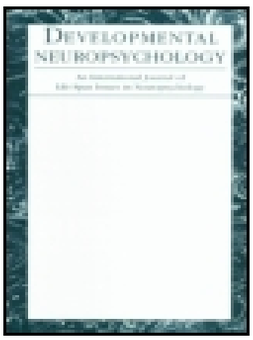

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I: EARLY WRITING DEVELOPMENT

Alphabetic Skills in Preschool: A Preliminary Study of Letter Naming and Letter Writing

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Development of letter naming and writing (skills in writing first name, dictated and copied letters, and dictated and copied numbers) was examined in 79 preschool children (*M* age = 56 months). Skills were assessed in the fall to determine the status of these procedural skills that are components of alphabetic knowledge at the start of the school year. Children with high letter-naming scores also had high scores on letter writing, including dictated or copied letters and writing some or all of the letters of their names. Letter-naming skills were related to number-writing skills whether the numbers were dictated or copied. The highest writing scores were found for first name writing compared to writing or copying letters and numbers. A focus on the development of procedural knowledge in the preschool period may yield the hopep for impacts on later reading skills that has not been found in curricula emphasizing conceptual knowledge (e.g., knowledge of print concepts, book conventions).

Findings from many studies of emergent reading, also known as *emergent literacy*, *pre-reading*, and *reading readiness*, have been published in recent years. Driving this research interest, in part, are the results of several large-scale studies pointing to the importance of specific cognitive skills in the preschool period for the subsequent development of reading skills. For example, Denton and colleagues (Denton

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& West, 2002; West, Denton, & Germino-Hausken, 2000) reported statistics on a general sample of 22,000 children from kindergarten through fifth grade. Children who were proficient in identifying letters (naming upper and lower case letters, recognizing beginning and ending word sounds) at entry into kindergarten showed stronger skills at the end of kindergarten and in first grade on measures of phonological processing and word reading compared to children who were not proficient. Although letter-knowledge skills are measured in different ways and these measures may be tapping different types of skills, researchers are finding that letter-knowledge skills are robust markers for cognitive skills that subsequently lead to the development of reading (Adams, 1990), with fluency in letter naming specifically linked with later reading skills (Badian, 1995; Walsh, Price, & Gillingham, 1988). Letter-knowledge skills are strong predictors of reading skills in English- and non-English-speaking children (Lyytinen et al., 2004; Muter & Diethelm, 2001)

The research reported here explores two components of the procedural knowledge involved in letter knowledge, specifically, letter-naming and letter-writing skills. Senechal, LeFevre, Smith-Chant, and Colton (2001) studied the role of procedural skills (e.g., knowledge of letter names) compared to conceptual knowledge (e.g., knowledge of print concepts, book conventions) using a longitudinal sample of 84 children who were studied from the beginning of kindergarten to the end of third grade. Although direct relations between conceptual skills and subsequent reading skills were not found, procedural skills at kindergarten entry and at entry into first grade were related to reading skills at the end of first grade and reading fluency at the end of third grade. Sulzby and colleagues (Bus et al., 2001; Sulzby, Barnhart, & Hieshima, 1989) also studied procedural skills by examining the relations between knowledge of letter names and children's knowledge of letter writing. These researchers report a strong correlation (r = .74) between 4- and 5-year-old children's letter naming and their use of invented spelling in written work. Children with more advanced letter-naming skills were able to combine letters using phonetic representations to create "words." Teale and Sulzby (1986) and colleagues hypothesized that knowledge gained from writing may facilitate the development of alphabetic knowledge. Riley (1995) reported moderate correlations between letter-naming and name-writing skills in 191 kindergarten-age children studied at school entry and their reading skills studied at the end of kindergarten (r = .57 and .60, respectively). Both letter-naming and name-writing skills were found to be strong predictors of reading skills, accounting for 31% of the 45% of variance accounted for. Weinberger (1996) reported similar links between letter-naming and name-writing skills at age 5 years and subsequent reading skills at age 7 years (r = .51 and .53, respectively).

