Language Skills in Kindergarten and Reading Ability at the End of Grade 1:

A Longitudinal Study

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Abstract

We examined the relation between language skills in kindergarten (as measured by routine teacher assessments at the beginning and end of the school year) and reading ability at the end of Grade 1 for 49 children from three schools in the Kamloops-Thompson School District. Participating children averaged 6.9 years of age; 63% were boys. Most children came to kindergarten with basic letter-recognition skills and showed substantial improvement in segmenting, blending, and rhyming by their Spring assessment. At the end of Grade 1 most children were mastering reading, although some were struggling. Teacher-assessed language abilities in kindergarten accounted for nearly half the variation in these individual differences and correctly identified 83% of children who were poor readers at the end of Grade 1 and 92% of those who were able readers. Critical skills were the ability to recognize letters of the alphabet, to segment simple words into their constituent sounds, and to correctly print one's own name. Although boys on average read as well as girls, they were over-represented in the group of poor readers. The relations between these variables and later reading ability were strong enough that they can serve as useful markers for identifying children who may have difficulties in mastering reading.

Introduction

There is extensive research across several languages that specific prereading skills are strongly linked to success in learning to read (see Ehri, Nunes, Stahl, and Willows, 2001, and the *Report of the National Reading Panel: Teaching Children to Read*, 2000, for reviews of recent reading research). The three key skills are phoneme awareness (e.g., What is the last sound in the word "sat"?), letter-sound knowledge, and rhyming. In the Kamloops-Thompson School District, teachers routinely assess Kindergarten students on these key prereading abilities (as well as other language and numerical skills) in September and again in May.

It would be extremely useful to teachers if children who have difficulty learning to read in Grade 1 could be identified on the basis of their assessed Kindergarten language skills. It was our goal to see how well this could be done. We assessed reading achievement late in Grade 1 (Spring) and then examined its relation with prereading abilities in Kindergarten. Our results confirm that early language skills, especially phoneme awareness and letter-sound knowledge, were very good at predicting which children would have difficulties learning to read in Grade 1.

Method

Participants

Sixty-four children from three schools (five Grade 1 classrooms) consented to take part in the project. Of these, 13 children had no Kindergarten Assessments on file, one child could not be tested, and one child was eliminated because of anomalous patterns in his kindergarten data, leaving a total of 49 children with data from both kindergarten and Grade 1.[1] Participating children averaged 6.9 years of age (range: 6.4 to 7.6); nearly two-thirds (63%) were boys.

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[1] A few children were missing values on some measures. Because our statistical approach required complete data, we estimated these missing values using regression analyses. For four children, Grade 1 Reading Comprehension and Fluency scores were estimated from their Grade 1 Word Identification and Work Attack scores. For three other children, spring kindergarten assessment scores were estimated from their fall assessment scores.

Measures

Kindergarten assessments. Children are individually assessed by teachers in September and again in May. Prereading skills include oral language (3 items; for example, "recites alphabet"), print awareness (3 items; for example, "identifies letters", "prints name"), and phonological awareness (4 items; for example, "rhymes", "segment sounds"). Items are scored on 4-point scales. For example, for "identifies letters", 1 = "child cannot name any letters in own name"; 2 = "child knows one or more letters in own name"; 3 = "child knows all the letters in own name plus some and other names"; 4 = "child knows most capital and/or lower case letters of the alphabet (guideline is 80%)".

Grade 1 reading ability. Reading ability was individually assessed in May or June of children's Grade 1 year using the Woodcock-Johnson for individual word reading and word attack skills and the John's tests for reading fluency and comprehension.

Procedures

Participation was solicited by letters distributed through school classrooms. After written consent was obtained from parents, kindergarten assessment forms were retrieved from children's files. Other research assistants then administered individual reading tests to children (in a separate room, not their classroom) after obtaining their verbal consent.

Results

Descriptive statistics

Early language abilities. As shown in Table 1, most children came to Kindergarten with basic language skills. Most could recite the alphabet with few mistakes; they could identify colours; they could recognize their own names and the names of most of their classmates; and they could express themselves in complete, grammatically correct sentences. In contrast, children showed much less ability to segment words into phonemes, blend sounds together, or rhyme.

Reflecting the success of the Kindergarten curriculum, children showed substantial improvement in segmenting, blending, and rhyming by the Spring

assessment, and most of those who had lagged behind their classmates in other language skills had caught up. For example, at the Spring assessment, two-thirds of the sample recognized most of the letters in the alphabet, a fivefold increase from the Fall, and over 80% could correctly print their own name, a threefold increase.

Children also showed gains in skills thought to be directly related to the acquisition of reading. The number of children who could produce rhymes out of context more than tripled, increasing from 25% to 80%. At the Fall assessment, only one child could successfully segment a one-syllable word into phonemes; by Spring, over one-third of the sample could do so. The ability to blend phonemes back into a word almost increased fourfold, from 15% in the Fall to 59% in the Spring.

