progress, (2) no mentoring but detailed children’s progress monitoring, (3) mentoring with limited feedback of children’s progress, and (4) no mentoring with limited feedback of the children’s progress. After one year, the professional development that included mentoring with detailed feedback on the children’s progress was found to be the most effective and coaching (identified as mentoring but defined it in a similar manner to the current study) was found to improve the educators’ use of phonological awareness and writing instruction. Girolametto and his colleagues (2012) investigated the efficacy of a professional development program that included in-service workshops plus coaching on early childhood educators’ use of emergent literacy strategies compared to a waitlisted control group of educators. They examined educator-child interactions across two classroom contexts, shared book reading and a craft/writing activity, and found that both the educators and children in the experimental group used significantly more references to print and sounds during both shared book reading and the craft/writing activity compared to the control group. While these emergent literacy in-service workshops coupled with coaching significantly improved early childhood educators’ ability to reference print and phonological awareness during the post-story craft/writing activity compared to the control (Girolametto et al., 2012), that study did not account for the unique contribution that coaching added to the provision of professional development. Thus, coaching varies across studies and its benefits need further investigation to determine if coaching is a useful adjunct to emergent literacy in-service workshops that speech-language pathologists may offer to educators as part of their services to preschoolers.
4.1.6 The Current Study

The current study examined the unique contribution that coaching added to a professional program for a group of early childhood educators who participated in in-service workshops plus coaching compared to a group of educators who participated in in-service workshops alone. The educators’ interactions with the children were video-recorded and all utterances spoken by the educator or the children were coded for the type of utterance, that is, references to print and phonological awareness. The current study examined two questions. The first question of the study investigated whether educators who participated in an emergent literacy professional development that included in-service workshops and individualized classroom coaching used more references to print and phonological awareness during the small group craft/writing activity compared to educators who received the professional development workshops without coaching (herein referred to as the comparison group). Few studies have examined educators’ use of references to print and phonological awareness within a post-story craft/writing activity. Based on the findings of Girolametto et al., (2012), it was predicted that the educators in the experimental group would use more references to highlight both print knowledge and phonological awareness compared to educators who received workshops alone.

The second question of this study examined whether the children in the experimental group, those whose educators received coaching, used more references to print and phonological awareness at posttest relative to the children in the comparison group. Based on the findings of Girolametto et al. (2012) it was hypothesized that as a result of increased educator talk related to print and phonological awareness, the children in the experimental group would be engaged in more talk related to print and phonological awareness than the comparison group during a craft/writing activity.
4.2 Method

4.2.1 Design

This study used a pretest-posttest randomized controlled design with random assignment of early childhood educators (N=32) to experimental and comparison groups. The experimental group received professional development that included four emergent literacy in-service workshops (i.e., a total of 21 hours of in-service instruction) and five individualized classroom coaching sessions with a speech-language pathologist. The comparison group received the same four in-service workshops without the coaching sessions. At pre- and posttest, all educators were video-recorded during a craft/writing activity for 15 minutes with a small group of three to four preschool children from their classrooms. The time span between the pre- and posttest was six months. See Namasivayam et al. (in press) for results related to the educators’ use of strategies to promote vocabulary learning during shared book reading.

4.2.2 Participants

4.2.2.1 Educators. A total of 32 early childhood educators from 31 childcare centres participated in this study. Research brochures that included a fax-back page were sent to childcare centres throughout Metropolitan Toronto. Once the fax-back page was received, a research coordinator travelled to the centre to meet with each educator to explain the research and answer questions. If the educators agreed to participate, they signed informed consent forms and were randomly assigned to experimental and control groups using a computer-generated randomizer. The educators completed a demographic questionnaire (e.g. age, years of study, experience). See Table 18 for summary data on the pretest characteristics of the educators in each group. All of the educators were female and ranged in age from 23 to 50 years. All educators had completed their academic qualifications in early childhood education in English
in Canada, they all spoke English fluently, and English was the only language spoken in the childcare centres. However, consistent with a large urban centre, 14 educators spoke other languages in the home in addition to English, including Albanian, Bosnian, Farsi, French, German, Gujarati, Hindi, Italian, Mandarin, Polish, Portuguese, Russian, Serbian, Spanish, and Ukrainian. At pretest, there were no significant differences between the experimental and comparison groups in terms of the educators’ age, years of education, years of experience, number of children in their classrooms, and number of educators who spoke another language in addition to English ts (20-28) = -0.478 – 0.886, ps = .384 - .976.

Table 18

Summary Characteristics of the Educators

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 15)</td>
<td>(n = 16)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>M (SD)</td>
<td>40.6 (8.7)</td>
</tr>
<tr>
<td></td>
<td>Min- Max</td>
<td>26 - 50</td>
</tr>
<tr>
<td>Years of post-secondary study</td>
<td>M (SD)</td>
<td>3.4 (1.8)</td>
</tr>
<tr>
<td></td>
<td>Min- Max</td>
<td>2 - 6</td>
</tr>
<tr>
<td>Years of career experience</td>
<td>M (SD)</td>
<td>14.8 (7.9)</td>
</tr>
<tr>
<td></td>
<td>Min- Max</td>
<td>2 - 26</td>
</tr>
<tr>
<td>Years of experience working with preschool-aged children</td>
<td>M (SD)</td>
<td>9.2 (5.7)</td>
</tr>
<tr>
<td>Exposure to a language other than English</td>
<td>Yes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>8</td>
</tr>
</tbody>
</table>

4.2.2.2 Children. A total of 125 children participated in this study. The children were recruited from each of the 32 educators’ classrooms by sending information and informed
consent forms home with each preschool-aged child. In the event that more than four consents were returned in a classroom, four children were randomly selected from those consents, balancing for an equivalent number of males and females. At the pretest, there were three comparison group classrooms in which only three children participated because these classrooms had only three children who were eligible based on age (i.e., greater than 45 months of age). At posttest, six classrooms had only three children. These included the same three classrooms from pretest as well as three additional classrooms from the experimental group. In all three cases, attrition at posttest was due to one child moving out of the classroom.

Approximately 60% (n = 36) of the children in the experimental group and 48% (n=29) in the comparison group were receiving subsidy, indicating that a number of the children came from low-income homes. A Chi-square test for independence (with Yates Continuity Correction) indicated no significant difference in the number of children who were on subsidy, $\chi^2 (1, n = 121) = 1.890, p = .233, \phi = .125$.

Parents were asked to complete a questionnaire that elicited family demographics and home language and literacy information using a Parent Literacy Questionnaire (Girolametto et al., 2012). Table 19 provides summary data for the children. The average age of the children was approximately 57 months (range: 46 – 71 months). Consistent with preschool classrooms in large urban settings, 39 children in the experimental group (65%) and 29 children in the comparison group (47.5%) were regularly exposed to a language other than English in the home (i.e., Albanian, Amharic, Arabic, Bengali, Cantonese, Czech, Danish, Dari, Edo, Farsi, French, Hebrew, Hindi, Hungarian, Igbo, Italian, Japanese, Mandarin, Marathi, Portuguese, Russian, Serbian, Spanish, Tagalog, Telugu, Turkish, Twi, Urdu, Uyghur, Vietnamese, and Yoruba). Independent samples t-tests indicated that there were no significant group differences in terms
Table 19

Summary Characteristics of the Children

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 60)</td>
<td>(n = 61)</td>
</tr>
<tr>
<td>Age (months)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>56.0 (6.8)</td>
<td>57.18 (6.8)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>Min-Max</td>
</tr>
<tr>
<td></td>
<td>41 - 69</td>
<td>41 - 71</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td>Expressive vocabulary¹</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>92.8 (15.2)</td>
<td>93.3 (16.7)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>Min-Max</td>
</tr>
<tr>
<td></td>
<td>61 - 145</td>
<td>55 - 133</td>
</tr>
<tr>
<td>Non-verbal IQ²</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>99.6 (13.7)</td>
<td>102.2 (11.7)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>Min-Max</td>
</tr>
<tr>
<td></td>
<td>54 - 130</td>
<td>74 - 130</td>
</tr>
<tr>
<td>Phonological awareness³</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>94.65 (9.79)</td>
<td>96.57 (8.08)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>Min-Max</td>
</tr>
<tr>
<td></td>
<td>75 - 119</td>
<td>78 - 113</td>
</tr>
<tr>
<td>Letter naming⁴</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>19.47 (8.32)</td>
<td>19.57 (8.44)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>Min-Max</td>
</tr>
<tr>
<td></td>
<td>0 - 26</td>
<td>0 - 26</td>
</tr>
<tr>
<td>Letter writing</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td></td>
<td>13.03 (6.09)</td>
<td>13.07 (6.51)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td>Min-Max</td>
</tr>
<tr>
<td></td>
<td>0 - 20</td>
<td>0 - 20</td>
</tr>
</tbody>
</table>