In this study, a sample of 4- and 5-year-old children from low-income homes are included as participants because these children have been found to be at risk

for the development of letter-knowledge skills. Researchers (e.g., Bowey, 1995; West et al., 2000) have reported that children whose mothers have less education and/or those whose families have low levels of income have fewer letter-identification skills in the preschool period compared to children with better educated mother and children from higher income homes. In our own work (Molfese et al., in press) with 4-year-old children attending preschool programs designed for economically disadvantaged children, we studied changes in letter-naming skills across the school year. Within a sample of 57 children, 53% made no gains or gains of only one letter between fall and spring assessments compared to classmates who made gains averaging seven letters. Most of the children making little gain in letter identification scores identified zero to three letters in the fall and the same number in the spring. Although there were differences in age and general cognitive abilities that impacted letter-naming skills, possible group differences in other procedural knowledge skills were not investigated. A study that compares the development of letter-naming and letter-writing skills may be able to determine whether there is a reciprocal relation between these skills as has been theorized by other researchers (Bus et al., 2001) and add to our understanding of important skills that may facilitate the development of alphabetic knowledge by kindergarten entry. The performance of children from low-income homes ("income eligible") attending preschool classes is compared to that of children who are from higher income homes ("tuition paying") and attend the same classes to determine if there are early differences in letter-naming and letter-writing skills.

Drawing from work by Treiman (Treiman & Broderick, 1998; Treiman & Kessler, 2003) and others (e.g., Bloodgood, 1999), our study compared children's letter-naming skills and their skills in writing the letters in their first names, writing dictated and copied letters, and writing dictated and copied numbers. Treiman's work has reported that the letters in children's names, particularly the first letter, have special salience to them and that preschool children are more accurate in naming a printed letter that corresponds to the first letter (or letters) of their names than in naming other printed letters. Treiman and Broderick (1998) also reported that by age 4;6 most middle-class children can write their first name, although the letters used may be a mixture of correctly and incorrectly formed letters (i.e., letters are recognizable and conventional). In the study presented here, it was expected that the preschool children would be able to write some or all of the letters in their names, but writing other letters and writing numbers would be more variable across children. We also examined whether copying letters or numbers from a display presented to the child would be easier than writing letters or numbers when they were individually dictated to the child. Both name-writing skills and writing dictated or copied letters and numbers are hypothesized to relate to skills in letter identification and early word reading.

METHOD

Participants

Participants were children enrolled in public preschool programs in the local school district. Enrollment in these preschool programs is based on family income eligibility (total annual family income less than $22,945 for a family of four) or ability to pay tuition. Fifty-five participants were enrolled based on income eligibility, and 23 attended the same programs as tuition-paying students. The school district has a common curriculum and continuous assessment protocols in place across all preschool programs as well as monthly professional development meetings for teachers that support the district's strong emphasis on emergent literacy (letter names and sounds, print concepts, story telling and retelling, writing and drawing activities) in preschool and kindergarten classrooms. Participants are normally developing children who speak English as their first language. The participants were 42 female and 36 male children with an average age of 56 months (range = 48–71 months, *SD* = 6.03). The racial composition of the participants is 71% White, 21% African American, 1% Hispanic, and 7% other.

Measures

General cognitive measures. Measures of verbal, nonverbal, and overall cognitive abilities were obtained to characterize the sample using the Differential Ability Scales (DAS; Elliott, 1990). The Preschool Level of the scale can be used with children from 2;6 years through 6;6 years and includes assessments of verbal abilities (Verbal Comprehension and Naming Vocabulary) and nonverbal abilities (Picture Similarities, Pattern Construction, and Copying). These measures plus Block Building and Early Number Concepts are used to obtain General Conceptual Ability (GCA) scores. GCA scores have a mean equal to 100 and a standard deviation set at 15. Preschool level test–retest reliabilities over a period averaging 30 days range from .90 to .94. The criterion-related validity of the Preschool Level of the DAS GCA is reported against the Stanford–Binet: Fourth Edition Composite (Thorndike, Hagen, & Sattler, 1986), with which it correlated .77, and against the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1989), with which it correlated .89 (DAS Examiner's Manual; Elliott, 1990).

Receptive vocabulary measure. The Peabody Picture Vocabulary Test – Third Edition: (PPVT–III; Dunn & Dunn, 1997) was used to measure receptive vocabulary. The PPVT can be used with individuals age 2;5 years through adulthood. The test involves individuals pointing to a picture from an array of four that corresponds to the named word. The PPVT–III scores are standardized with a mean equal to 100 and a standard deviation set at 15. The PPVT–III Examiner's Manual

reports alpha coefficients at .92 to .98 for both Form A and Form B; test–retest reliability for Form A equals.91 to .93 and Form B ranges from .91 to .94. The criterion-related validity of the PPVT–III for ages comparable to those used in our study (36–59 months) is reported against the Oral and Written Language Scales (OWLS; Carrow-Woolfolk, 1995). Although the OWLS is a broader assessment of oral language than the PPVT–III, the correlations range from .63 to .83.