Some skills became nearly universal. By Spring *all* children in our sample could recite most of the alphabet with few or no errors, name at least five of eight colours, and express themselves in complete, grammatically correct sentences. All but one could recognize their own printed name and the names of most of their classmates.

Reading achievement in Grade 1. Consistent with this level of achievement in kindergarten, most children were mastering reading at the end of Grade 1, some impressively so. Nearly two-thirds (64%) of the children in the sample had word-identification and word-attack skills at or above their grade level (25% performed at a Grade 3 level or better), and on average they performed well on reading fluency and comprehension, as shown in Table 2.

Nevertheless, some children were struggling. About one-quarter of the sample were six months or more below their grade level on word-attack skills and scored relatively low on reading fluency and comprehension. It was a major goal of our analysis to see if we could identify these children on the basis of their kindergarten skills.

Data aggregation

Because our measures of reading ability were highly correlated (median r = .63, range = .56 to .84), they were aggregated using principal components analysis. A single factor, Reading Ability, emerged, which accounted for 75% of the variance in

the original measures. Factor loadings (the correlation between the variable and factor) ranged from .76 (Comprehension) to .92 (Reading Identification). This factor was used as our outcome measure in all subsequent analyses.

Kindergarten language skills and reading achievement in Grade 1.

Accounting for individual variation in reading achievement. As shown in Table 3 and Figure 1, three of the Kindergarten language skills assessed in the Spring accounted for nearly half of the variance in reading ability at the end of Grade 1. The best single predictor was the ability to recognize the letters of the alphabet, followed by the ability to segment a word into phonemes. Children who could print their own names correctly by the end of kindergarten were also better readers at the end of Grade 1.

As shown in Figure 1, Spring language abilities were related to language abilities assessed the preceding Fall. In particular, the early ability to recite the letters of the alphabet was related to later recognition of letters and the ability to correctly print one's own name. Early letter recognition and (to a lesser extent) the ability to delete phonemes were related to later ability to segment words into phonemes.

As Figure 1 implies, language abilities assessed at entry into Kindergarten were not directly related to Grade 1 reading ability. Rather, they provided a base for learning during kindergarten, and it was these later skills, acquired by the end of kindergarten, that were related to reading ability in Grade 1.

As expected, given the narrow range of ages in this sample, there were no important relations between these language and reading abilities and age. Gender differences were also trivial.

Identifying children whose reading abilities were problematic. As described above, the bottom quartile (12 children) were identified as having difficulties reading. Their grade equivalence scores for word attack skills indicated that they were six months or more below their grade level. Their fluency scores (86 or less) were substantially lower than the majority of their classmates, 58% of whom scored 96 or better; and their comprehension scores were also lower (5 or fewer correct out of 10

possible; in contrast, 54% of the sample scored 8 or better). Reading was a challenging activity for these children.

A discriminant analysis was able to correctly identify 10 of 12 children (83%) with problematic reading abilities and 34 of 37 children (92%) who were performing at grade level or better. Consistent with the regression analysis described above, the most important discriminator was the ability of children to recognize the letters of the alphabet, followed by their ability to correctly print their own name. Considering the groups first, 30 of 37 children (81%) in the reading group could recognize most of the letters in the alphabet by the end of kindergarten, whereas only 25% of children in the problematic group could do so. Similarly, 95% of children in the reading group could print their own name completely and correctly by the end of kindergarten, whereas only half the children in the problematic group could do so.

Even after considering these variables, gender remained a significant discriminator, with boys over-represented in the problematic group (92% vs. 51% in the reading group).

We can also think about these findings by considering the variables. 91% of children (30 of 33) who could recognize and name most of the letters of the alphabet (score = 4) at the end of kindergarten were mastering reading at the end of Grade 1. In contrast, among children who were less familiar with the letters of the alphabet (scores < 4), fewer than half (7 of 16) were reading well at the end of Grade 1. Similarly, 85% (35 of 41) of those who could completely and correctly print their own names (score = 4) at the end of kindergarten were mastering reading at the end of Grade 1, whereas only 25% of those without this skill (2 of 8) were reading well at the end of Grade 1. Finally, more than a third of the boys in this sample were experiencing reading difficulties at the end of Grade 1, whereas fewer than five percent of girls were.

Phoneme discrimination. Although the ability to segment a simple word into its constituent sounds helped to predict individual reading ability in the regression analysis presented above, it did not strongly discriminate between our two groups. It will be recalled that just over a third of our sample had achieved this skill by the end

of their kindergarten year. Of these, most (89%; 17 of 19), as expected, were mastering reading by the end of Grade 1. However, many of those who had not been able to segment sounds at the end of kindergarten were also reading well at the end of Grade 1 (67%; 20 of 30). Although in the expected direction, the difference was not large enough to be statistically reliable.

