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Early Writing Deficits in Preschoolers with Oral Language Difficulties

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Abstract

The purpose of this study was to investigate whether preschool children with language impairments (LI), a group with documented reading difficulties, also experience writing difficulties. In addition, a purpose was to examine if the writing outcomes differed when children had concomitant cognitive deficits in addition to oral language problems. A group of 293 preschool children were administered an assessment battery that included measures to examine oral language, nonverbal cognition, emergent reading, and writing. Children were divided into four groups based on their language and cognitive performance. The findings from this study show that as early as preschool, children with weaker oral language skills lag behind their peers with stronger oral language skills in terms of their writing-related skills. Children with oral language and cognitive deficits performed more poorly than children whose deficits were confined to oral language. A child's cognitive ability also has an impact on emergent writing skills, but it appears to be moderated by oral language skills. These results are consistent with research documenting links between preschool language and emergent reading in children with a history of LI.

Keywords

emergent writing; emergent literacy; language impairment; preschool; writing

A substantial body of research has examined the relationship between oral language skills and reading (Aram & Nation, 1980; Bishop & Adams, 1990; Bishop & Edmundson, 1987; Catts, 1993; Catts, Fey, Tomblin, & Zhang, 2002; Naucier & Magnusson, 1998; Roth, Speece, & Cooper, 2002; Scarborough & Dobrich, 1990; Silva, Williams, & McGee, 1987). Results of these investigations have established that there are short-term and long-term negative consequences of poor oral language skills on beginning and subsequent reading achievement. Those identified with reading difficulties in the early grades continue to read poorly throughout their school years (e.g., Badian, 1988; Juel, 1988; Scarborough, 1998; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). Children who enter school with limited reading-related skills are at high risk for later academic underachievement (Aram & Nation, 1980; Scarborough, 1998; Snowling, Adams, Bishop, & Stothard, 2001). Consequently, these children are more likely to be referred for special education services and

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present with concomitant social, behavioral, and mental health problems (Johnson et al., 1999; Law, Rush, Schoon, & Parsons, 2009; Nelson, Benner, Stern, & Stage, 2006; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). Over the long term, these early language and associated reading difficulties have negative consequences for employment opportunities (Felsenfeld, Broen, & McGue, 1992, 1994; Howlin, Mawhood, & Rutter, 2000; Law et al., 2009).

The relationship between oral language and reading does not surface in grade school but begins early. Boudreau and Hedberg (1999) compared differences in early emergent reading-related skills in 18 children with language impairments (LI) and their typically developing (TD) peers. They found that children with LI performed more poorly on letter names, rhyme awareness, and print concepts compared to their TD peers. Findings have been similar when preschoolers with LI have been followed longitudinally. Among the earliest investigations included a longitudinal study by Aram and Nation (1980). A total of 63 children with LI were evaluated in preschool and then followed up 4 to 5 years later. At the time of the second evaluation, the majority of these children exhibited below-normal achievement in reading, spelling, and mathematics in addition to speech-language problems. Likewise, Catts (1993) compared 56 children with a preschool history of speech-language impairments to 30 TD children. In kindergarten, children were administered tests of receptive and expressive language, articulation, nonverbal abilities, phonological awareness, and rapid naming. In first and second grades, reading achievement was measured with word identification, word recognition, and reading comprehension tests. Findings indicated that children with speech-language impairments were at an increased risk for reading disabilities.

Research also has documented links between oral language and emergent literacy in children with weak oral language skills but without a history of preschool LI (Lonigan, Burgess, & Anthony, 2000; Spira, Bracken, & Fishel, 2005; Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998). Spira et al. (2005), who followed children longitudinally from kindergarten through fourth grade, found that children's reading development was strongly related to individual linguistic abilities. Children who had better oral language, print knowledge, and phonological awareness skills were more likely to show increased reading skills as they progressed through elementary school. Thus, in comparison to children with stronger oral language skills, children with weaker oral language skills perform less well on emergent literacy tasks.

Given the consequences of poor oral language skills on emergent literacy skills and their subsequent effects on reading achievement, academic progress, and social and behavioral problems, it is surprising that the effect of oral language skills on early writing skills has not been examined. The studies mentioned above have focused on early reading outcomes. However, it is likely that in addition to their reading difficulties, children with oral language difficulties also have difficulties with writing. Scarborough (2001) argued that difficulties with oral and written language might be causally related to and a reflection of an underlying core weakness in language, such that they affect both oral and written (reading and writing) language.