Letter naming and word reading. The Wide Range Achievement Test (WRAT) Reading subscale (Wilkinson, 1993) was used to assess letter-naming and word-decoding skills. The child is asked to name 15 uppercase letters presented in a random order. The child then is asked to name words on a list of 42 words presented in isolation. The WRAT is standardized for use with individuals from age 5 onward. Because children in our study ranged from 4 years of age to 5;11, standard scores based on the current sample were used, as WRAT standard scores could not be used for all children.

Writing. The three writing tasks and their scoring were patterned after the work of Sulzby (Sulzby et al., 1989) on differentiating drawing, scribbling, letter strings, invented spelling, and conventional writing. The scoring, as described next, was done by two independent scorers, and differences in scores were reconciled by discussion.

In the name-writing task, children were asked to write their first names on a piece of unlined paper using a pencil. Name writing was scored as follows: 0 indicated no attempt or refusal to write; 1 indicated that they wrote something, whether a drawing, scribble, or random letters; 2 indicated that the first letter of their name was written, regardless of good form; 3 indicated that the first letter of their name was written with good form; 4 indicated that more than the first letter of their name was written regardless of good form; 5 indicated that more than the first letter of their name was written with good form; 6 indicated that all letters of their name were written regardless of good form; and 7 indicated that all letters of their name were written with good form.

In the writing letters to dictation task, children were asked to write each of the 15 letters on the WRAT (Wilkinson, 1993) Letter Naming list. Letter writing was scored as follows: 0 indicated no attempt or refusal to write; 1 indicated that they wrote something, whether a drawing, scribble, or random letters; 2 indicated that some of the dictated letters (1–3) were written and recognizable regardless of form; 3 indicated that some of the dictated letters (1–3) were written and recognizable with good form; 4 indicated that most (but not all) of the 15 dictated letters were written and recognizable regardless of form; 5 indicated that most (but not all) of the dictated letters were written and recognizable with good form; 6 indicated that all letters were written and recognizable regardless of form; and 7 indicated that all letters were written and recognizable with good form.

In the writing numbers to dictation task, children were asked to write three numbers (3, 5, 6). Number writing was scored as follows: 0 indicated no attempt or refusal to write; 1 indicated if they wrote something, whether a drawing, scribble, or random numbers or letters; 2 indicated that some of the dictated numbers were written and recognizable regardless of form; 3 indicated that some dictated numbers were written correctly with good form; 4 indicated that all three dictated numbers were written and recognizable regardless of form; and 5 indicated that all dictated numbers were written and recognizable with good form.

Copying. Three copying tasks were used. The Copying subtest from the DAS (Elliott, 1990) assesses fine-motor skills and the ability to copy straight lines and simple shapes as well as complicated geometric figures. The individual must copy each figure on the 20-item subtest. This subtest is normed for ages 3;6 to 7;11 and correlatates .65 with the GCA (Elliott, 1990). In addition, the children's abilities to copy letters and numbers were also assessed. In these tasks, children were asked to copy the 15 letters on the WRAT Reading subtest and to copy three numbers (3, 5, and 6). For all the copying tasks, the model that the child is copying is present throughout the task, and the copying tasks followed the administration of the name writing and the writing to dictation tasks. The scoring system just described for writing to dictation was used for copying letters (maximum score = 7) and copying numbers (maximum score = 5).

Data Analyses

The data were analyzed to address specific hypotheses under study. It was hypothesized that letter-naming and letter-writing skills would be related, and correlations were used to test this hypothesis. Partial correlations to control of the effects of age and to control the effects of IQ were used to examine this hypothesis. Differences between name-writing scores and scores on other writing tasks involving letters from the WRAT and numbers were hypothesized as were differences between scores from dictated compared to copying tasks. These hypotheses were examined using *t* tests with Bonferroni corrections because of multiple tests. The Bonferroni correction used was for nine comparisons (group differences on DAS scores and the writing tasks with letter- and word-reading tasks), the *p* values adjusted to $p < .0056$ with *t* values ≥ 2.85. A link between writing skills and letter identification and early word reading was hypothesized, and this hypothesis was tested using correlations.

Procedure

At the start of school in the fall, parents of children participating in preschool programs at four schools were sent a letter requesting their child's participation in the

study. Those families returning consent letters (92%) were sent the packets with family background questionnaires. The general cognitive and vocabulary measures, the WRAT, and the handwriting measures were administered between October and November. Each child was tested individually by trained researchers at school in a room near the child's classroom. Testing continued for each child across several days as needed to complete the assessments due to unavoidable constraints on assessment time during the children's school day. The handwriting tasks were always administered last to the children so that experience in writing letters on the WRAT would not interfere with the valid administration of the WRAT Letter–Word Identification tasks. Handwriting tasks were administered in a constant order: name writing, letters to dictation, numbers to dictation, letters copied, and numbers copied.