¹Expressive One-Word Picture Vocabulary Test (Brownell, 2000)
³Phonological awareness subtest of Test of Preschool Early Literacy (TOPEL; Lonigan et al., 2007)
⁴Letter naming subtest of Phonological Awareness Literacy Screening for Preschoolers - 2nd Edition (PALS Pre-K; Invernizzi et al., 2004)

of the children’s age in months, $t (119) = -0.996$, $p = .320$, expressive vocabulary, $t (119) = -0.702$, $p = .48$, or non-verbal IQ, $t (119) = -1.459$, $p = .150$. Further, Chi square tests of independence indicated that there were no significant group differences in the children’s gender, $\chi^2 (1, n = 121) = 0.074$, $p = .790$, phi = 0.04; grade, $\chi^2 (1, n = 121) = 3.84$, $p = 0.147$, phi = .147; and the number of children who were exposed to a second language in the home, $\chi^2 (1, n = 121)$
Furthermore, there were no statistical differences between the two groups of children at pretest on measures of letter naming \((U = 1728.5, z = -0.535, p = ns)\), letter writing \((U = 1809.5, z = -1.07, p = ns)\), and phonological awareness \((U = 1618.5, z = -1.098, p = ns)\). See Table 19.

Due to mechanical failure with the video camera, one educator did not have a pretest videotape and was excluded from the study leaving 31 educators \((n=15\) experimental and \(n=16\) comparison group) and 121 children \((n=60\) in the experimental and \(n=61\) in the comparison group). All data analysis was conducted on the revised sample size. Note: follow-up analysis indicated that the inclusion of this educator’s posttest scores did not change the posttest group results for any variables.

### 4.3 Procedure

Trained research assistants met individually with the children in a quiet space in their preschool classrooms over two 30-minute testing sessions. Each child was informed of the procedures and provided assent to participate in the study. Two measures were used to describe the characteristics of the children in the groups at pretest: 1) expressive vocabulary, and 2) nonverbal IQ. Three measures of print and phonological awareness were used to establish the children’s ability in these key emergent literacy skills: 1) letter naming, 2) letter writing, and 3) phonological awareness.

#### 4.3.1 Measures. **Expressive vocabulary.** The Expressive One Word Picture Vocabulary Test (EOWPVT; Brownell, R., 2000) was used to assess the children’s expressive vocabulary skills. Using a stimulus book that presented a single coloured picture, the children were prompted to say the names of objects (e.g., bird), actions (e.g., painting), and concepts (e.g., fruit). The internal consistency of this measure for four and five year olds as reported in the
manual is .95-.96, respectively.

**Non-verbal IQ.** The Kaufman Brief Intelligence Test – Second Edition (KBIT-2; Kaufman, & Kaufman, 2004) was used to assess non-verbal reasoning ability. Using a stimulus manual, the children were asked to point to one of five possible pictures to identify the correct response. The internal consistency of this measure for four and five year olds as reported in the manual is .78.

**Letter naming.** The letter naming subtest of the Phonological Awareness Literacy Screening (PALS; Invernizzi, Sullivan, Meier, & Swank, 2004) was administered to assess the children’s knowledge of letter names. Using a fixed random order, the 26 uppercase letters were presented one at a time on 3 X 3 inch laminated white cards. The number of correctly identified letters constituted the child’s score.

**Letter writing.** The children were asked to write each of ten letters on a separate page in a 5.5” X 8” booklet with plain paper. The ten letters (i.e., B, D, S, T, O, A, H, K, M, and C) were used in previous studies with preschool children (Puranik, Lonigan, & Kim, 2011) and identified as the earliest letters learned by preschoolers (Justice, Pence, Bowles, & Wiggins, 2006). For each of the 10 letters, a score of 0 was given if the child did not respond, wrote an incorrect letter, or wrote an unrecognizable shape; 1 if the letter was horizontally reversed or poorly formed and would only be recognized by most adult readers in context; and 2 if the letter was written in a conventional form (i.e., upper or lowercase) and would be recognized out of context by most adult readers (Puranik & Apel, 2010). A trained research assistant independently scored 20% of the randomly selected letter writing samples resulting in an inter-rater reliability of 93% agreement.

**Phonological awareness.** The phonological awareness subtest of the Test of Preschool
Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) was used to measure children’s blending and elision ability. Testing stopped when the children made three consecutive incorrect responses. The internal consistency of this measure as calculated by Cronbach’s alpha for children ages three to five years as reported in the manual was between .86 and .88.

Craft/writing activity. At both pre- and posttest, a research assistant travelled to the childcare centre and video recorded the small group craft/writing activity. Initially the educator was asked to read the storybook Don’t Forget to Come Back (Harris, 1978) to the small group of children. Following the storybook reading, the educator and the children were seated at a table in the classroom or library of their childcare centre. The research assistant provided the educator with large sheets of paper, crayons, primer pencils, and the storybook. The educators were instructed: "Please ask the children to draw their favourite part of the story on their paper. Please interact the way you normally would. I will video record for 15 minutes. If you are finished before then, please tell me “I’m finished.” Do you have any questions?” The interaction was video recorded for 15 minutes using a portable video camera with a directional microphone.

4.3.2 Professional Development Program. The professional development program utilized in this study was ABC & Beyond™ - The Hanen Program® for Building Emergent Literacy (Greenberg, 2011). All of the educators participated in seven half-day workshops for a total of 21 hours of in-service workshop training. On each of three days, two workshops were administered, one in the morning and one in the afternoon, with a final fourth half-day session at the end to review of the information covered in the previous workshops. These four training dates were held once every three weeks and the topics of the sessions included shared book reading, vocabulary, story structure, inferential language, print knowledge, and phonological
awareness. These workshops were co-taught by two speech-language pathologists who had extensive experience consulting with educators in early childhood settings. The teaching methods used in all of the workshops were similar and included a) a review of the previous week’s workshop content; b) interactive lectures with examples and videotapes selected to illustrate key strategies; c) small group discussions to analyze videotaped examples or discuss ideas for strategy implementation in the classroom; d) role plays of strategy implementation; and e) completion of action plans, in which educators wrote out the strategies they intended to use during the week between sessions.

Of particular importance to the current study, the two workshops held on the third full-day of training included a half-day workshop (three hours) that focused on how to use verbal references to print to promote children’s knowledge and use of the alphabet and conventions of print and a half-day workshop (three hours) that focused on how to use verbal references to phonological awareness to promote children’s knowledge and use of phonological awareness. The educators were taught how to engage all children in the group in conversations related to print and phonological awareness and to do so within daily classroom contexts, such as book reading and writing activities. For example, during these two workshops the participants role-played a child drawing a picture and dictating a caption for the educator to write. The participant role-playing ‘the educator’ then used references to print and phonological awareness to engage the educator role-playing ‘the child’ in conversation related to these emergent literacy skills. Educators in the experimental group were also videotaped facilitating a craft/writing activity with children in their classroom and they participated in video-feedback discussion during the coaching session. Additional information related to the professional development can be found in the ABC and Beyond guidebook given to each educator (Weitzman & Greenberg, 2010).
Educators in the experimental group received a one-hour individualized coaching session in their early childhood classroom during the week following each of the first three workshops. Additionally, two follow-up coaching sessions were offered prior to the posttest, one was offered two weeks following completion of the training, and the other, two to three weeks later. The classroom coaching sessions lasted approximately one hour, were conducted by one of the two speech-language pathologists who co-taught the program, and followed a standard protocol. At the beginning of each visit, the speech-language pathologist reviewed the content of the previous workshop and the educator’s action plan for the videotaped interaction. This action plan consisted of the strategies that the educator intended to incorporate into the interaction with the children. Following this, the speech-language pathologist a) video recorded the educator interacting with a small group of children in the classroom; b) provided on-line suggestions for change during the recording as needed; and then, c) reviewed the video-recording and discussed the educators’ use of the program strategies and the creation of a new action plan. One full coaching session focused on print and phonological awareness. The two follow-up sessions focused on all topics covered by the workshops, including print and phonological awareness.