Although the evidence for the relationship between oral LI and reading impairments is well established, evidence for the relationship between oral LI and writing impairments has been steadily mounting. A growing body of research indicates that children with LI have difficulty with writing or have writing impairments. Findings indicate that children with LI have difficulty producing both narrative and expository texts (Dockrell, Lindsay, Connelly, & Mackie, 2007; Fey, Catts, Proctor-Williams, Tomblin, & Zhang, 2004; Gillam & Johnston, 1992; Gillam, McFadden, & van Kleeck, 1995; Liles, Duffy, Merritt, & Purcell, 1995; Mackie & Dockrell, 2004; Puranik, Lombardino, & Altmann, 2007; Scott & Windsor, 2000; Strong & Shaver, 1991; Windsor, Scott, & Street, 2000). Children with LI write fewer words and produce shorter texts compared to their TD peers. Furthermore, they express fewer ideas, make more grammatical errors, and demonstrate reduced lexical complexity in their writing when compared to their TD peers. However, these studies examining writing have been conducted with older children in elementary school and beyond.

Children do not begin writing in grade school. They begin writing as early as 2 years of age by scribbling, drawing, and making marks on paper to express meaning (Baghban, 1984; Schickedanz, 1990). They advance from writing letter-like forms, writing random letters, and writing their names to using invented spelling to spell words before writing conventionally. These early forms of written expression have been referred to as emergent writing (Clay, 1985; Ferreiro & Teberosky, 1982). Given that emergent reading weaknesses are apparent prior to formal reading instruction (e.g., Boudreau & Hedberg, 1999; Gillam & Johnston, 1985), it is likely that weaknesses in emergent writing are also apparent prior to formal writing instruction. In fact, there is preliminary evidence to suggest that differences in writing appear early. Cabell, Justice, Zucker, and McGinty (2009) found significant differences in the name-writing abilities of preschool children with LI compared to TD peers. Apart from this single study of name writing in preschoolers, however, we were unable to find other studies examining the early writing abilities of children with LI.

Because little is known about the early writing skills of this group of children, the purpose of this study was to address some of these knowledge gaps by examining the early writing skills of children with LI. Examining whether differences in writing or writing difficulties surface early is important for several reasons. First, literacy learning begins prior to formal schooling and before children exhibit conventional ways of reading and writing (Clay, 1975; Mason & Stewart, 1990; Sulzby, 1989; Sulzby & Teale, 1991; Whitehurst & Lonigan, 1998, 2001). Second, the developmental trajectory for literacy success or literacy failure begins early. Children who are poor writers in first grade are highly likely to remain poor writers at the end of fourth grade (Juel, 1988). Third, reading deficits appear to become stable over time (e.g., Puranik, Petscher, Al Otaiba, Catts, & Lonigan, 2008), and they are increasingly difficult to remediate as children get older (e.g., Torgesen, 2000; Vaughn, Linan-Thompson, & Hickman, 2003). The same might be true for writing. Hence, the purpose of this study was to investigate whether preschool children with LI—a group with documented reading difficulties—also experience writing difficulties.

In examining the relationship between LI and writing difficulties, we took into account children's cognitive status. Recent studies examining social and educational outcomes in children with LI have made a distinction between children with specific LI and those with

more general LI. The former include children with a discrepancy between language and nonverbal performance, whereas the latter include children with deficits in both language and nonverbal cognition and are referred to as children with nonspecific LI (NS-LI). Cognitive skills appear to affect reading achievement (e.g., Bishop & Adams, 1990; Catts et al., 2002; Snowling, Bishop, & Stothard, 2000); therefore, studies examining literacy and subsequent related outcomes (e.g., mental health and employment) of children with a history of LI have also found it useful to differentiate between children with LI and children with NS-LI (e.g., Catts et al., 2002; Law et al., 2009) because outcomes have differed based on the presence or absence of nonverbal impairments. For example, Catts et al. (2002), who followed children with LI from kindergarten through fourth grade, found that children with LI were at high risk for reading disabilities in fourth grade; however, the risk was higher for children with NS-LI (i.e., children with nonverbal and oral language deficits). Similar results were found by Bishop and Adams (1990), who followed children with LI from 4 years to 8.5 years and then later at 15 years of age (Snowling et al., 2000; Stothard et al., 1998). Thus, it appears that children with LI are at risk for literacy difficulties; however, these difficulties are more pronounced when they occur in conjunction with cognitive deficits. In addition to affecting reading outcomes, cognitive skills affect the ability to produce written language (e.g., Hayes, 1996; Stanovich, Cunningham, & Freeman, 1984) and are therefore consistently used as a control variable in studies examining writing (e.g., Abbott, Berninger, & Fayol, 2010; Berninger & Swanson, 1994). Hence, an additional goal of this study was to examine if the writing outcomes of children with NS-LI differed from the writing outcomes of children with LI.

