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Should We "Redshirt" in Kindergarten? A Study of the Effect of Age on Kindergarteners' Reading Readiness

This study examined the effect of chronological age on kindergarten children's reading readiness skills. Specifically, we ask whether chronological age should be considered when making decisions about academic redshirting: the practice of delaying younger children's entrance into kindergarten. We were concerned particularly with reading readiness because research has shown consistently that kindergarten children who demonstrate strong prereading skills such as phonological awareness and letter-sound understanding are more likely to become strong readers in later grades (Snow, Burns, & Griffin, 1998). The participants in this study were 625 kindergarten children who were measured for age, phonological awareness, and letter-sound understanding. Results of analysis indicate that younger children were no different from their older peers in their phonological awareness skills whereas significant between-group differences did occur for letter-sound understanding. These results give strength to the notion that younger children in kindergarten were comparable to older children in their phonological awareness skills. However, younger children were less skilled in understanding letter-sound relationships.

Cette étude porte sur l'effet de l'âge chronologique sur les habiletés relatives à la capacité de lecture d'enfants à la maternelle. Plus précisément, nous considérons s'il faudrait tenir compte de l'âge chronologique lors de la prise de décision impliquant la pratique académique de "redshirting" qui consiste à retarder l'entrée à la maternelle d'enfants plus jeunes. Nous nous sommes penchés sur la préparation à la lecture, les recherches démontrant, de façon persistante, que les enfants de la maternelle qui font preuve d'habiletés de prélecture – telles la conscience phonologique et le sens de la relation grapho-phonémique – très développées sont plus aptes à devenir de bons lecteurs plus tard (Snow, Burns, & Griffin, 1998). Les enfants qui ont participé à cette étude, 625 jeunes de la maternelle, ont été évalués en fonction de leur âge, leur conscience phonologique et leur sens de la relation grapho-phonémique. L'analyse des données a révélé qu'il n'y avait pas de différences dans les habiletés liées à la conscience phonologique entre les enfants plus jeunes et leurs pairs plus âgés. Pour le sens de la relation grapho-phonémique toutefois, les

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différences entre les groupes d'âge étaient importantes. Ces résultats viennent appuyer la notion selon laquelle les habiletés liées à la conscience phonologique chez les enfants plus jeunes sont comparables à celles des enfants plus âgés. Les plus jeunes, par contre, comprenaient moins bien la relation grapho-phonémique.

Younger university athletes may find themselves waiting out their first year on the team on the bench. This year allows time for them to mature physically and improve their skill level while keeping the four-year playing eligibility. This practice has been referred to as *redshirting*. In Canada many education systems also practice a type of academic redshirting, which allows parents or guardians of children born late in the year to delay their children's entrance into kindergarten. The purpose of this is to enable these children to mature for another year and enter kindergarten more intellectually, emotionally, and socially mature.

In this study we ask whether chronological age should be considered when making decisions about academic redshirting in kindergarten. Specifically, we study the effect of age on kindergarten children's reading readiness skills. We were concerned with reading readiness because research has shown consistently that kindergarten children who demonstrate strong prereading skills such as phonological awareness and letter-sound understanding are more likely to become strong readers in later grades (Snow, Burns, & Griffin, 1998). It is, therefore, important to determine whether younger children in kindergarten are at a disadvantage when acquiring important prereading skills. If younger children were disadvantaged, it may be appropriate to consider delaying their entry into kindergarten; however, if age had no effect on prereading skills, redshirting based on this factor may not be appropriate.

A great deal of debate has ensued as a result of the practice of academic redshirting, and there is widespread disagreement among policymakers, educators, and parents about whether this practice is effective. Furthermore, research attempting to demonstrate the effects of age on kindergarten achievement has been inconclusive. Often the difficulty lies in the interpretation of data and, therefore, proponents and opponents of redshirting often use the same evidence, but reach opposite conclusions (Katz, 2000). Therefore, continuing this research remains important, particularly because there is widespread agreement that kindergarten is a critical period in children's development.