4.3.2.1 Treatment Fidelity. In order to ensure treatment fidelity was maintained during the delivery of this professional development program, four strategies were used as suggested by Kaderavek and Justice (2010). First, all educators received a program guidebook, ABC and Beyond™: Building Emergent Literacy in Early Childhood Settings (Weitzman & Greenberg, 2010), that provided specific content relative to each workshop as well as multiple examples of how to use the emergent literacy strategies in the classroom. Second, data were collected on the educators’ attendance at the four workshops and five classroom visits. Thirty of the thirty-two educators attended all four workshops; however, two educators in the comparison group had an
unavoidable scheduling conflict for one workshop session so the program leader provided them with an individual session that covered the missed content. All 15 educators in the experimental group participated in the five classroom coaching sessions (the educators in the comparison group did not receive coaching sessions). Third, to ensure that both the experimental and comparison groups received the same workshop content, the second author attended all workshops for both groups of educators and completed a treatment fidelity checklist (available from the corresponding author) to score each workshop. The instructors received a score of 2 for content delivered in a way that fully complied with the instructor’s manual, Making Hanen Happen Leaders’ Guide for Hanen Certified ABC and Beyond Trainers (Greenberg, 2011), a score of 1 for partial compliance, and a score of 0 for non-compliance. The total possible score for the workshops varied as a function of the amount of content to be delivered (i.e., the total scores were 104, 96, 132, and 20, for workshops 1-4 respectively). Scores were converted to percentages and averaged to yield an overall fidelity score of 0.97 (n = 704), with a range of .95 - .99 for the four individual workshops. Fourth, all five classroom coaching visits offered to the educators in the experimental group were audio-recorded and examined to determine if they adhered to the established protocol. A research assistant, who was blind to the objectives of the research study, completed a coaching fidelity checklist to score 12 criteria, including items such as, the length of the session, the provision of coaching, and the creation of an action plan. The 12 items were scored as 2 if present, 1 if partially present, or 0 if the criterion was not met. The total number of points possible for each the five sessions was 24. The total scores were converted to percentages to yield an overall fidelity rating of 0.88 (n = 1800) for all five sessions combined, with a range from .80 to .93 for the individual coaching sessions. The overall fidelity score of .88 indicates a high level of consistency in the delivery of all 75
coaching sessions (15 educators x 5 coaching sessions each). Finally, a second rater, also blind to the study objectives, completed the coaching fidelity checklist on a random selection of 20% (i.e., 15) of the sessions. The inter-rater reliability between the first and second raters was .96 (n = 180).

4.3.3 Measures of Interaction. The pretest and posttest videotapes of the educator-child small group interactions during the craft/writing activity were transcribed by trained research assistants who were blind to both the group assignment of the participants and test time (i.e., pretest and posttest). All transcripts were completed using the Systematic Analysis of Language Transcripts software (SALT; Miller & Chapman, 2002). Trained research assistants conducted agreement reliability on 100% of the transcriptions. Using a consensus procedure used by Johnston (2001), a second research assistant viewed the videotapes while reading the completed transcripts, entering queries and corrections directly onto the transcripts. The two research assistants then met to resolve all discrepancies. Where a discrepancy could not be resolved, an X was entered on the transcript. Agreement reliability was calculated using the following formula: number of agreements / (the number agreements + disagreements) x 100 (Sackett, 1978) and yielded agreement reliability of .96 for transcription (n = 22,224 utterances). Agreement reliability indicated the extent to which the verifier agreed with the original transcription prior to making any changes to the transcripts.

4.3.3.1 Coding system. The 62 transcripts (i.e., 31 pretest and 31 posttest) were coded by trained research assistants who were blind to both group assignment and test time. The transcripts were coded in random order using a random numbers table. All utterances that contained a verbal reference to print or phonological awareness, whether spoken by the educator or one of the children, were awarded a single code. See Appendix 3 for the coding system that
consisted of phonological awareness and the four print referencing codes including, letter naming, letter-sound correspondence, print concepts, and writing. Twenty percent of the transcripts were randomly selected and coded by the first author to generate reliability estimates for each of the types of utterances. Inter-rater reliability was calculated using the following formula: \( \frac{\text{number of agreements}}{\text{the number agreements} + \text{disagreements}} \times 100 \) (Sackett, 1978). The inter-rater reliability for each print referencing code was: 97% for letter naming (n=389), 95% for letter-sound correspondence (n=304), 97% for print concepts (n=230), and 91% for writing (n=497). Inter-rater reliability for phonological awareness utterances was 98% (n=175). Overall inter-rater reliability for the code-related skills coding system was 94% agreement reliability (n=1595).

4.4 Results

A preliminary examination of the coded data indicated two issues: (1) some of the early childhood educators interacted with the children for less than 15 minutes, and (2) the assumptions of normality and homogeneity of variance were not met. First, five educators in both the experimental and comparison groups interacted with the children for less than the 15 minute allotted time for the craft/writing activity at pretest and six educators in both groups used less than the 15 minutes at posttest. To address these differences in length of interaction, educators’ use of print-related and phonological awareness talk was analyzed using rate per minute. Second, given that the assumptions of normality and homogeneity of variance had not been met, non-parametric Mann-Whitney \( U \) tests were used to examine group differences. Effect sizes were determined by converting \( z \)-scores into the effect size estimate, \( r \) (Rosenthal, 1991) and using Cohen’s (1988) criteria of 0.1 = small effect, 0.3 = medium effect, and 0.5 = large effect.
The first question of this study investigated whether there were group differences in the educators’ use of four specific verbal references to print taught by the professional development program: (a) letter naming; (b) letter sounds; (c) print concepts; and (d) writing. It was hypothesized that the educators in the experimental group would use more verbal references to print strategies on average at posttest relative to the comparison group. Table 20 provides summary data for the educators’ use of the four print references and phonological awareness at rate per minute. There were no significant differences between the experimental and comparison groups at pretest on any of the four references to print variables \((Mdns = .00 – 1.40), Us = 95.0 – 109.50, zs = -1.349 - -0.431, ns\). Additionally, at posttest, there were no significant group differences in any of the four references to print, \((Mdns = .54 – 2.60), Us = 82.00 – 103.00, zs = -1.502 – -0.672, ns\). Table 20 shows that, on average, both groups of educators increased their rate per minute for letter naming, letter sounds, concepts of print, and writing during the craft/writing activity from pretest to posttest. Educators in the experimental group increased their print talk related to letter naming, on average, from 1.0 per minute at pretest to 1.21 at posttest while the comparison group more than doubled their use of letter naming from 0.49 on average at pretest to 1.27 at posttest. Further, educators in the experimental group increased their use of letter sound correspondence from 0.31 per minute on average at pretest to 1.06 at posttest while the educators in the comparison group increased from 0.13 to 0.76 per minute. With regard to concepts of print, the educators in the experimental group increased their use of print references on average from 1.96 per minute at pretest to 3.01 per minute at posttest while the comparison group increased from 1.60 to 2.19 per minute. Finally, the educators in the
Table 20

Educators’ References to Print and Phonological Awareness in Rate per Minute

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 15)</td>
<td>(n = 16)</td>
</tr>
<tr>
<td>Print Referencing</td>
<td></td>
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</tr>
<tr>
<td>Letter Naming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00 (2.60)</td>
<td>0.49 (0.81)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 10.29</td>
<td>0.00 – 2.58</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.07</td>
</tr>
<tr>
<td>Post</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.21 (2.30)</td>
<td>1.27 (1.14)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 9.29</td>
<td>0.00 – 3.52</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.54</td>
<td>1.07</td>
</tr>
<tr>
<td>Letter/Sound Correspondence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.31 (0.74)</td>
<td>0.13 (0.47)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 2.78</td>
<td>0.00 – 1.87</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Post</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.06 (0.92)</td>
<td>0.76 (0.86)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 3.08</td>
<td>0.00 – 3.11</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.80</td>
<td>0.57</td>
</tr>
<tr>
<td>Concepts of Print</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.96 (1.37)</td>
<td>1.60 (1.17)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.27 – 4.84</td>
<td>0.16 – 5.38</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.40</td>
<td>1.37</td>
</tr>
<tr>
<td>Post</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.01 (1.70)</td>
<td>2.19 (1.38)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.94 – 7.05</td>
<td>0.78 – 5.73</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.60</td>
<td>1.79</td>
</tr>
<tr>
<td>Writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.96 (1.10)</td>
<td>1.22 (1.27)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 3.40</td>
<td>0.00 – 4.07</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.53</td>
<td>0.67</td>
</tr>
<tr>
<td>Post</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.86 (0.78)</td>
<td>2.02 (1.04)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.60 – 3.08</td>
<td>0.27 – 3.78</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.76</td>
<td>2.06</td>
</tr>
<tr>
<td>Phonological Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.18 (0.39)</td>
<td>0.15 (0.43)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 1.31</td>
<td>0.00 – 1.73</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Post</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.37 (2.39)</td>
<td>0.61 (0.78)</td>
</tr>
<tr>
<td></td>
<td>Min-Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00 – 8.69</td>
<td>0.00 – 2.79</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.53</td>
<td>0.31</td>
</tr>
</tbody>
</table>
experimental group almost doubled their use of references to print related to writing, on average, from 0.96 per minute at pretest to 1.86 at posttest while the comparison group increased from 1.22 per minute at pretest to 2.02 at posttest.