RESULTS

The mean GCA score (Elliott, 1990) was obtained to get a general measure of cognitive skills of the participants. The mean GCA score is 90.94 (range = 59–124, *SD* = 14.93). Of the six children with GCA scores more than 2 *SD*s below the mean (scores of 59–70), only one child also had a low score of 40 on the PPVT–III (Dunn & Dunn, 1997), a frequently used assessment of verbal (receptive) abilities. The remaining five children had PPVT score ranging from 72 to 89. In the final analyses, the one child with low GCA and low PPVT scores was not included.

The descriptive statistics for the GCA and PPVT reflect the breadth of cognitive abilities that characterize children from low-income homes who often enter preschool with fewer experiences and less developed cognitive skills than children from higher income homes. These differences are reflected in the scores of the 55 children enrolled in the preschool classes based on income eligibility compared to those of the 23 children who are tuition-paying students. In Table 1, means and standard deviations on all measures for the final sample, as well as for each group (income eligible and tuition paying), are presented along with *t* tests comparing group means on the dependent variables. Mean differences for all dependent measures except WRAT Word Reading and writing numbers to dictation are significant, with the tuition-paying children having higher scores. Effect sizes are shown in Table 1 and range from small (.36) to large (.92).

There is a wide age range within the full sample. Ages ranged from 48 to 71 months ($M = 56.01$, $SD = 6.03$). Age was found to be a significant correlate of each of the dependent variables, with a range of $r(78) = .47–.68$, $p < .01$, as shown in Table 2. To control for the effects of age in the correlations, partial correlations with age held constant were used throughout (as shown above the diagonal in Table 2). For comparison purposes, correlations without age held constant also are in Table 2 (shown below the diagonal). Partial correlations with IQ (DAS GCA) held con-

TABLE 1
Means, Standard Deviations, and Range of Scores for Variables in This Study

Variable	*Full Sample*[a]			*Group 1*[b] *Income Eligible*			*Group 2*[c] *Tuition Paying*			*t Test:*
	M	*SD*	*Range*	*M*	*SD*	*Range*	*M*	*SD*	*Range*	*Group 1–Group 2*
Age (months)	56.01	6.03	48–71 months							
DAS GCA	90.94	14.93	59–124	87.24	12.84	59–116	99.78	13.96	73–124	$t(76) = 3.63$*ES = .42
PPVT	93.99	3.20	58–124	90.47	12.50	58–111	102.39	11.05	83–124	
WRAT Letter Identification	6.37	5.97	0–15 letters	4.80	5.27	0–15	10.13	5.98	0–15	$t(76) = 3.71$*ES = .43
WRAT Word Reading	0.69	2.04	0–12 words	0.49	0.22	0–10	1.17	0.59	0–12	$t(76) = 1.09$
Name Writing	4.09	2.47	1–7 score	3.49	2.40	1–7	5.52	2.04	1–7	$t(76) = 3.80$*ES = .41
Writing Letters to Dictation	2.81	1.92	0–7 points	2.36	1.82	0–7	3.87	1.77	1–7	$t(76) = 3.40$*ES = .39
Writing Numbers to Dictation	1.76	1.58	0–5 points	1.45	1.43	0–5	2.48	1.73	0–5	$t(76) = 2.51$
Copying Letters	3.45	2.07	1–7 points	3.02	2.05	1–7	4.53	1.74	1–7	$t(58) = 2.87$*ES = .37
Copying Numbers	2.36	1.70	0–5 points	2.00	1.58	0–5	3.22	1.58	0–5	$t(76) = 2.91$*ES = .36
DAS Copying	10.73	5.75	1–26 points	9.33	0.70	1–20	14.09	1.21	3–26	$t(76) = 3.41$*ES = .92

Note. $N = 60$ for Copying Letters. DAS = Differential Ability Scales; ES = effect size; GCA = General Conceptual Ability; PPVT = Peabody Picture Vocabulary Test; WRAT = Wide Range Achievement Test.

[a]$N = 78$. [b]$n = 55$. [c]$n = 23$.

*$p < .01$.