The skills learned in kindergarten establish critical frameworks for children's academic and social trajectories. Of particular importance are foundational reading skills such as phonological awareness and letter-sound correspondence. Both these skills act as prerequisites for the reading process (Snow et al., 1998). Research with kindergarten children has shown that the phonological awareness skills learned during this year significantly predict future reading achievement (Torgesen, 1997). It is important also to recognize the protective factors that reading success provides for development of emotional and social adjustment. As such, the issue of children's readiness for kindergarten has received a great deal of attention and continues to be an important focus for study. A specific issue worth investigating is whether younger children have the developmental capacity or the necessary experiential frameworks to achieve at consistent levels with older classroom peers. A

second related issue is whether to hold these younger children back from entering kindergarten.

Researchers who support keeping younger, less prepared children out of school until they are older argue that children held back demonstrate higher levels of academic achievement or are socially and emotionally better adjusted than their younger classmates (Olson, 1989; Rabinowitz, 1989; Spitzer, Cupp, & Parke, 1995). There are a range of educational policies regarding this issue. Some suggest that children born during the last three months of the kindergarten eligibility year wait a year before entering school. Others suggest raising the official age for kindergarten entry. These proponents base their arguments on a variety of measures. One is student achievement scores. The National Center for Education Statistics in a Report of the Early Childhood Longitudinal Study (West, Denton, & Germino-Hausken, 2000) found that older kindergarten children outperform younger children in reading. Specifically, older children were more likely to score in the highest quartile of the distribution of scores than younger children. However, this study also found that some of the youngest children (16%) also scored in the highest quartile of reading scores. These findings are consistent with studies of reading readiness skills. Kurdek and Sinclair (2001) found that younger kindergarten children had lower verbal skills when compared with older children. These researchers found that the effects of age dissipated with time and that younger children were not different from older children in their grade 4 reading achievement. In another genre of studies, DiPasquale, Moule, and Flewelling (1980) explored the prevalence of psychoeducational referrals and found that children born later in the school year were more likely to be referred for psychoeducational assessment. Consistent with these data, Diamond (1983) found that children born later in the school year were more likely to be diagnosed with learning disabilities. These findings suggest that younger children may be better off delaying kindergarten school entry until the subsequent school year.

However, others argue that retaining younger children has no effect on their academic achievement in kindergarten and in subsequent grades. Graue and DiPerna (2000) explored redshirting of children in kindergarten by examining the school records of 8,000 students. These researchers found that kindergarten redshirts were comparable to their normally entered peers in their academic achievement. They also found that children who were red-shirted were more likely to receive special education services in later grades. This result is consistent with the findings of May, Kundert, and Brent (1995), who found that those children who were held back were placed in special education programs in significantly higher proportions than non-delayed-entry students. Another consistent finding in the research literature is that chronological age in kindergarten does not significantly predict academic achievement in later grades. These findings come from longitudinal studies that measured the effects of age over time (Kurdek & Sinclair, 2001; Narahara, 1998). Snow et al. (1998) explored two studies of phonological awareness training (Brady, Fowler, Stone, & Winbury, 1994; Dorval, Joyce, & Ramey, 1980) and found that the amount of benefit per hour of phonological awareness training was equivalent for 4-year-old and 6-year-old high-risk samples, indicating that little would be gained from delaying phonological instruction

until children were older. Implications from these findings suggest that delaying entry to kindergarten may not in fact be a useful strategy for increasing academic, and particularly reading, readiness.