With regard to educators’ use of references to phonological awareness during the small group craft/writing activity, the two groups of educators did not differ in phonological awareness references at pretest, ($Mdns = 0.00), U = 117.50, z = -0.123, ns.$ However, at posttest, the experimental group of educators ($Md =1.53$) differed significantly from the comparison group ($Md = 0.31), U = 51.50, z = -2.72, p = .006, r = .49.$ This is a medium to large effect size. The data in Table 20 indicate that the educators in the experimental group increased the mean number of utterances that included a phonological awareness reference from a rate of 0.18 per minute at pretest to 2.37 at posttest while the educators in the comparison group increased their use of phonological awareness talk, on average, from 0.15 at pretest to 0.61 at posttest.

The second question of this study examined whether the children in the experimental and comparison groups differed in their use of four print codes (i.e., letter naming, letter sound, print concepts, and writing) and phonological awareness at pretest and posttest. Table 21 includes summary data for the children’s use of utterances related to print and phonological awareness. At pretest, there were no significant differences between the groups of children on any of the four types of print references, ($Mdns = 0.00 – 0.53), Us = 80.0 – 114.5, zs = -1.629 – -0.218, ns.$ Similar to the educators’ use of the four print variables (i.e., letter naming, letter sounds, print concepts, and writing), there were no significant group differences in the frequency of the children’s use of any of the four print references at posttest, ($Mdns = 0.27 - 1.01), Us = 88.0 – 118.0, zs = -1.265 – -0.080, ns.$ Table 21 indicates that the children in both groups used similar frequencies of these print references following the professional development program. Children
Table 21

*Children’s References to Print and Phonological Awareness in Rate per Minute*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 60)</td>
<td>(n = 61)</td>
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<tr>
<td><strong>Print Referencing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letter Naming Pre M (SD)</td>
<td>0.83 (1.22)</td>
<td>0.39 (0.69)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 4.74</td>
<td>0.00 – 2.46</td>
</tr>
<tr>
<td>Median</td>
<td>0.53</td>
<td>0.03</td>
</tr>
<tr>
<td>Post M (SD)</td>
<td>0.53 (0.61)</td>
<td>1.17 (1.11)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 1.97</td>
<td>0.00 – 2.87</td>
</tr>
<tr>
<td>Median</td>
<td>0.35</td>
<td>0.90</td>
</tr>
<tr>
<td><strong>Letter/Sound Correspondence</strong> Pre M (SD)</td>
<td>0.43 (0.94)</td>
<td>0.10 (0.37)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 3.47</td>
<td>0.00 – 1.47</td>
</tr>
<tr>
<td>Median</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Post M (SD)</td>
<td>0.74 (1.04)</td>
<td>0.63 (0.69)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 3.98</td>
<td>0.00 – 1.86</td>
</tr>
<tr>
<td>Median</td>
<td>0.27</td>
<td>0.34</td>
</tr>
<tr>
<td><strong>Concepts of Print</strong></td>
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<tr>
<td>Pre M (SD)</td>
<td>0.26 (0.42)</td>
<td>0.27 (0.46)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 1.60</td>
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<tr>
<td>Median</td>
<td>0.07</td>
<td>0.09</td>
</tr>
<tr>
<td>Post M (SD)</td>
<td>1.03 (0.78)</td>
<td>0.79 (0.96)</td>
</tr>
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<td>Min-Max</td>
<td>0.00 – 2.79</td>
<td>0.07 – 3.76</td>
</tr>
<tr>
<td>Median</td>
<td>0.87</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td></td>
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<tr>
<td>Pre M (SD)</td>
<td>0.51 (0.54)</td>
<td>0.53 (0.55)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 1.80</td>
<td>0.00 – 2.00</td>
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<tr>
<td>Median</td>
<td>0.33</td>
<td>0.46</td>
</tr>
<tr>
<td>Post M (SD)</td>
<td>1.10 (0.76)</td>
<td>0.95 (0.59)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.13 – 2.36</td>
<td>0.00 – 1.97</td>
</tr>
<tr>
<td>Median</td>
<td>1.01</td>
<td>0.87</td>
</tr>
<tr>
<td><strong>Phonological Awareness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre M (SD)</td>
<td>0.23 (0.57)</td>
<td>0.01 (0.02)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 2.12</td>
<td>0.00 – 0.07</td>
</tr>
<tr>
<td>Median</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Post M (SD)</td>
<td>1.91 (1.90)</td>
<td>0.38 (0.60)</td>
</tr>
<tr>
<td>Min-Max</td>
<td>0.00 – 6.43</td>
<td>0.00 – 2.14</td>
</tr>
<tr>
<td>Median</td>
<td>1.39</td>
<td>0.15</td>
</tr>
</tbody>
</table>
in the experimental group increased their letter sound references on average from 0.43 per minute at pretest to 0.74 per minute at posttest while the children in the comparison group increased from 0.10 to 0.63. Next, the children in the experimental group increased their use of references related to concepts of print on average from 0.26 per minute at pretest to 1.03 at posttest while the comparison group increased from 0.27 to 0.79. Finally, the children in the experimental group increased their use of print references related to writing, on average, from 0.51 per minute at pretest to 1.10 at posttest while the comparison group increased from 0.53 at pretest to 0.95 at posttest. There was one exception to this pattern of the children increasing their use of references print from pretest to posttest; this was letter naming. For this type of print referencing, the children in the experimental group decreased their use, on average, from 0.83 per minute at pretest to 0.53 at posttest, whereas the children in the comparison group tripled the rate of their use of utterances related to letter naming, on average, from 0.39 per minute at pretest to 1.17 per minute at posttest.

With regard to the children’s phonological awareness, at pretest, the children in the experimental group ($Mdn = 0.00$) did not differ significantly from the comparison group ($Mdn = 0.00$) in their use of references to phonological awareness. However, at posttest, the children in the experimental group ($Mdn = 1.39$) used significantly more utterances related to phonological awareness relative to the comparison group, ($Mdn = 0.15$), $U = 46.0$, $z = -2.94$, $p = .003$, $r = .53$. This is a large effect size. Table 21 indicates that the children in the experimental group used 0.23 references to phonological awareness per minute at pretest and 1.91 at posttest. In contrast, the children in the comparison group used, on average, 0.01 phonological awareness utterances per minute at pretest and 0.38 per minute at posttest.
4.4.1 Quality of Phonological Awareness References

A post hoc follow-up analysis was conducted to explore the quality of educators’ phonological awareness references to determine if there was a particular type of phonological awareness utterance that educators used most often as a result of coaching. In keeping with Schuele and Boudreau’s (2008) hierarchy of phonological awareness complexity, eight levels of phonological awareness skills were identified, ranging from low to high level of complexity, that is, (a) syllable; (b) rhyme; (c) alliteration; (d) onset-rime; (e) initial/final sounds; (f) blending phonemes into words; (g) segmenting words into phonemes; (h) elision and manipulation of phonemes in words. The first author coded each phonological awareness utterance using the coding system in Appendix 4. A research assistant conducted inter-rater reliability on 20% of the transcripts resulting in 96.8% for syllable (n=32), 95.6% for rhyme (n=23), 80% for alliteration (n=5), 100% for onset-rime (n=21), 97.7% for identification of initial/final sounds (n=44), 100% for blending phonemes into words (n=2), 80.9% for segmenting words into phonemes (n=42), and 100% for elision and manipulation of phonemes in words (n=0). Given that the intervention focused on educators’ use of early phonological awareness skills (i.e., syllables, rhyme, and alliteration), it was hypothesized that the experimental group would use significantly more identification of syllables, rhyme, and alliteration relative to the comparison group.