TABLE 2
Correlations and Partial Correlations With Age Held Constant

	Age (Months)	*WRAT Letters*	*WRAT Words*	*Name Writing*	*Letters to Dictation*	*Numbers to Dictation*	*Letters Copied*	*Numbers Copied*	*DAS Copying*
WRAT Letter Identification	.60**		.16	.54**	.71**	.56**	.46**	.40**	.29**
WRAT Word Reading	.52**	.42**		.05	.17	.29**	.13	.13	–.03
Name Writing	.64**	.72**	.37**		.57**	.34**	.57**	.41**	.44**
Writing Letters to Dictation	.68**	.83**	.46**	.76**		.46**	.53**	.35**	.43**
Writing Numbers to Dictation	.62**	.72**	.51**	.60**	.68**		.55**	.68**	.58**
Copying Letters	.60**	.67**	.42**	.74**	.73**	.72**		.55**	.65**
Copying Numbers	.63**	.62**	.41**	.65**	.62**	.80**	.73**		.57**
DAS Copying	.47**	.48**	.22*	.60**	.60**	.59**	.68**	.69**	

Note. Correlations above the diagonal are correlations with the effects (chronological age in months) held constant. In each case, $N = 78$ except for Letters Copied, $N = 60$.

*$p < .05$. **$p < .01$.

stant were also examined, but these partial correlations, although slightly stronger, showed similar relations with the cognitive scores, as did the partial correlations with age held constant and, therefore, are not reported separately.

The letter-naming scores ranged from 0 to 15 ($M = 6.37$, $SD = 5.97$), with 14 of the 78 children identifying no letters and 12 children identifying one letter correctly. The word-reading scores were low ($M = .69$, $SD = 2.04$), as would be expected with these young children. Only 15 children could identify one or more words. The writing scores showed that most children could write at least some letters and at least some numbers ($M = 2.81$, $SD = 1.92$ and $M = 1.76$, $SD = 1.58$, respectively), and most could copy at least some letters and numbers ($M = 3.45$, $SD = 2.07$ and $M = 2.36$, $SD = 1.70$, respectively). Indeed, of the 78 children, only 1 wrote no letters to dictation, only 13 wrote no numbers to dictation, and 6 copied no numbers. Of the performances on the other writing assessments, 30 wrote something in response to dictated letters, 36 wrote something in response to dictated numbers, 15 wrote something when asked to copy letters, and 29 wrote something when asked to copy numbers. The remaining children wrote or copied one or more letter(s) or number(s) correctly. In general, children had higher letter-writing scores when they were copying letters compared to when they wrote letters from verbal dictation, $t\,(59) = 4.05$, $p < .01$. Similarly, their scores in copying numbers were higher than in writing numbers from verbal dictation, $t(77) = 5.13$, $p < .01$.

Partial correlations between letter-naming scores and letter- and number-writing scores, $r(78) = .40–.71$, $p < .01$, are medium to large and significant. These correlations are significant regardless of whether letters and numbers were written to dictation or copied; however, the partial correlations with letter naming are stronger for dictated compared to copied letters ($z = 3.10$, $p<.001$) but not to dictated compared to copied numbers ($z = 1.25$, $p=.11$). Weaker partial correlations were found between word-reading scores and letter- and number-writing scores, $r\,(78) = .05–.29$, due to the low word-reading scores. Few of these young children could read any words. Only the partial correlation between word-reading scores and number writing to dictation was significant, $r(78) = .29$, $p < .01$.

The partial correlations between letters and numbers written to dictation, $r(78) = .46$, $p < .01$, and letters and numbers copied, $r(78) = .55$, $p < .01$, were found to be significant. The difference between the strength of the letters and numbers dictated versus letters and numbers copied correlations was not significant ($z = 1.11$, $p = .13$). Differences in the strength of the correlations for letters written to dictation or copied, $r(60) = .53$, $p < .01$, compared to numbers written to dictation or copied, $r(78) = .68$, $p < .01$, were not significant ($z = 1.79$, $p > .05$).

The children's name-writing skills were found to range from scribbled writing to writing all letters in the first name with well-formed letters ($M = 4.09$, $SD = 2.47$). No child refused to write his or her name. Although 30% of the children scribbled their names in response to a request to write their first names and 13% of the children could write only the first letter of their names, 41% could write all the

letters in their names. Children's scores on name writing were higher than their scores in writing letters to dictation and in copying letters, $t(77) = 6.99$, $p < .01$ and $t(59) = 2.73$, $p < .01$, respectively.