RESEARCH QUESTIONS

1. Do preschool children with LI have poorer writing outcomes compared to their TD peers before beginning formal literacy instruction? In line with studies examining reading outcomes in preschool children, we hypothesized that there would be an association between oral language difficulties and writing. Differences in writing between preschool children with and without LI would be evident early.
2. Do writing outcomes vary for children with NS-LI versus children with LI? In line with previous studies on reading, we hypothesized that although both children with NS-LI and children with LI would have difficulties with writing compared to their TD peers, children with NS-LI would have poorer outcomes compared to their peers with LI.

METHOD

Participants

Participants for this study were 359 preschool children who were part of a larger longitudinal study that was a randomized control trial examining the effects of literacy intervention. These children were enrolled in various public and private preschools and child care centers that served children from families from a diverse range of socioeconomic status in a moderate-sized city in northern Florida. Informed consent forms were distributed to

parents of all children in the participating centers through their classroom teachers. Only children whose parents or guardians returned consent forms participated in this study. Of this larger group, 293 children had complete data on the oral language, cognitive, and emergent literacy measures used in this study. Demographic information for the participants is provided in Table 1. Parental education was normally distributed and ranged from *did not complete high school* to *postdoctoral degree* (median education reported ranged from *completed some college* to *completed AA degree*). Only 10% of the sample reported completing a BA or above, and less than 10% reported less than a high school diploma or GED. Median reported income was in the \$31,000 to \$40,000 range.

Procedures and Materials

All children were tested individually by trained research assistants at their child care centers or preschools. All assessments were completed in the spring of the school year prior to the literacy intervention for the larger study. The assessments were conducted in a quiet room in two to three sessions that lasted approximately 20 to 30 minutes each depending on the child's tolerance level and ability to attend to the task.

Oral language—The *Clinical Evaluation of Language Fundamentals–Preschool* (CELF-P; Semel, Wiig, & Secord, 1992) was used to assess oral language. The CELF-P is a widely used, psychometrically sound measure of preschool oral language skills. Scores on the CELF-P subtests are combined to yield an expressive language standard score (Formulating Labels, Word Structure, and Recalling Sentences subtests), a receptive language standard score (Basic Concepts, Linguistic Concepts, and Sentence Structure subtests), and a total language standard score. Internal consistency reliabilities across all subtests for children 3 to 6 years of age range from .74 to .85. The test has good concurrent validity with the *Differential Ability Scales* (Elliott, 1990) and the *Preschool Language Scales–3* (Zimmerman, Steiner, & Pond, 1992).

Nonverbal cognitive abilities—The *Wechsler Preschool and Primary Scale of Intelligence–Revised* (WPPSI-R; Wechsler, 1989) measures intellectual abilities in young children ages 2.6 to 7.3 years. In this study, children completed the Block Design and Matrix Reasoning subtests. On the Block Design subtest, the child is required to re-create a design using blocks while viewing a constructed model or a picture in a stimulus book within a specified time limit. On the Matrix Reasoning subtest, the child is shown an incomplete matrix and is required to select the missing portion from four or five response options. These subtests have strong reliability and have significant correlations with both the Performance IQ and the Full Scale IQ scores derived from the WPPSI-III. Criterion validity for the WPPSI-R is supported by high correlations with other instruments measuring cognitive abilities. These subtests have been used in previous studies and are particularly useful in measuring nonverbal cognitive abilities in children with LI (e.g., Stothard et al., 1998) because they do not require a verbal response.

Emergent writing measures—Three measures were used to assess children's emergent writing skills. On the Write Letters task, children were asked to write each of 10 letters named by the examiner (B, D, S, T, O, A, H, K, M, and C). These letters were chosen based

on previous recommendations (Mason & Stewart, 1990) and research documenting the letters known most frequently by preschool children (e.g., Justice, Pence, Bowles, & Wiggins, 2006; Phillips, Lonigan, & Graham, 2006). The examiner said a letter in the same random order, and the children were asked to write the letter. Children were not given any directions regarding writing in uppercase or lowercase and were given points irrespective of the case used; however, the majority of children wrote letters in uppercase. The Write Letters task was scored on a 0 through 2 scale depending on if, and how well or poorly, the letters were formed. Children obtained a score of 0 if they did not respond or wrote an unrecognizable letter, a score of 1 if the letter was reversed or was poorly formed and recognized only in context, and a score of 2 if the letter was written accurately and could be recognized out of context. Internal consistency estimates obtained for the Write Letters task were high ($\alpha = .93$).