Again, given the violation of the assumptions of normality and homogeneity of variance, non-parametric Mann-Whitney U tests were conducted to identify if there were group differences in educators’ use of the type of phonological awareness utterances at pretest and posttest. At pretest, the educators in the experimental group (Mdns = 0.00) did not differ significantly from the comparison group (Mdns = 0.00) in their rate per minute use of any of the
eight phonological awareness variables, $U_s = 104 - 120$, $z_s = 0.0 - -1.085$, $ns$. At posttest, educators in the experimental group used significantly more phonological awareness references related to segmenting words into syllables ($Mdn = 0.67$) compared to educators in the comparison group ($Mdn = 0.00$), $U = 60$, $z = -2.958$, $p = .003$, $r = .53$. This is a large effect size. Additionally, at posttest, the educators in the experimental group used significantly more references to rhyme ($Mdn = 0.41$) compared to educators in the comparison group ($Mdn = 0.00$), $U = 68.5$, $z = -2.452$, $p = .014$, $r = .44$. This is a medium effect size. Finally, the educators in the experimental group used significantly more phonological awareness references related to onset-rime ($Mdn = 0.30$) relative to educators in the comparison group ($Mdn = 0.00$), $U = 44.5$, $z = -3.33$, $p = .001$, $r = .60$. This third finding also yields a large effect size.

### 4.5 Discussion

The current study investigated the effects of individualized classroom coaching as part of an emergent literacy professional development program to enhance early childhood educators’ use of references related to print and phonological awareness during a small group craft/writing activity. This randomized controlled trial revealed three important findings in relation to the effects of coaching. First, educators who received individualized coaching sessions in addition to in-service workshops learned to use a higher quantity of references to phonological awareness in their interactions with small groups of preschool children relative to the comparison group of educators who only received workshops. The second important finding, from a post-hoc analysis, revealed that educators who received coaching learned to use a higher quantity of phonological awareness references that were consistent with the strategies instructed in the emergent literacy workshops. In contrast, educators who participated in the in-service workshops alone did not apply these skills during the video-recorded craft/writing activity. The
third finding of this study revealed that the children in the experimental group were engaged in more frequent phonological awareness talk at posttest relative to children in the comparison group.

The finding that coaching significantly enhanced early childhood educators’ ability to talk about phonological awareness is important because these educators are positioned to provide multiple opportunities for children to learn about phonological awareness (Bus, & van IJzendoorn, 1999; NELP, 2008). Previous studies have indicated that some educators possess little knowledge of phonological awareness or strategies that promote the analysis of language into sound (Cunningham, Perry, Stanovich, & Stanovich, 2004; Girolametto et al., 2012; Moats, 1999). The pretest data in the current study supports this viewpoint, indicating that educators used few references focused on phonological awareness. The posttest results indicate that educators who attended professional development that included coaching made significantly more references to phonological awareness during a small group craft/writing activity compared to educators who attended only in-service workshops. This increase in use of references to phonological awareness indicates an enriched learning environment for all of the children in the classroom. In this study, the coaches were speech-language pathologists who have specific knowledge of phonological awareness and language development. The study design permits the conclusion that the individualized coaching that the educators received was instrumental in supporting the educators to talk about the sound structure of words.

A post-hoc question investigated the quality or specific types of phonological awareness references that the educators learned to use. The post hoc results indicated that the educators in the experimental group used significantly more strategies that explicitly directed the children’s attention to syllables, rhyme, and onset-rime at posttest. Schuele and Boudreau (2008) identified
children’s abilities to segment words into syllables and rhyme as lower level or less complex phonological awareness skills while onset-rime ability was identified as a complex, phonemic awareness skill. The educators who received coaching learned to talk about these phonological awareness skills explicitly taught in ABC and Beyond. All three skills precede and support more fine-grained abilities to analyze language into sound at the phoneme level, a skill related to reading and spelling (Anthony & Lonigan, 2004; Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003). Educators’ ability to learn to use these strategies as a result of coaching (i.e., given that both groups received the workshops) supports Neuman and Cunningham’s (2009) assertion that immediate implementation of in-service workshop content with feedback is necessary to ensure transfer of instructed strategies to classroom practice. Phonological awareness is a cognitively complex metalinguistic insight (i.e., that words are made up of phonemes) that may require individualized coaching in order to provide educators with the depth of understanding and skill necessary for classroom implementation. Future research is needed that examines the effects of coaching on educators’ ability to promote higher-level phonemic awareness (e.g., elision) during a craft/writing activity.

The third finding of the current study revealed that the children whose educators received coaching were engaged in significantly more talk that focused on phonological awareness relative to the comparison group at posttest. As the educators interacted with the children by referencing phonological awareness, the children in their small groups learned to respond to and initiate this same type of talk. Previous experimental studies have determined that as early childhood educators engage children in conversation by asking questions and being responsive to the children’s conversational turns during interaction, children use significantly more utterances in response (Girolametto, Weitzman, & Greenberg, 2003; Milburn,
Girolametto, Weitzman, & Greenberg, 2014). Therefore as the educators engaged children in talk related to phonological awareness, children responded and, in several cases, went beyond the typical question, answer, feedback interactions that occur in adult-child interactions. An informal examination of the individual transcripts indicated that, as the educators encouraged the children to think about the first sound in the words the children wanted to spell, the children began to suggest other words that began with the same sound. Furthermore, the children in the experimental group began to interact with each other producing multiple rhyming words, counting syllables, and identifying words that began with the same initial sound. These adult-to-child and child-to-child interactions related to phonological awareness indicate an environment that promotes the awareness of the sound structure of words. For example, when child A was writing the word ‘Dad’, the following interaction ensued:

Educator: How many syllables is dad?
Educator: {claps once} How many syllables?
Child A: Two.
Child C: Da - ad.
Child A: Dad is two.
Child B: It's not d - ad.
Educator: It's not two.
Educator: {claps once} Dad.
Child A: Dad is one.
Child C: {claps twice} Daddy.
Child B: {claps once} Dad.

Contrary to the hypothesis that coaching would substantially improve educators’ use of print references, the two groups of educators did not differ significantly from each other in the frequency of their references to print at posttest. This finding is inconsistent with a previous
study by Girolametto et al. (2007), wherein educators who participated in workshops showed significantly higher use of print references compared to a no-treatment control group. The results of the current study indicate that both groups of educators demonstrated low levels of references to print at pretest at a rate of approximately four references to print per minute but increased the frequency of print references at posttest to, on average, 6.5 per minute. In contrast, Zucker and her colleagues (2009) observed educators’ print referencing during shared book reading within a whole classroom context and reported that educators referenced print considerably less, at a rate of approximately one reference per minute. Taken together, these studies indicate that typical educator practice includes low levels of print referencing without professional development to support their use. Furthermore, the current findings may suggest that workshops alone may be sufficient for educators to learn to use strategies that promote children’s print knowledge and use (Justice, Kaderavek, Fan, Sofka, & Hunt, 2009). However, caution must be exercised in drawing conclusions regarding the effectiveness of the workshops used in the current study for increasing educators’ references to print from pre- to posttest given that this study did not include a no-treatment control group and cannot account for possible time effects.

4.5.1 Coaching

The results of this study build on those of previous randomized controlled trial studies that have investigated the effects of coaching on preschool and early childhood educators’ ability to provide a literacy-rich classroom environment. In comparison to previous studies of coaching (Landry, Swank, Smith, Assel, & Gunnewig, 2006; Girolametto et al., 2012; Neuman & Wright, 2010), this study reports specific skill development in an area of emergent literacy that has typically been difficult for educators to apply. For example, neither Landry et al. (2006)
nor Neuman and Wright (2010) found an effect of coaching on educators’ ability to promote phonological awareness skills following professional development. Landry and her colleagues (2006) administered a large scale study examining the effectiveness of emergent literacy workshop training along with coaching or mentorship with Head Start teachers over two years. Despite one hour per week of coaching in the first year, the authors reported that phonological awareness was difficult for the educators to understand and incorporate into curricular activities. The intervention in the current study included two workshops (i.e., three hours each) that explicitly trained educators to use references to print and phonological awareness within specific contexts, targeting early developing skills. The educators in the experimental group received coaching to implement these same strategies during the coaching session that immediately followed these workshops and received feedback on their performance related to the children in their class. Relative to Landry et al. (2006), the educators’ effective implementation of phonological awareness references may require explicit teaching of this skill within specific curricular activities.