Partial correlations showed that name-writing scores were related to scores on writing letters and numbers to dictation, $r(78) = .57$, $p < .01$ and $r(78) = .34$, $p < .01$, respectively, and to scores in copying letters and numbers, $r(58) = .57$, $p < .01$ and $r(78) = .41$, $p < .01$, respectively. The magnitudes of the partial correlations for name writing with letters and numbers to dictation were significantly larger than those for copying ($z = 2.95$, $p < .01$ and $z = 2.01$, $p < .02$, respectively). We also examined children's scores on the WRAT Letter Identification and whether there were performance differences if the first letter of the name was one of the 15 letters on the WRAT or if the first letter of their name was not one of the letters. The t test was not significant, $t(78) = 1,27$, $p = .21$.

We examined whether copying skills in general as assessed by the DAS Copying subtest were related to the children's abilities to write letters and numbers and to their name-writing skills. Partial correlations with age controlled between DAS Copying and copying letters and numbers were significant, $r(78) = .65$, $p < .01$ and $r(78) = .57$, $p < .01$, respectively, as were partial correlations between DAS Copying and writing letters and numbers to dictation, $r(78) = .43$, $p < .01$ and $r(78) = .58$, $p < .01$, respectively. The magnitude of the partial correlations between DAS Copying and copied letters was larger than with letters written to dictation ($z = 2.81$, $p < .01$). The difference in magnitude between DAS Copying and copying numbers compared to numbers written to dictation was not significant ($z = .13$, $p > .05$). Scores on DAS Copying were significantly correlated with name writing scores, $r(78) = .44$, $p < .01$.

DISCUSSION

The research reported here investigated the relations between preschool children's skills in letter naming and word reading and their skills at writing letters, numbers, and their first names. It was expected that skills in letter naming would be related to writing skills, and this was found. Children who had high letter-naming scores also had higher scores on letter writing whether it was writing letters that were dictated or copying letters from a list or whether it was writing some or all of the letters of their names. Letter-naming skills also were related to number writing skills, again, whether the numbers were dictated or copied. Thus, at the beginning of the school year these 4-year-old children on average could identify six letters and most could accurately write or copy an average of one to three letters as well as some numbers. The children were also able to write some or all of the letters of their first names. Although these skills in letter identification and writing are expected to grow over the course of the school

year, it is an important finding that there is already a foundation of skills at the start of the school year from which additional growth can occur.

The link between letter identification and writing skills has been hypothesized to be a complementary one supporting the development of alphabetic knowledge that is needed for word-decoding skills. Alphabetic knowledge assumes an association of letter names and letter sounds. Treiman and Broderick (1998) and McBride-Chang (1999) have suggested that knowledge of letter names and letter sounds is influenced by different factors. According to these researchers, letter-name knowledge is influenced by experiences with alphabetic letters, including children's experiences with learning the letters of their names. Letter-sound knowledge develops from the child's understanding that written letters have associated sounds. Children's phonological skills in discriminating sounds play an important role in letter-sound knowledge. Other researchers (Silva & Martins, 2003) have noted that both letter-name knowledge and phonemic awareness are needed for writing-skill development, whether these be preconventional (e.g., invented spelling) or conventional writing (using letters to represent sounds).

In our study, there may be some early evidence of the use of letter-sound knowledge in addition to letter-naming skills, although letter-sound knowledge was not directly assessed. Children's scores on the WRAT Letter Identification task were strongly to moderately related to their scores in writing letters and numbers to dictation. Children were sufficiently able to associate the letter and number names they heard with their knowledge of letter names to accomplish the task of writing at least some of the letters and numbers dictated. The children's scores suggest that writing to dictation is a harder task than copying letters and spontaneously writing their first names, as scores on both of these tasks are higher than those for writing letters to dictation. Although intuitively it makes sense that copying should be an easier task than writing in response to verbal dictation, there is little research published on this topic with preschool children beyond reports of correlations between writing and drawing (r = .58–.69), controlling for age (Levin & Bus, 2003). Most published reports provide descriptive statistics for various tasks (writing names and phrases, form copying, drawing, and invented spelling of dictated words), but no correlations are reported between tasks (Badian, 1998; Silva & Martins, 2003; Weinberger, 1996). The study presented here provides correlation matrixes for all of the measures used that may be of use to other researchers. Further research is needed to determine how the development of letter-sound knowledge, either directly or through the development of phonological skills, plays a role in the development of different types of writing skills and whether letter-sound knowledge influences skills in writing to dictation compared to copying skills.