For the Write Name task, the examiner gave the child paper and a pencil and asked the child to write his or her name. Children's name writing was scored on a 9-point scale using a modified version of the rubric used by Levin, Both-de Vries, Aram, and Bus (2005). On this scale, children are given progressively higher scores based on the number of the elements included in their writing. This scoring is in line with other studies examining name writing (e.g., Ferreiro & Teberosky, 1982; Hildreth, 1936; Levin & Bus, 2003; Levin et al., 2005; Lieberman, 1985; Puranik & Lonigan, 2011; Puranik, Lonigan, & Kim, in press; Saracho, 1990). Scoring was based on the following: no response or a scribble produced by scratching generally distributed over the page = 0 points; a scribble that is linear—organized in a horizontal or vertical line = 1 point; writing containing distinguishable or separate units—circles, dots, or lines that are separated = 2 points (child needed to have at least 2 to receive credit, with the exception of a cursive line that goes up and down repeatedly); writing contains simple characters—units are simple forms including dots, circles, square- and triangle-like forms, short lines and symbols—that are separated = 3 points; writing contains simple characters and is written demonstrating left-to-right orientation = 4 points; writing contains first letter of name and other letters may be represented by simple characters = 5 points; writing contains first letter of name and other letters may be represented by complex characters—the units are not simple but include pseudo and real letters = 6 points; writes name using correct first letter and represents other sounds in name with random letters = 7 points; writes more than half of the letters contained in the first name = 8 points; and correctly spells first name using conventional spelling = 9 points.

The Spelling task included six items that required children to write common CVC words (i.e., mat, bed, duck, cat, fell, hen). The Spelling task was scored on a 7-point scale using a modified version of the Tangel and Blachman (1992) spelling rubric. According to this scale, children receive points for the number of phonemes they represent in writing. Children were given a score of 0 if they did not respond, 1 if they responded verbally with random letters, 2 if they produced a scribble, 3 if they used random letters to spell a word (e.g., “toh” for “bed,” “ka for “fell”), 4 if they wrote the correct initial or last letter (e.g., “mob” for “mat,” “tad” for “bed”), 5 if their spelling contained the correct initial and last letter (e.g., “fl” for “fell,” “hn” for “hen”), 6 if they had the first and last letter but the incorrect vowel (e.g., “hin” for “hen,” “bad” for “bed”) or used invented spelling (e.g., “duc” for “duck,” “fel” for

“fell”), and 7 if they had the correct spelling. Excellent internal consistency was obtained ($\alpha = .96$).

Emergent reading measures—Four measures were used to assess children’s emergent reading skills. A researcher-developed Print-Related Knowledge task, which included 24 items to assess children’s knowledge about print and print conventions, was administered. The measure included questions to assess children’s knowledge regarding general principles of print (e.g., “Which one is a word?”), environmental print (e.g., “Which one says Wal-Mart™?”), and functions of print (e.g., “Show me a newspaper? What do people do with a newspaper?”). Children were shown a set of four pictures and had to point to the correct picture for all the subtests except for portions of the Functions of Print subtest, in which they had to also answer specific questions (e.g., “What do people do with a newspaper?”). Internal consistency estimate obtained for the print knowledge task was high ($\alpha = .84$). Concurrent validity for the Print-Related Knowledge task was established by examining correlations with subtests of the *Preschool Comprehensive Test of Phonological and Print Processing* (Pre-CTOPPP; Lonigan, Wagner, Torgesen, & Rashotte, 2002). The Pre-CTOPPP was the development version of the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) and was designed as a downward extension of the *Comprehensive Test of Phonological Processing* (Wagner, Torgesen, & Rashotte, 1999). Correlations between the Print-Related Knowledge task and the Print Knowledge and the Expressive Vocabulary subtests of the TOPEL were .69 and .66, respectively.

On a Letter-Naming task, children were shown uppercase letters printed on cards and were asked to name the letter. The letters were presented to children in a fixed random order. The letters were the same as used in the Write Letters task. This task was untimed, and responses were scored dichotomously. The internal consistency estimate obtained for the Letter-Naming task was .94.

Two phonological awareness subtests from the Pre-CTOPPP were administered. The phonological awareness subtests include an 18-item Elision subtest that assesses analysis skills and a 21-item Blending subtest that assesses synthesis skills across the developmental continuum of phonological awareness (Anthony et al., 2002). For the Elision subtest, children had to respond to questions such as “Look at these pictures. My word is (sunflower). Say (sunflower). Now point to sunflower without flower.” The child is expected to point to the picture of (sun) from an array of four pictures. For the Blending subtest, children had to respond to questions such as, “What words do these make: hot-dog, air-plane.” Reliabilities for the phonological awareness subtests of the Pre-CTOPPP for 3-, 4-, and 5-year-old children are reported to be high ($\alpha = .86$ to .88).

Interrater Reliability

After practice and establishing coding guidelines, two research assistants and the first author coded the Write Name, Write Letters, and the Spelling tasks. Approximately 25% of the written samples were randomly chosen to calculate interrater reliability. Interrater reliability was 94% for the Write Letters task, 95% for the Write Name task, and 91% for the Spelling

task. All scoring differences were settled by consensus following discussion. The final score entered was the one agreed on by both raters.