The disparate results of research in this area have led to confusion among policymakers, educators, and parents about what to do with younger kindergarten children. Graue and DiPerna (2000) suggest that this confusion about interpreting results may be caused by a recent shift in developmental epistemologies. For most of the 20th century, child development and its related practices have been operating under a maturationist theoretical framework (Graue & DiPerna, 2000). The underlying assumption of this framework is that certain absolute developmental foundations must be in place before children can learn certain concepts. In other words, developmental maturation precedes learning. Until a child has developed certain foundations, learning cannot take place. Assuming this perspective, retaining younger children from kindergarten makes sense. However, over the past two decades the field of child development has experienced a shift toward sociocultural perspectives that posit that learning is a function not only of maturation, but also of environment. In fact Vygotsky (1978) and then Wertsch (1985) hypothesized that children may be able to learn beyond developmental thresholds with the assistance of effective mentoring or instruction. Vygotsky referred to children's learning potential as their *zone of proximal development* and held that with effective mentoring children can learn beyond their current development. In other words, given effective instruction, children may be surpass a level of knowledge that might be assumed under a maturational perspective. Thus it becomes important to consider results of any research of kindergarten readiness under the assumption of a theoretical framework of child development. Without such consideration, interpretation of data is difficult. This study assumes a sociocultural framework of development and posits that children may learn beyond a perceived threshold with the guidance of a parent, educator, or mentor.

Reading Readiness

Earlier studies concerned with the practice of academic redshirting have explored many facets of academic achievement. The particular focus of our study is kindergarten children's reading achievement. Therefore, it is important to define reading readiness operationally and also to explore what may cause individual differences in prereading skills. Over the past decade reading and literacy have been in the forefront of educational research, policy, and practice. Specifically, a great deal of attention has been paid to the importance of prereading skills such as phonological awareness and letter-sound correspondence. Research has shown conclusively that these prereading skills are strong predictors of future reading success (Torgesen, 1997).

Phonological Awareness

Phonological awareness may be defined as one's ability to recognize that words are composed of individual sounds or phonemes (Lerner, 2003). This includes an awareness of and sensitivity to the fact that words can be broken down into phoneme-sized units (Mann, 1998). Acquiring phonological awareness, then, involves developing an understanding that words can be divided into segments of sounds smaller than a syllable (Torgesen & Mathes, 2002). An important element of phonological awareness is one's ability to manipulate

phonemes. Activities that demonstrate children's phonological awareness initially may include rhyming tasks, blending tasks, and the ability to match a sound to a particular word (e.g., the sound /b/ is matched with *boy* rather than *toy*). Phonological awareness is a necessary prerequisite to successful reading as it enables an understanding of how words in our language are represented in print. When children enter school they begin to learn about the reading process by learning about the alphabetic principle and how words are represented in print at the level of phonemes (Torgesen & Mathes, 2000). Children must master phonetic principles in order to become good readers. Those children who do not acquire phonological awareness are those who most often become poor readers (Torgesen, 1997).

Given the objectives of this study, it is important also to understand how children come to acquire phonological awareness, and furthermore what factors contribute to individual differences. To do this one must revisit the longstanding debate of nature versus nurture. This refers to the debate about the effects of genetic endowment and the effects of early environment. Research of the reading process has come to understand that both these factors contribute significantly to children becoming good readers. However, research in this area has suggested that particular reading skills may be more closely tied to one influence or the other. For example, research has demonstrated that children vary significantly in the phonological component of their natural capacity for language (Liberman, Shankweiler, & Liberman, 1989; Olson, Forsberg, Wise & Rack, 1994). In other words, individual differences in phonological awareness may be influenced largely by inherited traits. However, it is important to recognize that phonological awareness is also influenced by environment. Early exposure to the phonological components of language can have positive long-term effects on children's success with reading (Snow et al., 1998). Longitudinal studies in this area have shown that children who have more exposure to preschool phonological information (i.e., nursery rhymes, word plays, etc.) at age 3 have more highly developed phonological awareness skills at age 4 (Bryant, MacLean, Bradley, & Crossland, 1990). The current study investigates further the relationship between entry age in kindergarten and phonological awareness.

Letter-Sound Understanding

Research has also demonstrated that success in reading is influenced by one's understanding of the sounds associated with the letters of the alphabet (Juel & Meier, 1999). In many ways, when considering prereading instruction, letter-sound understanding may precede phonological awareness training. In other words, letter-sound correspondence may be a prerequisite to phonological awareness (Juel & Meier). A primary element of the reading process is the understanding that words are composed of individual letters and that these letters correspond to sounds. This mapping of print to speech that establishes a clear link between a letter and a sound is referred to as alphabetic understanding. The early literacy measures of letter knowledge and print concepts knowledge have been shown to be strong predictors of future reading scores (Juel & Meier). However, there is a significant difference in how children acquire letter-sound understanding. Unlike phonological awareness, letter-sound knowledge has little to do with inheritance. Children gain letter knowledge

through instruction. Typically, this takes place relatively early in a child's preschool experience. Parents often demonstrate to children that individual letters have names and that these letters are associated with individual sounds.