Nevertheless, the early ability to segment a simple word into its constituent sounds appeared to pay important dividends. In a separate analysis, we found that over half the children who had mastered this ability in kindergarten were among our most able readers at the end of first grade – 10 of 19 fell into the top quartile in assessed reading ability. As mentioned earlier, children in the top quartile were reading at a Grade 3 level. In contrast, only 4 of 30 children (13%) without this early ability achieved such a high level of reading mastery at the end of Grade 1.

Discussion

Consistent with other research in reading (Ehri et al., 2001), we found that children who, by the end of their kindergarten year, could recognize and name the letters of the alphabet and segment simple words into their constituent sounds were well placed to put these skills together during Grade 1 and learn to read. In addition, children who could print their own names correctly by the end of kindergarten were also better readers at the end of Grade 1, a factor that may reflect greater motivation or more practice in associating words in their printed and spoken forms. Our discriminant analysis indicated that the relations between these variables and later reading ability were strong enough for these skills to serve as useful markers in identifying children who may have difficulties in mastering reading. Overall, we could, on the basis of kindergarten skills, account for nearly half the variation in individual reading scores at the end of Grade 1, and correctly classify 90% of our sample as poor or able readers.

Although these are impressive findings, it is worth noting that there are exceptions to these patterns. A few children who had strong prereading skills at the end of kindergarten nevertheless experienced difficulty in mastering reading during Grade 1, and a few children with weak language skills in kindergarten were

nevertheless reading well by the end of Grade 1. We need to know more about these children and the factors that affected their acquisition of reading.

The importance of gender in our discriminant analysis also suggests a further area of study. In contrast to girls, there were two distinct groups of boys: one that was struggling with reading (hence their over-representation in our group of poor readers) and a second, larger, group that was doing quite well. What factors distinguish these two groups and make it more difficult for some boys to master reading? There are a number of plausible candidates (e.g., ability to attend and to stay on task; activity level) that could be investigated in a follow-up study. It is possible, too, that some of the difficulty is in the demands of the testing situation, rather than in reading ability as such.

The importance of the ability to recognize the constituent sounds of words is suggested by the fact that, of those who had not been able to segment sounds by the end of kindergarten, one-third were struggling with reading at the end of Grade 1. In contrast, those children who had mastered this ability by the end of kindergarten were over-represented in our group of most able readers. Thus the early acquisition of sound segmentation appears to lead to the early acquisition of reading and allows children to go from strength to strength.

Our longitudinal findings are consistent with a causal model in which early linguistic skills lead to the mastery of reading (and deficits in these skills lead to difficulty in reading). Moreover, as we noted earlier, the relations found in this sample are strong enough that these early skills can serve as useful markers of future reading achievement.

Nevertheless, it is clear that early language skills are only part of the story. Although early language skills facilitate later reading mastery, they do not guarantee it. Similarly, the lack of early skills does not always impede the later acquisition of reading. There are other factors at work, and in our future research, we hope to identify them and study their interactions with early languages skills.

References

Ehri, L. C., Nunes, S. R., Stahl, S. a., & Willows, D. M. (2001). Systematic phonics instruction helps students learn to read: Evidence from the National Reading Panel's meta-analysis. *Review of Educational Research*, **71**, 393-447.

Report of the National Reading Panel: Teaching Children to Read (2000), www.nichd.nih.gov/publications/pubskey.cfm?from=nrp.

Table 1. Kindergarten abilities: Descriptive statistics for Fall (N = 47) and Spring (N = 48) assessments.

Variable	Time	Quartiles		
		1st	Median	3rd
Recites alphabet	Fall	3	4	4
	Spring	4	4	4
Identifies colours	Fall	4	4	4
	Spring	4	4	4
Expressive language	Fall	3	4	4
	Spring	4	4	4
Recognizes names	Fall	4	4	4
	Spring	4	4	4
Identifies letters	Fall	2	3	3
	Spring	3	4	4
Prints name	Fall	3	3	4
	Spring	4	4	4
Blends sounds	Fall	1	2	3
	Spring	3	4	4
Segments sounds	Fall	1	1	2
	Spring	2	3	4
Rhymes	Fall	1	2	3
	Spring	4	4	4
Auditory perception (phoneme deletion)	Fall	1	2	3
	Spring	3	3	3

Notes.

1 = No evidence; 2 = Minimal evidence; 3 = Can do most of task; 4 = Consistent and complete

Table 2. Woodcock-Johnson Reading achievement at the end of Grade 1: Means and standard deviations.