RESULTS

Operationalizing the Language Groups

The participants were divided into four groups following the criteria used by Catts et al. (2002). The four groups were LI, NS-LI, TD, and low nonverbal IQ (LNIQ) based on a diagnostic test battery of language and nonverbal abilities. Participants were defined as having LI if their performance was 1.25 *SD* or more below their chronological age-expected scores on at least two of the three oral language composite measures. Participants who scored within 1 *SD* of the mean on all oral language measures formed the TD group.

Children with LI were further divided based on their nonverbal skills. The LI group included children who scored within 1 *SD* of the mean on the Matrix Reasoning subtest of the WPPSI-R (Wechsler, 1989), and the NS-LI group included children who scored more than 1 *SD* below the mean on the subtest.

Similar to the LI groups, the TD group was also divided into those with and without nonverbal cognitive deficits. Those without nonverbal cognitive deficits, that is, those who scored within 1 *SD* of the mean on the Matrix Reasoning subtest of the WPPSI-R (Wechsler, 1989), formed the TD group. Participants who scored 1 *SD* below the mean on the Matrix Reasoning subtest met the criterion for a nonverbal deficit and composed the LNIQ group. Just as in studies of reading (e.g., Catts et al., 2002), this group served as a useful comparison group when considering the relationship between nonverbal IQ and writing achievement. Demographic information for participants in all four groups is provided in Table 1.

Descriptive Statistics

Table 2 contains the scores for oral language and nonverbal cognitive skills for each of the four groups. There were no significant differences in the mean chronological age for the groups. By definition, the LI children scored below the mean on oral language measures but scored in the average range on the nonverbal IQ test. Children in the NS-LI group scored below the mean on tests of oral language and the WPPSI subtests. The TD group scored in the average range for oral language tests and the WPPSI subtests. Finally, the LNIQ group scored within the mean for the test on the oral language measures, but their scores on the WPPSI subtests were mixed. Scores on the Block Design subtest were below the mean for the test, whereas scores on the Matrix Reasoning subtest were in the average range.

Bivariate correlations among the oral language, cognitive, emergent writing, and emergent reading measures are shown in Table 3. As expected, strong correlations were noted between the oral language measures and emergent literacy measures. Correlations between oral language measures and emergent writing measures were in the moderate range ($r_s = .40$ to $.49$), whereas the correlations between oral language measures and emergent reading measures were strong ($r_s = .51$ to $.69$). Correlations between nonverbal cognitive measures and emergent reading and emergent writing measures were similar and in the moderate

range ($rs = .29$ to $.40$). The correlations between emergent reading and emergent writing measures were moderate to strong ($rs = .42$ to $.62$).

Early Writing and Oral language

Our first question concerned the nature of the writing outcomes for children with LI. Given that the sample sizes for the four groups were different, a primary concern was violation of the homogeneity of variance assumption for ANOVA analyses. Therefore, Levene's test was conducted for each outcome measure and Welch's ANOVA was used to protect against Type I error. Group differences on the reading- and writing-related measures are displayed in Table 4. Children with LI had lower scores, compared to their TD peers, on all emergent writing and emergent reading measures, $F(3, 289) = 17.73$, $ps < .001$. Both groups of children with LI (LI and NS-LI) named and wrote fewer letters than the group without LI (TD and LNIQ). They were also less proficient in their name writing than the TD and LNIQ groups. Only 32% and 50% of children in the NS-LI and LI groups, respectively, could write their first names accurately, compared to 79% and 68%, respectively, of children from the TD and LNIQ groups. The LI and NS-LI groups had poorer spelling abilities and lower scores on the print knowledge and phonological awareness tasks compared to the TD and LNIQ groups.

Early Writing and Cognitive Abilities

For our second question, we examined whether IQ played a role in determining early writing outcomes. Hence, we examined whether children with LI and children with NS-LI had different writing outcomes and whether children with LNIQ and the TD children had different writing outcomes. Results of the ANOVA indicated that children with NS-LI performed less well on all of the reading- and writing-related outcomes compared to children with LI. Differences between the LI and NS-LI groups were statistically significant for Write Letters ($p < .01$), Write Name ($p < .05$), Print-Related Knowledge ($p < .05$), and the Letter-Naming task ($p < .05$). Although the means for the NS-LI groups were lower than the means for the LI group for the Blending, Elision, and Spelling tasks, the differences were not statistically significant. Comparison of the performance on literacy-related measures for the TD and LNIQ groups yielded a different pattern. Although the means for the LNIQ group were lower than the means for the TD group for all reading and writing measures, none of those differences were statistically significant.