This Study

The primary purpose of this study was to examine the relationship between the chronological age of children in kindergarten and their performance on prereading measures including letter-sound understanding and phonological awareness. As mentioned above, earlier research in this area has been unequivocal. However, addressing this issue is important as findings drive policies concerning retention of children with later birth dates, and more important, findings drive parental decisions about delaying kindergarten entry of their younger children in order to increase the likelihood of their academic success.

Based on the research and theoretical frameworks reviewed in this article, it was hypothesized that letter-sound understanding would be correlated with chronological age whereas phonological awareness would not. Letter-sound understanding is thought to be influenced significantly by experience and instruction whereas phonological awareness is thought to be much more of an inherited trait.

Method

Participants

The participants in this study were 625 kindergarten children from three school districts in central Saskatchewan, Canada. The sample used in this study was primarily middle-class and English-speaking. Children with low-incidence disabilities were not included as participants.

Measures

All participants were measured for age, phonological awareness, and letter-sound understanding. The specific measures used in this study were as follows.

Age. Children's ages were measured in months at the time of testing.

Phoneme identities. The importance of children's ability to identify and manipulate phonemes has been well documented (Adams, 1990). Researchers have found significant correlations between phoneme identification and future reading achievement (Snow et al., 1998). On this measure children were required to listen to a sentence where two target words were similar in their phonetic structure. After the sentence was read children were asked to say a phonetic sound and then asked whether they heard this sound in one word or another. Children were scored as correct if they repeated the target word associated with the correct sound. An example of a question is:

Researcher says to student: "Say: We hid from him. Now say the sound /m/. Do you hear /m/ in hid or him?" (Correct response: "him").

This measure contained 20 items that progressed in difficulty from easy to more difficult.

Rhyming words. Children's ability to rhyme and recognize words that rhyme has also been found to be a strong predictor of future success (Snow et al., 1998). For this measure students listened to two words and then had to indicate

whether each word pair rhymed by responding with either *yes* or *no*. An example of this task is:

Researcher says to student, "Listen to these words: tree—truck. Do these words rhyme?" (Correct response: "no").

Researcher says to student, "Listen to these words: fat—bat. Do these words rhyme?" (Correct response: "yes").

Phoneme blending. This measures assesses children's ability to synthesize phonological information. Phonological synthesis has a strong association with future reading success (Torgesen, Rashotte, & Wagner, 1994). For this task children listened to the researcher say a series of individual phonemes in one-second intervals. Students were then asked to blend these sounds into words. Students were scored as correct if they were successful in blending the relevant phonemes. An example of this task is:

Researcher says to student, "Listen to these sounds: /d/ /o/ /g/. Now put these sounds together and what word do you get?" (Correct response: "dog").

Lower-case letter name knowledge. Letter-name association clearly taps into something of critical importance in early reading (Juel & Meier, 1999). The major task of letter naming is mapping a visual symbol to a phonetic representation. Therefore, for this task children were shown all 26 lower-case letters of the English alphabet and asked to give the letter name. Students were scored as correct if they responded with the appropriate letter name.

Upper-case letter name knowledge. The same procedures as described above were used for upper-case letter names knowledge.

Letter-sound correspondence. Letter sound tasks require associating symbols with discrete sounds, which may be more challenging because it requires isolating individual phonemes. Research has demonstrated that this skill has a significant causal effect on subsequent development of phonological skills (Juel & Meier, 1999). For this task students were shown lower-case letters and asked to give the corresponding sound. If students responded with a letter's corresponding soft sound (e.g., /c/ as in race), they were prompted to think about another sound. The target sound was the hard consonant or short-vowel sound. Students were scored as correct if they responded with the appropriate letter sound.