In addition to letter-name and letter-sound skills, the children's skills in writing their own names were examined. Name-writing skills have been identified as having special meaning to children, and children's exposure to their written names by

parents and teachers is thought to provide many early learning opportunities by which written letters and letter sounds become connected (Treiman & Broderick, 1998; Villaume & Wilson, 1989). In our study, the highest writing scores were found for first-name writing compared to writing or copying letters and numbers. On average, the children could write at least the first letter of their names, as scores for name writing were higher than those for writing letters or numbers. Researchers have found name writing to be correlated with reading skills. However, our study found weak correlations between name writing and word reading, although name writing and letter naming were moderately correlated. Bloodgood (1999) reported modest correlations (r = .59–.72) between skills in name writing, letter identification, and word recognition skills in 4- and 5-year-olds as measured in the fall. The difference between studies lies in the difference in number of words the children could read; where Bloodgood (1999) reported that an average of 2 to 3 words out of 15 words could be identified by 4- to 5-year-olds, on average the children in our study could read few words. Indeed, only 15 of the 78 children could read 1 or more of the words. Further research is needed to determine how early name-writing skills link word reading at ages where more words can be read. Work by Ferguson (1975) showed that strong correlations between name-writing skills at 5 years of age can be obtained with word-reading skills when measured at 7 years of age.

Surprising differences were found between children participating in these preschool programs who were from low-income homes compared to children in the same classes who were tuition paying from higher income homes. In broader socioeconomic status (SES) samples of preschool children, it is not unusual to find differences in children's performance related to family income. Indeed, West et al. (2000) and Bowey (1995) reported differences in letter-naming skills related to income. In the study presented here, SES differences between income-eligible and tuition-paying children were not as broad as would be found in the general population, yet scores on letter-naming, word-reading, and all the writing tasks were lower for the children from the lower income homes. These findings may reflect the constellation of characteristics that are correlated with family income, particularly parental education and literacy level, both of which are correlated with children's academic achievement (e.g., Berlin & Sum, 1988; Brizius & Foster, 1993; Sticht & Armstrong, 1994). Limitations of our study were that parental literacy was not assessed and information was not obtained about the home literacy environment, such as the availability of books and materials encouraging cognitive skills related to emergent literacy and parenting practices that involve parent–child reading, and conversation skills as well as activities related to alphabetic knowledge and writing. This information might have been useful in learning more about the role of family characteristics in the performance of these children.

With the emphasis of these children's preschool programs on letter-name and letter-sound knowledge, along with writing and language skills, it is expected that

skills measured in the spring would be stronger than those measured in the fall. However, our previous work with this same population showed that for some children, fall to spring gains in letter-naming skills were negligible (Molfese et al., in press). Explicit attention to developing letter-name and letter-sound skills, building phonological awareness, and learning letter- and name-writing skills may impact the skill development of at-risk children (Brady, Fowler, Stone, & Winbury, 1994; Saint-Laurent & Giasson, 2001). A focus by teachers on the development of procedural knowledge skills in the preschool period may yield the hoped for impacts on later reading skills that has not been found in curricula emphasizing conceptual knowledge (Senechal et al., 2001).

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REFERENCES

Adams, M. (1990). *Beginning to read: Thinking and learning about print: A summary.* Champaign-Urbana, IL: Center for the Study of Reading.

Badian, N. (1995). Predicting reading ability over the long term: The changing roles of letter naming, phonological awareness and orthographic processing. *Annals of Dyslexia*, *45,* 29–96.

Badian, N. (1998). A validation of the role of preschool phonological and orthographic skills in the prediction of reading. *Journal of Learning Disabilities, 31,* 472–481.

Berlin, G., & Sum, A. (1988). *Toward a more perfect union: Basic skills, poor families, and our economic future* (Occasional Paper No. 3). New York: Ford Foundation.

Bloodgood, J. W. (1999). What's in a name? Children's name writing and literacy acquisition. *Reading Research Quarterly, 34*, 342–367.

Bowey, J. (1995). Socioeconomic status differences in preschool phonological sensitivity and first-grade reading achievement. *Journal of Educational Psychology, 87*, 476–487.

Brady, S., Fowler, A., Stone, B., & Winbury, N. (1994). Training phonological awareness: A study with inner-city kindergarten children. *Annals of Dyslexia, 44,* 26–58.

Brizius, J. A., & Foster, S. A. (1993). *Generation to generation: Realizing the promise of family literacy.* Ypsilanti, MI: High/Scope Press.

Bus, A. G., Both-de Vries, A., de Jong, M., Sulzby, E., de Jong, W., & de Jong, E. (2001). *Conceptualizations underlying prereaders' story writing* (CIERA Report No. 2–015). Ann Arbor: University of Michigan, School of Education, Center for Improvement of Early Reading Achievement.