DISCUSSION

In this study, we compared the performance of preschool children with and without LI on emergent writing measures. Furthermore, we examined the impact of nonverbal IQ on performance on early writing measures. The findings from this study show that as early as preschool, children with significant delays in oral language skills lag behind their peers with TD oral language skills in terms of their writing-related skills. Children with oral language and cognitive deficits performed more poorly than children whose deficits were confined to oral language. Previous research has shown that children with weaker oral language skills and children with LI have weaker emergent reading skills as compared to their peers with higher oral language skills (Aram & Nation, 1980; Boudreau & Hedberg, 1999; Catts, 1993;

Gillam & Johnston, 1985; Spira et al., 2005). The findings of this study showing differences in writing-related outcomes between children with LI and those with NS-LI extend previous research by demonstrating that for children with oral LI, difficulties with written language are not confined to reading but also extend to difficulties with writing.

Effect of Oral LI on Writing

The findings of this study showing differences in writing-related outcomes between children with LI and those with NS-LI demonstrate that writing difficulties do not surface in elementary school and later but begin as early as preschool, prior to the start of formal education. Our results are in line with the findings of Cabell et al. (2009), who reported that children with LI showed poorer name-writing skills compared to their TD peers. However, our results extend their findings by showing that children with LI performed more poorly not only on the Write Name task but also on other writing tasks such as writing letters and spelling words.

Although the performance of the NS-LI and LI groups was poor in comparison to their peers without oral language difficulties on all three writing tasks included in this study, our results indicate that 32% and 50% of the children, respectively, could write their first names accurately. These percentages are higher than those reported by Cabell et al. (2009). They reported that only one child (4%) of the LI children compared to 65% of their TD peers in their study wrote their names accurately. Differences in the findings could be the result of at least two partially related reasons—the time and the age of the children when these tasks were administered. Measures for this study were administered in early spring—closer to the end of the preschool year, when a majority of children are able to write their names. No information about timing of assessment was provided by Cabell et al. Given that proficiency in name writing is acquired over a relatively short time span, difference in timing of the assessment during the preschool year between studies might explain the differences in findings. In addition, the children in this study were on average 4 months older than those in the Cabell et al. study (58 months vs. 54 months), which is likely associated with the time during preschool when measures were administered.

Our results concerning group differences support the notion that oral language skills play an important role in the development of writing starting in preschool. Additional evidence for this conclusion comes from the moderate correlations noted between oral language measures and writing outcomes. Further substantiation comes from examining differences between subgroups. Statistically significant differences were obtained between children with LI (NS-LI and LI groups) and their peers without LI (TD and NLIQ group), who had higher language scores than the two groups with LI. The finding that the children with LI and the NS-LI group performed more poorly on writing measures is consistent with the results of other studies examining differences in reading and other long-term outcomes between these two groups. Although this was not the focus of this study, our results also showed that children with LI and NS-LI performed more poorly than the TD and LNIQ groups on emergent reading tasks, including naming letters, print-related knowledge, and phonological awareness skills, consistent with the findings of previous studies of young children (Aram & Nation, 1980; Boudreau & Hedberg, 1999; Catts, 1993; Gillam & Johnston, 1985).

Effects of Cognitive Abilities on Writing

Another important aim of this investigation was to identify if IQ was related to writing outcomes in children with LI, and our results confirmed our hypothesis. Correlations between nonverbal IQ and writing tasks were significant and in the moderate range. This relation was further validated by examining the performance differences between the TD group and the LNIQ group and the performance differences between the LI and NS-LI groups. In both cases, the group with stronger nonverbal cognitive skills outperformed its respective comparison group. The differences between the NS-LI and LI were significant for two out of the three writing variables. Although the mean of the NS-LI group was lower than the mean for the LI group for the Spelling task, the difference was not statistically significant. Most likely this may have been because spelling compared to name writing and letter writing is a more complex task such that both groups struggled with the task. Although differences between the NS-LI and LI were significant for most of the writing variables, the differences between the TD and LNIQ groups were not statistically significant. The former results indicate that nonverbal cognitive abilities matter, whereas the latter results indicate that although nonverbal cognitive abilities matter, oral language skills have a moderating effect. Thus, nonverbal cognitive abilities are related to writing, but this relationship is affected by oral language competency.