Variable	Mean	SD
Word identification: (maximum possible = 47)	22.2	7.2
Word identification: grade equivalent	2.4	1
Word attack: (maximum = 21)	8.8	6
Word attack: grade equivalent	2.4	1.2
Fluency (maximum = 100)	92.7	8.7
Comprehension (maximum = 10)	7.3	2.2

Note: *N*s vary from 46 to 50.

Table 3. Kindergarten predictors of reading ability at end of Grade 1.

Multiple R^2 = .47, F(3,45) = 13.25, p < .0001

Predictor	r	β	sr^2	$r \times \beta$
Identifies letters	.56***	0.41	.14**	0.23
Segments one syllable words into phonemes	.44**	0.33	.10**	0.15
Prints name	.41**	0.23	.05*	0.09

Notes. N = 49.

*p < .053; **p < .01; ***p < .001. Tests are two-tailed.

r = simple (raw) correlation

$ß$ = standardized regression coefficient

sr^2 = the squared semipartial correlation; the variance accounted for independently of all other predictors.

Kindergarten:
Fall

Kindergarten:
Spring

Identifies colours

.27

Identifies letters

$R^2 = .27$

.40

Recites alphabet

.32

Prints own name

$R^2 = .10$

.23

.41

Grade 1
Reading Ability

$R^2 = .47$

Phoneme deletion

.28

Segments words
into phonemes

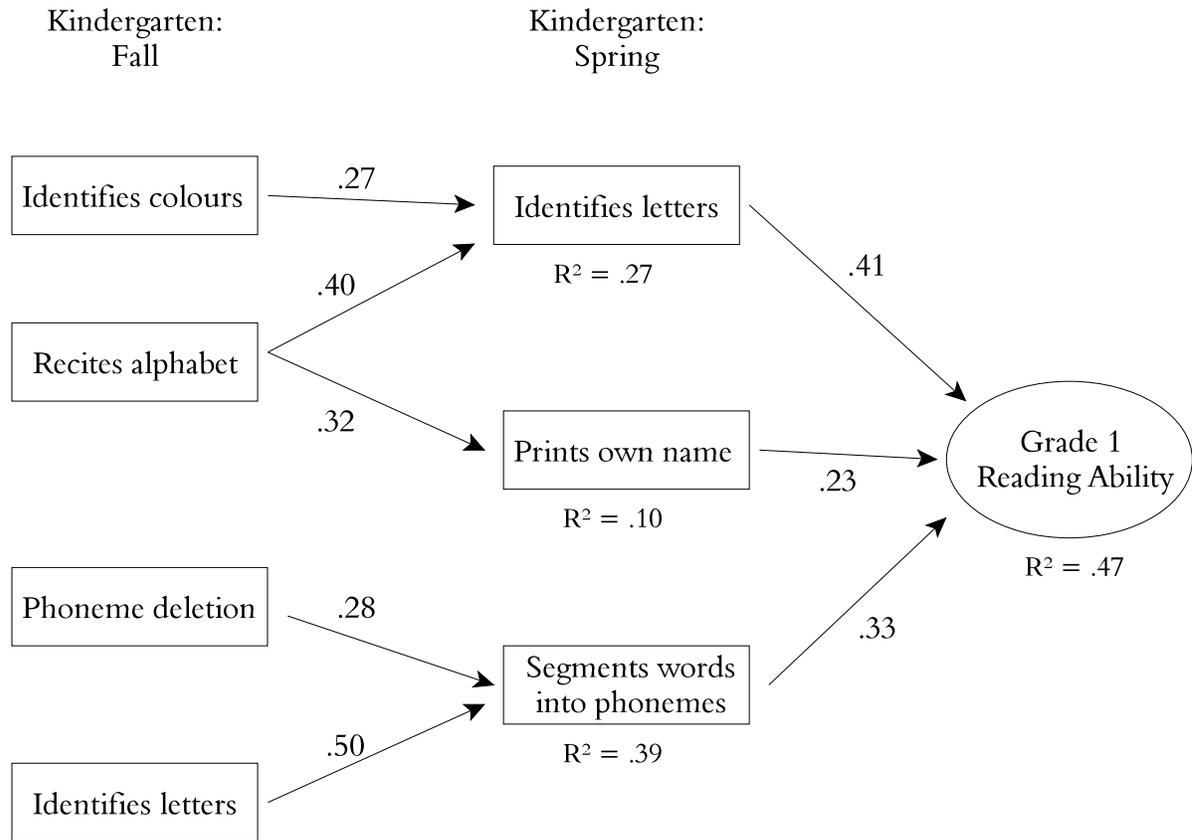$R^2 = .39$

.50

Identifies letters

.33

Figure 1. Language skills in kindergarten and reading ability in Grade 1. For paths from Fall to Spring, N = 45; for paths from Spring to Grade 1, N = 49.