Neuman and Wright (2010) compared the effects of coursework and individualized coaching as modes of professional development and found no statistical differences in teacher learning and practice outcomes for language and literacy instruction compared to a no-treatment control group. Rather, they found significant improvements in the structural features of the preschool centers (e.g., inclusion of writing centers). One reason for this finding may be found in the focus of the coaching sessions. The coaches’ logs revealed that fewer coaching sessions were spent on teaching and modelling instructional strategies to promote language and literacy with a greater number of sessions focusing on improvements to the environment. The authors reported that the coaches had a masters’ degree in early childhood education whereas in the
current study the coaches were speech language pathologists who had received extensive training in language, including phonological awareness, and emergent literacy. Further, the strategies taught in the current study had immediate application for curricular use by providing educators with the skills and feedback to implement these strategies appropriately. Girolametto et al. (2012) found that educators who participated in the emergent literacy workshops plus coaching learned to use references to print and to talk about the sounds in words compared to a no-treatment control group; however, that study did not examine the contribution of coaching alone. The current study extended this latter study by isolating the additive effects that coaching offers and determining the types of phonological awareness educators used. By using a research design that provided all of the educators with in-service workshops, this study ensured that educators in both groups received the same foundation in emergent literacy and as a result, group differences could be attributed to the coaching.

Coaching is an expensive type of professional development (Hamre et al., 2012) and the overarching goal of this study was to identify its effects on print and phonological awareness instruction. The findings of this study showed intervention effects specific to phonological awareness, a skill that was developed only by the group that experienced coaching. While coaching may be more costly than other forms of professional development, if educators are able to adopt more sophisticated strategies that promote children’s phonological awareness, this may be a reasonable investment in preschool education given the impact of enhancing one educator’s practice on a number of children in his or her care. In the current study, the coaching was provided by a speech-language pathologist who provided educators with individualized video feedback on their performance related to the emergent literacy strategies taught during the in-service workshops. Speech-language pathologists often consult with early childhood
educators regarding children in their classrooms and the current findings reflect their ability to provide individualized feedback to educators in relation to the needs of specific children in their classroom as well as how to integrate the strategies within curricular activities.

The current study examined educators’ use of references to print and phonological awareness within the context of a craft/writing activity. Previous studies have focused on storybook reading as a context for educators to explicitly reference print and found that educators rarely refer to the print on the page during shared book reading (Hindman et al., 2008; van Kleeck, 2003; Zucker et al., 2009). The use of a craft/writing activity provided an appropriate context for explicitly discussing print and promoting children’s print use that may have contributed to these increases in educators’ and children’s use of print-related talk. This context may yield greater opportunities for educators to engage children in meaningful use of print. However, consistent with the findings of shared book reading studies (Connor et al., 2006; Piasta et al., 2010; Zucker et al., 2009), the educators in the current study demonstrated variability in their use of references to print and phonological awareness during a craft/writing activity. At pretest, some educators only referenced print or talked about phonological awareness five times during the fifteen minute craft/writing activity while others used a total of 154 references to print. This variability prior to professional development is reflective of educators’ typical practice and indicates that some children have very few interactions with educators related to print and phonological awareness while others experience considerably more talk related to print and phonological awareness in their classrooms (Zucker et al., 2009). Following professional development, there continued to be variability in the educators’ total use of print referencing even among the educators in the experimental group (i.e., range 49 to 212). Continued research is needed to identify educator characteristics and beliefs that coincide with
educators’ ability to adapt the strategies supported during coaching in order to promote more consistent educator-child interactions across preschool classrooms (Sheridan et al., 2009).

### 4.5.2 Limitations of the Study

A number of limitations need to be considered when reviewing the findings of this study. First, the current study included only educators who had completed their diploma in early childhood education, had a minimum of 1.5 years of experience working with this age group, and were responsible for curricular planning for their classroom. These results may not generalize to educators who have fewer qualifications or less experience working with preschool-aged children. Second, the methodology used in the current study involved video-recording the educator and children during a craft/writing activity at pretest and posttest to examine group differences in educators’ and children’s utterances related to print and phonological awareness. This study did not include observation of the educators’ use of strategies to promote print and phonological awareness during other daily classroom activities to see if this ability generalized to other literacy-related activities. Third, given that all of the children in each classroom would be expected to benefit from changes in educators’ practice, future studies might test all of the children’s literacy-related outcomes as secondary effects of educators’ participation in professional development. Finally, a fourth methodological limitation of the current study is the lack of a group of educators that received coaching alone. This would be an important future direction to identify if the effects of coaching are additive to information received in workshops or if coaching alone by a speech-language pathologist would bring about similar effects to in-service workshops plus coaching.
4.5.3 Implications

Policymakers and researchers continue to investigate the features that contribute to quality preschool programming (Early et al., 2007; Mashburn et al., 2008; Moats, 1999). The quality of instruction in preschool classrooms is enhanced by educators who are able to incorporate references to phonological awareness into meaningful interactions with children (Phillips et al., 2008). Educators who promote print-related skills and phonological awareness within their classroom have the potential to facilitate children’s knowledge and interest in print (Cunningham, & Stanovich, 1991) and improve their early reading and spelling abilities. In the current study, coaching by a speech-language pathologist enabled educators to encourage the children to talk about the sounds in words when engaged in a craft/writing activity. Importantly, the current study indicates that professional development that included coaching by a speech-language pathologist in addition to in-service workshops improves early childhood educators’ ability to direct children’s attention to phonological awareness better than professional development that includes in-service workshops alone.
Appendix 3  Coding System for References to Print and Phonological Awareness

Print Referencing


Examples: Educator: Is that the letter S, Tammy [LN]?

Child: My mommy has an N in her name [LN].

Letter/Sound Correspondence [LS] – included pairing letters with sounds or pairing a letter with words that begin with it.

Examples: Educator: What is the letter that makes the sound /t/ [LS]?

Child: Night starts with the N [LS].

Print/Book Concepts [PC] – included concepts of how print and books work, such as, - left to right directionality, upper/lowercase, font, punctuation, and talk related to the author/illustrator.

Examples: Educator: This is a question mark [PC].

Child: Look I made a title for my book [PC].

Writing [W] – included how to hold the pencil, write a word or the child’s name, and formulation of the caption the child wanted to write on the page. Where there was overlap between a writing code and either a print-related or phonological awareness code, the utterance was coded for the print/phonological awareness code.

Examples: Educator: You make an R like this [W].

Child: I made my name [W].

Phonological Awareness

Phonological Awareness [PA] – included isolation of a phonological unit of sound in a word, such as, syllable, rhyme, onset-rime, word initial/final sound, segmenting words into sounds,
and blending sounds to form words.

Examples: Educator: What is the first sound that you hear in the word ‘pizza’ [PA]?

Child: Hot and pot rhyme [PA].
Appendix 4  Coding System for References to Phonological Awareness

Syllables [PA1] – identification of syllables in words

Examples: Educator: Clap the syllables in the word ‘sunflower’ [PA1].

Child: There are three claps in sunflower [PA1].

Rhyme [PA2] - recognition or production of words that rhyme

Examples: Educator: Do cat and bat rhyme [PA2]?

Child: Pail rhymes with nail [PA2].

Alliteration [PA3] - match words with the same beginning or final sounds

Examples: Educator: ‘Silly’ and ‘Sally’ start with the same sound [PA3].

Child: Ball, bike, beach start the same [PA3].

Onset-rime segmentation [PA4] – isolating the onset and rime

Examples: Educator: If ‘cat’ and ‘bat’ rhyme, what sounds do they have in common [PA4]?

Child: Car, bar, ar [PA4].

Initial/final sounds [PA5] – identify the initial or final sound in words

Examples: Educator: What is the first sound that you hear in the word ‘moose’ [PA5]?

Child: Mop starts with /m/ [PA5].

Blending [PA6] - Blend phonemes to make words

Examples: Educator: /m/ /u/ /s/ makes ‘moose’ [PA6].

Child: It says /n/ /o/ No [PA6].

Segmenting [PA7] - Segment words into phonemes

Examples: Educator: What are the sounds that you hear in ‘panda’ [PA7]?

Child: The next sound is /n/ and then /t/ [PA7].
Elision or Substitution [PA8] - Delete or substitute phonemes in words

Examples: Educator: If you say ‘cold’ without saying /k/, what word is left [PA8]?

Child: If you take /z/ away from ‘nose’ you just have ‘no’ [PA8].
4.6 References


Beyond Trainers. Toronto, ON: The Hanen Centre.


Chapter 5

Summary of Contributions and Future Directions

5.1 Dissertation Summary

This conclusion briefly reviews the findings of the three studies that make up this dissertation work, how the studies fit within the literature, and broad theoretical implications of these findings. Subsequently, some limitations will be proposed that should be considered when reflecting on the outcomes of this body of work. Furthermore, some future directions for research in preschool children’s spelling will be discussed. Finally, this conclusion will identify the combined contribution that these three studies add to our understanding of preschool children’s early spelling and writing as well as implications of these studies for educators, clinicians, and parents of preschool children.