LIMITATIONS AND FUTURE RESEARCH

Despite evidence for associations between emergent literacy skills and oral language, there have been relatively few studies examining the relationship specifically between emergent writing and oral language. The findings of this study thus extend previous work examining the relationship between oral language and emergent literacy skills. However, as with most studies, some limitations of the current study must be noted. The results of this study should be considered preliminary because it was cross-sectional and correlational and no unambiguous causal inferences can be drawn from our data. Future studies replicating these findings are needed, as are longitudinal examinations before drawing conclusions. This is even more important because in his investigation of preschool children, Catts (1993) found significant differences between the children with LI and their TD peers; however, only one half of those children continued to demonstrate reading difficulties when assessed in first and second grades. These results must also be tempered with caution because children's reading performance has been shown to change over time; performance in the early grades is not an absolute predictor of long-term reading achievement (Cunningham & Stanovich, 1997). This could likely be the case for writing performance, which may change over time with maturation, with instruction, or as oral language deficits resolve.

Another limitation of this study is that we did not systematically observe the literacy instruction taking place in the classrooms, which may have had some effect on student performance. Informal observations indicated that the procedures and routines at the participating preschools were comparable and included a variety of activities seen in typical preschool classrooms. These included painting, drawing, puzzles, toys, dress-up clothes, books, music, and activity centers. All preschools reported activities involving identifying children's names and learning the letters of the alphabet. Finally, our writing tasks were

limited to word-level tasks, namely name writing, letter writing, and spelling, and we did not examine children's ability to compose sentences. It is more than likely that children with weaker oral language skills who struggled with the writing tasks included in this study would have had a particularly difficult time with more complex writing tasks such as sentence writing and writing notes. However, this remains a study for the future.

One of the strengths of this study was that we did not use clinical referral to obtain participants; instead, the children with LI in this study were chosen from the educational setting. Results from participants referred clinically may be biased because of an overrepresentation of the more severe cases in the population (Berkson, 1946, as cited in Catts et al., 2002). Often these more extreme clinical cases also present with other problems in addition to their language difficulties, making it difficult to examine the relationship between oral LI and writing. An additional strength of this study was that the comparison groups included children from the same classrooms receiving similar instruction. Past research has indicated less than optimal congruence between groups identified through research and clinically referred population (Aram, Morris, & Hall, 1993). How the findings of this study generalize to the clinical population remains a topic for a future study. Replicating these findings with a clinical population could be an avenue for future research.

Implications for Research

Our finding that children with LI exhibit differences in writing as early as preschool has important implications for early identification and intervention. Research on literacy has clearly shown substantial developmental continuity in reading skills from the preschool period into the elementary grades. Children who have success with reading continue to read more and maintain that success; in contrast, children who fall behind early are less motivated to read, continue to struggle, and have later reading problems (Scarborough, 1998). It is for this reason that early identification and remediation of reading difficulties have been a big educational emphasis. Although preliminary, the findings of this study raise questions about the need for early screening and assessment of emergent writing skills especially for children with weaker oral language skills. Classroom teachers and educators could take steps to extend their prevention efforts to include writing. At the very least, the findings of this study suggest the need to incorporate or encourage writing activities to foster written language development especially because teaching writing has been shown to have facilitative effects that promote children's language and literacy skills (Kaderavek, Justice, Hunt, & Cabel, 2007; also see Graham & Hebert, 2010). This might be particularly beneficial for children with weaker oral language skills.

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Table 1

Demographic Information for NS-LI, LI, TD, and LNIQ Groups

	NS-LI (<i>n</i> = 92)	LI (<i>n</i> = 28)	TD (<i>n</i> = 89)	LNIQ (<i>n</i> = 84)
Age (months; <i>M, SD</i>)	58.49, 3.46	58.0, 3.24	58.2, 3.65	59.93, 3.58
Gender				
Male	66.7	57.1	57.3	57.1
Female	33.3	42.9	42.7	42.9
Ethnicity				
Asian	2.2	3.6	2.2	2.4
Black or African American	45.7	32.1	40.4	44.0
Hispanic	1.1	7.1	4.5	2.4
White	50.0	53.6	47.2	45.2
Other	1.1	3.6	5.6	6.0

Note: NS-LI = nonspecific LI; LI = language impairment; TD = typically developing controls; LNIQ = low nonverbal IQ.

Table 2
Means and Standard Deviations for Oral Language and Nonverbal IQ Scores by Group