Procedures

All participants were individually administered the battery of measures. All measures were administered in May of the students' kindergarten year. The battery was administered by classroom teachers who attended inservice workshops given by the research team, during which teachers were introduced to the project and instructed in how to administer all measures. Scoring forms were provided for each classroom, and students' responses were recorded as raw scores. Data were collected and cleaned by the research team.

Results

Descriptive statistics for each of the measures were calculated. Means and standard deviation are shown in Table 1.

Table 1
Overall Means and Standard Deviation for Age, Measures of Letter-Sound Understanding, and Phonological Awareness

	Mean	Standard Deviation
Age	5.93	.36
Phoneme identities (16)	11.81	2.32
Rhyming (20)	16.57	3.17
Blending (8)	5.10	2.55
Upper-case letter ID (26)	22.62	5.67
Lower-case letter ID (26)	21.17	6.35
Letter sounds (26)	18.75	7.43

To explore initially the relationships between chronological age and all six prereading measures, Pearson correlation coefficients were calculated. Correlations are shown in Table 2.

Given the high number of participants in the study, it is important to recognize that statistical analysis packages will tag even mild correlations as significant. Thus many of the relationships between variables in this study were significant at the $\alpha=.05$ level. Assuming this susceptibility, interpretation of these data is based on the actual coefficients rather than their statistical significance.

Not surprisingly, high correlations were found between measures of lower- and upper-case letter knowledge (.93). High correlations were found also between lower- and upper-case letter knowledge and letter-sound correspondence (.82 and .73 respectively). Moderately high correlations were also found between all three of the phonological awareness tasks (ranging from .40 to .51). Smaller yet significant correlations were also found between letter-sound knowledge and phonological awareness (ranging from .32 to .53). These data suggest that children who tend to have poor letter-sound understanding also tend to have poor phonological awareness. These results are not overly surprising because letter-sound knowledge may be seen as a prerequisite to phonemic awareness. In other words, children who have less knowledge about the sounds associated with letters will also tend to have poor understanding of the sounds associated with phonemes. Furthermore, without letter-sound correspondence, phonological awareness skills will most certainly be less developed.

Exploring the relationship between age and the seven prereading variables, only weak correlations were found between age and all six variables (ranging from .03 to .13). This finding suggests that age had little relationship to how well children performed on the prereading measures.

To investigate the relationship between all variables further, a factor analysis with Varimax rotation was performed on seven variables including chronological age at the time of testing and the six reading-based measures for the sample of 625 kindergarten students. Two factors were extracted. The first had an eigenvalue of 3.56 and accounted for 50.91% of the total variance of all seven variables. The second had an eigenvalue of 1.03 and accounted for an

Table 2
 Correlations for Variables of Age, Measures of Letter-Sound Understanding,
 and Phonological Awareness

	Age	Phoneme Identity	Rhyming	Blending	Upper-Case Letter ID	Lower-Case Letter ID	Letter Sounds
Age	1.00						
	$p=.$						
Phoneme identities	.093	1.00					
	$p=.020$	$p=.$					
Rhyming	.025	.403	1.00				
	$p=.537$	$p<.000$	$p=.$				
Blending	.101	.512	.409	1.00			
	$p=.011$	$p<.001$	$p<.001$	$p=.$			
Upper-case letter ID	.124	.476	.332	.335	1.00		
	$p=.002$	$p<.001$	$p<.001$	$p<.001$	$p=.$		
Lower-case letter ID	.127	.502	.322	.378	.925	1.00	
	$p=.001$	$p<.001$	$p<.001$	$p<.001$	$p<.001$	$p=.$	
Letter-sounds	.103	.534	.346	.442	.733	.816	1.00
	$p=.010$	$p<.001$	$p<.001$	$p<.001$	$p<.001$	$p<.000$	$p=.$

additional 14.66% of the total variance. Both factors accounted for 65.57% of the total variance.