5.1.1 Summary of Study 1 (found in Chapter 2)

Study 1 found in Chapter 2 examined the component skills that predicted preschool-aged children's ability to write their first name and spell words. The results of this study revealed that children’s letter writing uniquely predicted their ability to write their name conventionally, whereas word spelling was predicted by letter writing and phonological awareness (blending). A distribution of children’s name writing scores indicated that children either could or could not write their name suggesting that as children begin to write their name there is rapid development of this ability. These findings corroborate those of Puranik, Lonigan, & Kim (2011) who also identified that different skills underlie children’s ability to spell words and write their name during the preschool years. Those authors found that name-writing ability was dependent on children’s letter writing skills and print knowledge whereas children’s word spelling was predicted by their letter writing, alphabet knowledge, print knowledge, and phonological
awareness (blending) ability. Taken together, these concordant findings suggest that young children in both the United States (i.e., Florida) and Canada (i.e., Toronto) are similar in terms of using different underlying skills to write their name and spell words. It is noteworthy that the Canadian sample of 95 children included 42 children who heard a minority language in the home greater than 20% of the time and spoke that language in the home greater than 10% of the time. The findings of both studies may be generalizable to large urban centres where many children have similar bilingual language backgrounds as the children who participated in the current study.

Theoretically, classic phase models of spelling development have been used to explain the stages through which children learn to spell words; however, the results of the current study might suggest that a more dynamic model may be necessary to adequately explain how children learn to spell words and write their name. For example, these results may be explained by the emergence of a dual-route for spelling during the preschool years (Houghton & Zorzi, 2008). This model assumes that spellers make use of two processes or “routes” for translating speech to print: a lexical route and a sub-lexical route. The lexical route involves the speller retrieving the spelling of familiar words from the orthographic output lexicon. A child’s name, in this model, is acquired as an orthographic form through frequent exposures to it in print and this orthographic form is accessed directly when children write their name. The sub-lexical route involves the speller applying knowledge of phoneme to grapheme conversion to recode sound to print. This sub-lexical route is activated when the speller wants to spell an unfamiliar word, which would be the case for most, if not all, words for a preschool speller. As the child learns to spell words, the phonological representation activates individual graphemes by exploiting the speller’s knowledge of sound to spelling correspondence through statistically high frequency
combinations of phoneme to grapheme relations (Rapp et al., 2002; Houghton & Zorzi, 2003). This model can explain the differences in children’s ability to write their name and spell words. However, additional work is needed to test this model computationally to explain how young children advance in their early spelling of words.

Alternative models, such as a connectionist model or Share’s self-teaching model (Share, 1999), may also be used to explain children’s early word spelling and name writing. The connectionist model of reading, for example, describes a means of learning to read words aloud that includes a distributed network of orthographic, phonological, and semantic representations (e.g., letters or phonetic features) along with ‘hidden units’ that facilitate activation patterns that enable the child to learn to read increasingly complex mappings (Plaut, McClelland, Seidenberg, & Patterson, 1996; Seidenberg & McClelland, 1989). Much like the use of connectionist models to describe word reading ability, research is needed to explore this model for its ability to explain young children’s earliest written productions, that is, spelling words and writing their name. Share’s self-teaching model postulates that word reading or the phonological recoding of print to sound enables a child to acquire an orthographic form that enables visual word recognition necessary for reading (Jorm & Share, 1983; Share, 1999). As young children spend time looking at print and decoding words, they learn word-specific orthographic information, that with very few exposures to a word (Ehri & Saltmarsh, 1995), can facilitate a self-teaching mechanism for acquiring additional orthographic forms or words. This conceptual model has been used to explain children’s rapid learning for word reading. Research is needed to examine this model’s ability to explain young children’s earliest writing abilities. The current study focused on a dual-route model to explain spelling development because this model has been effectively tested computationally in adult proficient spellers who experienced a brain injury.
Furthermore, if a child’s name is acquired as an orthographic form while early word spelling requires the use of phonological analysis of language to sound, a dual-route model may be the most parsimonious model to explain these early abilities and pave the way for other processes as spelling ability develops. Additional research is needed in this important aspect of becoming literate.

5.1.2 Summary of Study 2 (found in Chapter 3)

Study 2 found in Chapter 3 described a study that investigated the early literacy abilities of two groups of preschool-aged English Language Learners (ELLs) relative to a group of their monolingual English (EL1) peers. These ELL preschoolers had attended English child care for a minimum of two years, were attending English-only preschool/kindergarten, and would be attending English-only primary school. Based on parent report of the language the children heard and spoke most often at home, the children were assigned to either the ELL-English language users (i.e., heard and spoke predominantly English at home) and ELL-Minority language users (i.e., heard and spoke predominantly a minority language at home). The results indicated that ELL-English children performed similarly to their monolingual English peers in letter naming and phonological awareness while significantly outperforming them in word spelling. ELL-Minority children performed similarly to their ELL-English peers on word spelling despite scoring significantly lower than this group in letter naming and significantly lower than the EL1 preschoolers in phonological awareness. There were no group differences in letter writing or the home literacy environment.

The results of this study highlight three findings. First, these findings are in-line with those of Hipfner-Boucher et al. (2014) who identified distinct profiles of these two groups of bilingual preschool children based on their narrative retell. The current study also found group
differences for code-related skills. This highlights the heterogeneity of bilingual children and the importance of educators and clinicians gathering information related to children’s home language environment to inform instruction. Second, the results of this study corroborate the findings of Goodrich, Lonigan, and Farver (2014) who reported that phonological awareness in preschool is language-specific. In the current study the groups’ phonological awareness ability on English measures was related to the children’s exposure to English at home. This finding suggests that future research should explore this developmental trajectory of phonological awareness as a language-specific skill in preschoolers and language-general skill in children who have completed kindergarten. Third, the children in the current study were from middle-income families (median) removing socioeconomic status as a possible confound that might exist in other studies of bilingual children. Theoretically, these findings might suggest the early appearance of an advantage for word spelling in bilingual preschool children. Additional research is needed to explore the early literacy skills of preschool children from diverse linguistic backgrounds to determine if their enhanced ability in word spelling is linguistically driven or if they are using different strategies from their monolingual peers when spelling words in English.

5.1.3 Summary of Study 3 (found in Chapter 4)

Study 3 found in Chapter 4 described a randomized controlled study that examined the effects of coaching as part of professional development to enhance preschool educators’ ability to talk about print and phonological awareness during interactions with small groups of preschool children in the context of a craft/writing activity. The results of this study indicated that there were no group differences at pretest in the educators’ or the preschoolers’ frequency of utterances related to print and phonological awareness as measured by rate per minute.
However, at posttest, both the educators and the children in the experimental group used a significantly higher rate of references to phonological awareness relative to the comparison group who received in-service workshops alone. Furthermore, these educators learned to talk about the types of phonological awareness skills taught in the professional development.

These findings extend the work of Girolametto, Weitzman, and Greenberg (2012). That study examined the effects of professional development that included in-service workshops and coaching by a speech language pathologist on preschool educators’ ability to promote print and phonological awareness during a small group writing activity relative to a no-treatment control group of educators. The current study design isolated the effects of coaching, given that both groups of educators received the same in-service workshops, to determine the additive contribution coaching makes to professional development in emergent literacy with preschool educators (Namasivayam et al., in press). Importantly, at posttest the finding that educators who received coaching learned to talk about phonological awareness with preschool children during a small group craft/writing activity compared to the educators who received only in-service workshops indicates that coaching provides educators with the feedback necessary to learn this fine-grained, metalinguistic skill that is often hard to teach (Girolametto, et al., 2012).

Furthermore, the children whose educators received coaching used significantly more references to phonological awareness at posttest relative to the children in the comparison group. Theoretically, this finding conforms with Vygotsky’s social constructivist theory of child development that postulates that learning takes place in a social context with a knowledgeable adult. Educators who were using a greater number of references to phonological awareness resulted in the children in their group engaging in a greater number of references to this critical early literacy skill relative to the comparison group. A review of the transcripts indicated that
the children in the experimental group were not only responding to the educators but also initiating questions and responding to other children’s queries regarding sounds in words. Implications of these findings indicate that coaching by a speech language pathologist as part of early literacy professional development can support educators to engage children in interactions related to phonological awareness.