Measure	Language Impairment Group									
	NS-LI (n = 92)		LI (n = 28)		TD (n = 89)		LNIQ (n = 84)			
	M	SD	M	SD	M	SD	M	SD	M	SD
CELF-P Expressive	78.11	13.91	78.43	14.21	104.01	12.03	102.86	10.31		
Formulating Labels	7.18	2.61	7.64	2.25	11.36	3.24	11.08	2.01		
Word Structure	5.32	2.15	5.25	2.34	9.98	2.34	9.70	2.14		
Recalling Sentences	6.44	2.05	6.64	1.95	10.83	2.01	10.61	1.72		
CELF-P Receptive	74.56	14.59	78.21	11.17	106.69	10.21	103.02	9.97		
Basic Concepts	6.25	2.67	6.75	2.44	11.8	2.21	11.11	2.38		
Linguistic Concepts	5.21	2.66	5.57	2.22	11.43	2.43	10.68	2.54		
Sentence Structure	5.41	2.12	5.68	1.94	9.88	2.68	9.25	2.48		
CELF-P Composite	75.63	12.6	78.46	10.78	105.59	9.88	102.94	9.04		
WPSSI-R Block Design	6.51	1.77	11.64	2.13	12.27	2.27	7.63	1.05		
WPSSI-R Matrix Reasoning	7.07	3.38	8.43	3.94	10.18	3.65	8.99	3.01		

Note: Values for CELF-P expressive, receptive, and composite scores are reported in standard scores with a mean of 100 and an *SD* of 15; values for CELF-P subtests are reported in standard scores with a mean of 10 and an *SD* of 3; WPSSI-R scores are reported in standard scores with a mean of 10 and an *SD* of 3. NS-LI = nonspecific LI; LI = language impairment; TD = typically developing controls; LNIQ = low nonverbal IQ; CELF-P = *Clinical Evaluation of Language Fundamentals–Preschool*; WPSSI-R = *Wechsler Preschool and Primary Scale of Intelligence–Revised*.

Table 3
Correlations Among Oral Language, IQ, and Emergent Reading and Writing Measures

	1	2	3	4	5	6	7	8	9	10	11
1. CELF-P Receptive	—										
2. CELF-P Expressive	.79	—									
3. CELF-P Total	.95	.94	—								
4. WPSSI-R Block Design	.42	.27	.37	—							
5. WPSSI-R Matrix Reasoning	.40	.30	.37	.33	—						
6. Write Letters	.48	.42	.48	.40	.38	—					
7. Write Name	.49	.46	.50	.40	.30	.62	—				
8. Spelling	.48	.40	.46	.28	.38	.65	.49	—			
9. Print-Related Knowledge	.69	.61	.69	.39	.40	.62	.57	.58	—		
10. Pre-CTOPPP Blending	.54	.52	.56	.29	.28	.46	.44	.52	.54	—	
11. Pre-CTOPPP Elision	.58	.51	.59	.35	.33	.46	.42	.46	.57	.59	—

Note: All correlations significant at $p < .001$. CELF-P = *Clinical Evaluation of Language Fundamentals-Preschool*; WPSSI-R = *Wechsler Preschool and Primary Scale of Intelligence-Revised*; Pre-CTOPPP = *Preschool Comprehensive Test of Phonological and Print Processing*.

Table 4
Means and Standard Deviations on Emergent Reading and Writing Measures by Group

Measures	Language Impairment Group								F for Overall Age-Group Contrast, With F(3,289)	Four-Group Contrasts
	NS-LI (n = 92)		LI (n = 28)		TD (n = 89)		LNIQ (n = 84)			
	M	SD	M	SD	M	SD	M	SD		
Emergent Writing										
Write Letters	5.89	6.12	10.54	6.79	14.27	5.57	12.08	6.14	31.37, <i>p</i> < .001	1 < 2 **, 1 < 3,4 ***, 2 < 3 *
Write Name	6.05	2.56	7.54	2.38	8.65	2.03	8.04	2.03	24.54, <i>p</i> < .001	1 < 2 *, 1 < 3,4 ***, 2 < 3 *
Spelling	11.89	1.01	14.50	1.83	21.66	1.02	19.45	9.94	17.73, <i>p</i> < .001	1 < 3,4 **, 2 < 3 **
Emergent Reading										
Print-Related Knowledge	9.59	4.03	12.00	4.09	16.96	3.71	16.02	4.52	60.42, <i>p</i> < .001	1 < 2 *, 1 < 3,4 **, 2 < 3,4 **
Letter Naming	5.08	3.73	6.79	3.56	8.49	2.34	7.82	2.86	20.74, <i>p</i> < .001	1 < 2 *, 1 < 3,4 **
Pre-CTOPPP Blending	12.35	4.62	13.07	4.10	16.67	3.63	16.21	3.64	23.98, <i>p</i> < .001	1 < 3,4 ***, 2 < 3,4 **
Pre-CTOPPP Elision	7.79	3.83	8.61	4.06	12.92	3.82	11.79	3.62	33.13, <i>p</i> < .001	1 < 3,4 ***, 2 < 3,4 **

Note: NS-LI = nonspecific LI; LI = language impairment; TD = typically developing controls; LNIQ = low nonverbal IQ; Pre-CTOPPP = Preschool Comprehensive Test of Phonological and Print Processing.

* $p < .05$.

** $p < .01$.

*** $p < .001$.