After rotation, Factor 1 loaded highly with Lower-case letter identification (.88), Upper-case letter identification, (.86), Letter-sound correspondence (.76), and Age (.40). No other variables loaded highly on Factor 1. Factor 1 was interpreted as including variables that were associated with letter understanding. However, interpretation was complicated by the inclusion of age in this factor. Chronological age of students was included in this factor although the factor loading was only moderate. Interpretation was complicated further by the weak correlation between chronological age and each of the letter-sound variables. Given these results, it was hypothesized that age had a weak to moderate relationship with letter-sound understanding. In other words, children's age was weakly associated with their achievement on letter-sound understanding. However, chronological age was not associated with measures of phonological awareness.

Factor 2 loaded highly with Phonemes identification (.71), Rhyming (.78), and Blending (.77). No other variables loaded significantly on Factor 2. Given the variables that loaded highly, Factor 2 was interpreted as Phonological Awareness.

In order to compare the achievement levels of younger and older children more directly, quartiles were calculated to form four groups of children based on their chronological age in months at the time of testing. Quartiles enable comparisons of measures across low and high chronological age groups. Quartile 1 was defined as those children from the sample with chronological ages including and below the bottom 25th percentile, Quartile 2 was defined as those children with chronological ages between the 25th and 50th percentile, Quartile 3 was defined as those children with ages between the 50th and 75th percentile, and Quartile 4 was defined as those children with ages between the

Table 3
Means and Standard Deviations for Chronological Age Quartiles in Months

	Mean	Standard Deviation
Quartile 1	65.60	1.35
Quartile 2	69.64	.95
Quartile 3	72.47	.58
Quartile 4	76.46	2.52

75th and 100th percentile. Table 3 shows the mean chronological age in months of the four quartiles.

To address whether chronological age had an effect on the prereading skills of children in kindergarten, an analysis of variance was performed on each measure of prereading using quartile group membership as an independent variable. The first set of analyses measured the effect of age on measures of phonological awareness. Table 4 shows the means and standard deviations for each quartile age group on phonological awareness measures.

No significant age group differences were found for each of the three measures: Phoneme identities, $F(3, 625)=1.15, p=.329$; Phoneme rhyming, $F(3, 625)=.465, p=.707$; and Phoneme blending, $F(3, 625)=1.88, p=.131$.

The next set of analyses compared quartile age groups on measures of letter-sound understanding. Table 5 shows the means and standard deviations for each age group on letter-sound understanding measures.

A statistical significant between-group difference was found on all three measures. For upper-case letter naming a significant between-group was found, $F(3, 625)=4.26, MSE=134.99, p<.01$. A Tukey post-hoc analysis revealed that the difference was between the lowest age quartile and the three remaining quartile groups. For lower-case letter naming a significant between-group difference was found, $F(3, 625)=3.88, MSE=154.46, p<.01$. Here the differences were also between the youngest age quartile and the rest of the age groups. For Letter-sound correspondence a significant between-group difference was found, $F(3, 625)=3.00, MSE=164.15, p<.05$. Post-hoc analyses indicated that the differences occurred between each age group.

Discussion

The findings of this study provide important insights into the nature of both letter-sound understanding and phonological awareness in kindergarten-aged children. Earlier research has demonstrated that phonological awareness and letter sound understanding are critical to early reading development (Snow et al., 1998). A question we asked in this study was whether younger children in kindergarten were at a disadvantage in acquiring these skills. The results of our study suggest that the answer is not straightforward.

Results of the study suggest that younger children were no different from their older peers in their phonological awareness skills. No significant between-group differences between age groups were found for phonological awareness. However, significant between-group differences did occur for letter-sound understanding. In general, these results give strength to the notion that younger children in kindergarten were comparable to older children in

Table 4
Means and Standard Deviation for Chronological Age Quartiles on Measures of Phonological Awareness

Age Group	Phoneme Identities (16)		Phoneme Rhyming (20)		Phoneme Blending (8)	
	M	SD	M	SD	M	SD
Quartile 1	11.65	2.19	16.35	3.27	4.88	2.71
Quartile 2	11.63	2.53	16.70	3.09	5.03	2.43
Quartile 3	12.00	2.28	16.73	2.92	4.94	2.54
Quartile 4	11.97	2.27	16.53	3.36	5.47	2.49

their phonological awareness skills. However, younger children were less skilled in their understanding of letter-sound relationships. A question arising from these results is why were between-group differences found for one construct but not the other? The complication may be owing to the findings that suggest that letter-sound understanding and phonological awareness may be two different categories of prereading skills. This was interpreted from the emergence of a two-factor model.