5.2 Future directions

There are three future directions that would extend the findings of these studies. First, in a cross-sectional study of the phonological awareness skills that predict children’s spelling in grades 1, 3, and 4, Nation and Hulme (1997) used hierarchical linear regression to identify that phoneme segmentation and not onset-rime was highly predictive of spelling scores even after accounting for age, short-term memory, rhyme, alliteration, and onset-rime segmentation. The study described in Chapter 2 of this dissertation found that the phonological awareness skill blending explained unique variance in preschool children’s spelling but not elision. According to Schuele and Boudreau (2008), segmenting phonemes in words is an intermediate phonemic awareness skill between blending and elision. Given that research has established the critical role that phonological awareness plays in children literacy learning (NELP, 2008; Storch & Whitehurst, 2002), research is needed that examines the full range of phonological awareness skills to identify the contribution of discrete phonological awareness skills and at what time points in children’s literacy learning. For example, blending might be necessary for preschool children to get started with spelling whereas segmenting phonemes might facilitate later, more complex spelling ability. Longitudinal studies are needed to identify the trajectory of children’s development of and use of discrete phonological awareness skills in literate behaviours.

A second future direction for research that would extend the findings of these studies is
the need for longitudinal studies of bilingual children to observe how differences in exposure to the language of literacy instruction at home predict literacy achievement and possible cognitive advantages. There are no known studies, other than Hipfner-Boucher et al. (2014), that have identified profiles of bilingual preschool children’s early literacy skills based on parent report of the language the child hears and speaks most often at home during the preschool years. These differences at preschool may be short-lived as the children acquire proficiency in English given that they are attending English-only school. Conversely, there may be residual differences based on children’s early abilities or future advantages.

A third and final future direction that would build on the findings of these studies would be to research methods to support preschool educators to individualize instruction for children in their care. Studies 1 and 2, described in Chapters 2 and 3 respectively, revealed individual differences in preschool children’s early literacy ability. Furthermore, Study 3 described in Chapter 4 indicated that preschool educators are called upon to interact with groups of preschool children who may differ widely in their early literacy knowledge and skills. Given the growing expectations placed on preschool educators to support children’s early learning through quality child care programs (Sheridan, Edwards, Marvin, & Knoche, 2009), future studies are needed that provide preschool educators with the means to determine child’s early literacy knowledge and skills in order for them to interact with individual children and mediate their print use at a level that is commensurate with their knowledge and ability. Furthermore, research is needed to determine the extent to which preschool educators are able to differentiate their instruction as they interact with children with different abilities. Some activities, such as storybook reading, may provide a suitable context for promoting print in a general fashion that reinforces knowledge known to advanced learners while introducing new concepts for novices within the
group. However, writing activities are individualized and skilled educators can maximize children’s learning opportunities through interaction that scaffolds at the child’s level. As research moves in this direction, young children will benefit from an enriched learning environment.

5.3 Limitations

There are several limitations that should be considered when reflecting on the outcomes of this collective body of work and in looking ahead to future research. This body of work was conducted with a small number of early childhood educators and children and as a result, non-parametric measures were used in all three studies. Larger sample size is likely to result in data that meets the assumptions of normality enabling the use of parametric measures to control for covariates, and results that can be more confidently applied to the general population. Additionally, in designing the current body of work it was necessary to economize the number of measures collected from these young preschool-aged children given the demands on their time and attention. However, a more complete battery of measures would have included a measure of children’s print awareness (e.g., directionality of print, letter versus word), letter-sound correspondence, and a measure of working memory that would result in variability of children’s scores rather than a number of zeros. Finally, Study 2, described in Chapter 3, administered cognitive, linguistic, and print-related measures in English based on the language of literacy instruction given that all of the children were attending English-only schools. There were no measures of children’s knowledge and ability on these measures in their first language, which may limit our understanding of what these bilingual children know about literacy.

5.4 Conclusion
Collectively, these studies make an additional contribution to our understanding of early literacy. First, preschool children know a great deal about early spelling (Puranik & Lonigan, 2010). Studies 1 and 2, described in Chapters 2 and 3, indicated that many preschool children can write letters, write their name, and spell words. Moreover, Study 2 reported in Chapter 3, revealed that children from bilingual homes performed well in spelling words, with no evidence of a disadvantage in this specific emergent literacy skill. A review of the transcripts of educator-child interactions during the small group craft/writing activity at pretest (Study 3 in Chapter 4), revealed that educators often asked the children what they would like the educators to write on their drawing as a caption. Interestingly, some of these children could spell (as indicated by their scores on the word spelling measure) and yet the educators seemed unaware of their ability. Thus, there were many missed opportunities to facilitate the children’s spelling of individual words. It should be noted that the professional development program advocated this strategy of writing the caption for the child to model that language can be represented in print. Thus, educators were applying what they had learned. At the same time, it appears that early childhood professionals may not be aware of preschool children’s early spelling and writing ability. Given that adults are in a position to promote children’s early literacy, it is important that professional development for emergent literacy, such as ABC & Beyond (Weitzman & Greenberg, 2010), include information on how educators may become aware of what preschool children can do in order for them to learn to scaffold joint writing opportunities at the children’s individual levels of spelling development.

Second, a common thread found among the three studies conducted for this dissertation work is the role of phonological awareness. In Study 1, described in Chapter 2, phonological awareness (i.e., blending) made a unique contribution to word spelling indicating the importance
of this skill in the development of word spelling. In Study 2, described in Chapter 3, the ELL-English children achieved phonological awareness scores that were comparable to their monolingual peers and yet they outperformed their monolingual peers on word spelling. This suggests a metalinguistic advantage for these bilingual preschoolers with regular exposure to the language of literacy instruction. Additionally, in Study 3, described in Chapter 4, coaching by a speech language pathologist provided the necessary feedback to support educators to learn to use references to phonological awareness during a small group craft/writing activity. The children in their group also learned to talk with each other and their educators about phonological awareness. Thus the first two studies described the importance of children’s phonological awareness to spelling and the third study revealed that educators can learn to promote phonological awareness during interactions with preschool children through professional development that includes coaching. Given that this early literacy skill is well-established in the literature as being predictive of children’s ability to learn to read (NELP, 2008), these studies contribute important information on spelling in monolingual and bilingual in 4- and 5-year-old children and its facilitation within writing activities in early childhood settings.

Third, preschool children who are provided with opportunities for word spelling and name writing can utilize the component skills that underlie these writing tasks and, as such, these activities provide children with opportunities to practice and improve these skills. Furthermore, both monolingual and bilingual children at varying stages of ability can benefit from opportunities for spelling and writing. Preschool curricula can include regular opportunities for writing (Bodrova & Leong, 2001) and these may enhance children’s early ability. Additionally, writing centres that facilitate play-based writing activities in preschool
classrooms (e.g., a post office centre where children can write letters and leave them in other children’s ‘mailboxes’) provide a functionally meaningful context for adult-child and child-child interaction related to print. Recent philosophical trends in Canadian child care include an emphasis on play-based learning wherein the educators provide resources that promote opportunities for learning through social interaction with the educator and/or peers (Doherty, Lero, Goelman, Tougas, & LaGrange, 2000). However, much of the research in promoting print and phonological awareness with preschool children has focused on the context of shared book reading (Justice et al., 2010; Zucker et al., 2009). Despite extant studies that have indicated that preschool educators use a higher rate of utterances related to print and phonological awareness during a craft/writing activity than during shared book reading (Girard, Girolametto, Weitzman, & Greenberg, 2013; Girolametto et al., 2012), research has focused on book reading rather than spelling and writing activities. The use of classroom writing activities provides educators with opportunities to promote the use of print and phonological awareness using instruction that is individualized to children’s level of ability. These opportunities provide children with the means of drawing on what they know about print, letters, and the analysis of language into smaller units of sound to begin to map language to print.

This dissertation work investigated three distinct yet interrelated studies pertaining to preschool children’s early spelling and writing. Efforts to improve young children’s early literacy need to place greater emphasis on early spelling and writing as a functionally meaningful activity for children to learn that language can be represented in print. In preschool, this can mean ensuring there is a writing centre or writing tools (e.g., pencils and paper), play-based opportunities to write words (e.g., writing a letter to the three little pigs), and engagement in conversation related to phonological awareness and print. Preschool children know a lot about
print and this dissertation work adds to the literature to support early spelling and writing development in preschool children.
5.5 References


Appendix 5  

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Customer: Trelani Milburn  
Account Number: 3000386035  
Organisation: University of Toronto  
Email: trelani.milburn@mail.utoronto.ca  
Phone: +1 (416) 615-9636  
Payment Method: Invoice

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