Carrow-Woolfolk, E. (1995). *Oral and written scales: Listening comprehension and oral expression manual*. Circle Pines, MN: American Guidance Service.

Denton, K., & West, J. (2002). Children's reading and mathematics achievement in kindergarten and first grade. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Dunn, L., & Dunn, L. (1997). *Peabody Picture Vocabulary Test* (3rd ed.). Circle Pines, MN: American Guidance Service.

Elliott, C. (1990). *Differential Ability Scales: Introductory and technical handbook.* New York: Psychological Corporation/Harcourt Brace Jovanovich.

Ferguson, N. (1975). Pictographs and prereading skills. *Child Development, 46*, 786–789.

Levin, I., & Bus, A. G. (2003). How is emergent writing based on drawing? Analyses of children's products and their sorting by children and mothers. *Developmental Psychology, 39,* 891–905.

Lyytinen, H., Aro, M., Eklund, K., Erskine, J., Guttorm, T. K., Laakso, M. L., et al. (2004). The development of children at familial risk for dyslexia: Birth to school age. *Annals of Dyslexia, 54,* 185–220.

McBride-Chang, C. (1999). The ABCs of the ABCs: The development of letter-name and letter-sound knowledge. *Merrill-Palmer Quarterly, 45,* 285–308.

Molfese, V., Modglin, A., Beswick, J., Neamon, J., Berg, S., Berg, J., et al. (in press). Letter knowledge, phonological processing and print awareness: Skill development in non-reading preschool children. Special Issue of *Journal of Learning Disabilities*.

Muter, V., & Diethelm, K. (2001). The contribution of phonological skills and letter knowledge to early reading development in a multilingual population. *Language Learning, 51*, 187–219.

Riley, J. (1995) The relationship between adjustment to school and success in reading by the end of the reception year. *Early Child Development and Care, 114*, 25–38.

Saint-Laurent, L., & Giasson, J. (2001). Effects of a multicomponent literacy program and of supplemental phonological sessions on at-risk kindergarteners. *Education Research and Evaluation, 7,* 1–33.

Senechal, M., LeFevre, J., Smith-Chant, B., & Colton, K. (2001). On refining theoretical models of emergent literacy: The role of empirical evidence. *Journal of School Psychology, 39*, 439–460.

Silva, C., & Martins, M. A. (2003). Relations between children's inventive spelling and the development of phonological awareness. *Education Psychology, 23,* 3–16.

Sticht, T.G., & Armstrong, W.B. (1994). *Adult literacy in the United States: A compendium of quantitative data and interpretive comments.* Washington, DC: National Institute for Education.

Sulzby, E., Barnhart, J., & Hieshima, J. (1989). Forms of writing and rereading from writing: A preliminary report. In J. Mason (Ed.), *Reading and writing connections* (pp. 31–63). Needham Heights, MA: Allyn & Bacon.

Teale, W. & Sulzby, E. (1986). *Emergent literacy: Writing and reading.* Norwood, NJ: Ablex.

Thorndike, R., Hagen, E., & Sattler, J. (1986). *Guide for administering and scoring the Stanford-Binet Intelligence Scale: Fourth Edition*. Chicago: Riverside.

Treiman, R., & Broderick, V. (1998). What's in a name? Children's knowledge about the letters in their own names. *Journal of Experimental Child Psychology, 70,* 97–116.

Treiman, R., & Kessler, B. (2003). The role of letter names in the acquisition of literacy. In R. Kail (Ed), *Advances in child cevelopment and behavior* (pp. 105–135). San Diego, CA: Academic.

Villaume, S. K., & Wilson, L. (1989). Preschool children's explorations of letters and their own names. *Applied Psycholinguistics, 10,* 283–300.

Walsh, D., Price, G., & Gillingham, M. (1988). The critical but transitory importance of letter naming. *Reading Research Quarterly, 23*, 108–122.

Wechsler, D. (1989). *Wechsler Preschool and Primary Scale of Intelligence–Revised*. San Antonio, TX: Psychological Corporation.

Weinberger, J. (1996) A longitudinal study of children's early literacy experiences at home and later literacy development at home and school. *Journal of Research in Reading, 19*, 14–24.

West, J., Denton, K., & Germino-Hausken, E. (2000). *America's Kindergarteners* (NCES 2000–070). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved March 8, 2004, from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000070

Wilkinson, G. (1993). *The Wide Range Achievement Test – 3*. Wilmington, DE: Jastak Associates.