Factor 1: Phonological Awareness

The first factor was interpreted as children's phonological awareness skills. As described above, all the measures that loaded on this factor were designed to tap phonological processing. It is not overly surprising that these three measures loaded heavily on this factor; however, it is interesting to note that this factor did not include any measures of letter-sound understanding or the measure of age. We interpreted this as somewhat consistent with theoretical frameworks concerning how individual differences in phonological awareness emerge. Phonological awareness has been hypothesized to be a skill that is in part inherited. Therefore, children's capacity for developing phonological awareness may be more stable than letter-sound knowledge and hence more independent of instruction. This is not to say, of course, that instruction in phonological awareness skills is not useful. Research has demonstrated consistently that instruction in phonological awareness is a strong predictor of children's future reading success. However, the nature of phonological awareness skills may be such that children who have poor phonological awareness skills

Table 5
Means and Standard Deviation for Chronological Age Quartiles on Measures of Letter-Sound Understanding

Age Group	Upper-case letter names (26)		Lower-case letter names (26)		Letter sounds (26)	
	M	SD	M	SD	M	SD
Quartile 1	21.31	7.06	19.74	7.41	17.45	7.90
Quartile 2	23.02	4.96	21.39	6.04	18.60	7.20
Quartile 3	23.47	4.09	22.03	5.19	19.95	6.40
Quartile 4	21.56	5.81	21.56	6.31	19.07	7.84

may have difficulty raising these skills to a level consistent with children who are not impaired in this skill. In other words, individual differences in phonological awareness may be influenced more by stable heritable factors. Perhaps a good way to think about phonological awareness is that there is an inherited dimension to phonological awareness that moderately affects the ease with which children acquire this competence from instruction. This hypothesis is furthered by the finding that the measure of age did not load on the phonological awareness factor.

Factor 2: Letter-Sound Understanding

The second factor was interpreted as letter-sound understanding. The measures that loaded highly on this factor were upper- and lower-case letter naming and letter-sound understanding. The measure of chronological age also loaded weakly on this factor. Much of the research in this area posits that letter-sound understanding is a strong predictor of a child's future reading success. However, it may be a skill that is largely acquired through experience. That is, children may gain proficiency with letter-sound correspondence by being exposed to and memorizing letter names and the corresponding sounds. Such experience may be gained through early literacy environments in the home or preschool programs. Assuming this, older children in our study may have had more exposure to, or experience with, letters and sounds. In some instances this increased exposure may amount to almost 12 months' gain. The differences in exposure may have contributed to the performance differences in kindergarten on how well a child understands the relationship between letters and sounds. Thus it is not surprising that the measure of chronological age loaded on this factor.

Conclusion

In general, the findings of this study suggest that chronological age is associated with letter understanding, but not with phonological awareness. When exploring between-group differences for each age group, we found no significant results for any of the phonological awareness measures. This finding indicates that younger children in this study performed similarly to older children in their ability to manipulate phonemes. However, this result was not found with measures of letter-sound understanding. Significant between-group differences did occur for letter-sound understanding. This finding suggests that letter-sound understanding may be a skill that is acquired largely through experience with letters and their corresponding sounds.

These results give strength to the notion that in kindergarten younger children were comparable to older children in their phonological awareness skills. However, younger children were less skilled in their understanding of letter-sound relationships. Thus retaining younger children from kindergarten may not have an effect on their phonological awareness skills, but may have more effect on their letter-sound understanding. Considering these results, we suggest that stakeholders concerned with delaying younger children's entrance into kindergarten be cautious in considering chronological age when making this decision. The results of this study suggest that redshirting children in kindergarten may not have a positive effect on their phonological awareness skills and may have some effect on their letter-sound understanding.

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