Phonological Processing, Family Support, and Academic Self-Concept as Predictors of Early Reading

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We investigated factors related to early reading achievement: phonological processing, family support, academic self-concept. The subjects were 72 children in Grade 1. Predictors were measured in October. In May, the children's reading achievement was measured using subtests of the *Woodcock Reading Mastery Tests – Revised* and teacher appraisals. The predictors accounted for 47%–54% of the variance in the various reading scores, but only the phonological processing measures contributed a statistically significant amount. These results support the importance of phonological processing in early reading, and raise questions about the predictive utility of family support and self-concept measures.

L'article traite des facteurs reliés à la maîtrise de la lecture précoce : traitement phonologique, soutien familial et estime de soi. Les sujets étaient 72 enfants de première année. Les prédicteurs ont été mesurés en octobre. En mai, la maîtrise de la lecture a été mesurée à l'aide de sous-tests du test révisé de maîtrise de la lecture de Woodcock et des évaluations des enseignants. Les prédicteurs expliquaient l'écart dans les résultats obtenus dans une proportion de 47 à 54 %. Seules les mesures ayant trait au traitement phonologique ont contribué à des résultats statistiquement significatifs.

Learning to read is a central activity undertaken by children during their early school years. Becoming a fluent reader provides the basis for further growth in reading and in other areas (Tunmer & Rohl, 1991). Children begin formal reading instruction, usually in Grade 1, differing in knowledge and attitudes about reading, and these differences are magnified as schooling proceeds (Cunningham & Stanovich, 1997; Stanovich, 1986). To enhance early reading achievement, educators need to understand early reading achievement and the factors that lead to it. One first step is to identify the predictors of early reading achievement. Groups of researchers have argued, separately, that phonological processing skills, family support for literacy, and self-concept are linked to early reading achievement, but few have attempted to integrate this research or assess the effects of these

variables in the presence of each other. In the study reported in this article, we assessed the effects of these variables, measured in combination with each other at the beginning of Grade 1, on reading achievement at the end of Grade 1.

PHONOLOGICAL PROCESSING

Phonological processing is a broad term referring to individual cognitive operations that make use of the phonological or sound structure of oral language when one is processing oral or written language (Wagner, Torgesen, & Rashotte, 1994). Many researchers have demonstrated that developmental and individual differences in phonological processing are causally linked to the normal acquisition of beginning reading skills (e.g., Kirby & Parrila, 1999; National Reading Panel, 2000; Share & Stanovich, 1995; Snow, Burns, & Griffin, 1998; Wagner et al., 1994). Phonological processing is composed of a number of more specific processes, including phonological memory, naming (lexical access), rhyming, and phonological awareness (Kirby & Parrila, 1999; Wagner et al., 1994). Of these, phonological awareness, the ability to reflect on, manipulate, and report sub-lexical segments of speech (Tunmer & Rohl, 1991) is often seen as the most important. Many researchers would agree that the presence of phonological awareness is the hallmark of a good reader, whereas its deficiency is one of the more consistent characteristics of a poor reader.

Phonological analysis and synthesis are two basic kinds of phonological awareness tasks. Analysis tasks involve segmenting a word into units; examples include pronouncing a word after deleting a given sound (say "meat" without the "m"), or counting the number of sound units (syllables or phonemes) in a word. Synthesis tasks involve combining the constituent segments of a word into a whole word; for example, a child could be given a sequence of sounds (/c/, /a/, /t/) and asked what word they make. Skilful performance in these areas is presumed to reflect well-developed awareness of the sound structure of language. Wagner, Torgesen, Laughon, Simmons, and Rashotte (1993) found it easier to train young children in synthesis skills than analysis skills. Perfetti, Beck, Bell, and Hughes (1987) found that synthesis was a better predictor of word reading than analysis for the first part of Grade 1; later in the year, however, as the children's reading ability increased, analysis became a better predictor of reading. Kirby, Beggs, and Martinussen (1995), on the other hand, found analysis a more powerful predictor than synthesis in kindergarten and Grade 1. We included measures of synthesis and analysis in this study so that we could assess their joint and separate effects on reading.

FAMILY SUPPORT FOR LITERACY

Although there is widespread belief that family support is important for the development of literacy, there is less agreement on how to investigate this factor, and little evidence demonstrating the specific causal factors. Earlier studies investigated the associations of broad factors such as socioeconomic status (SES), parental education, parental educational aspirations for the child, and cultural influences with literacy; more recent research has aimed to identify the specific characteristics and behaviours that play a causal role in literacy development (Crain-Thoreson & Dale, 1992; Kirby & Hogan, 2001; Mason, 1990; Morrison, Griffith, Williamson, & Hardway, 1995). Morrison et al. (1995) argued that once these specific factors within the family are accounted for, the broader measures will capture little unique variance in academic outcomes. Kirby and Hogan (2001) found that maternal education had a small residual effect, but that the effect of the more specific factors, such as home instruction in letter names and sounds, was more powerful.

Mason (1990) claimed that reading stories to children, with appropriate coaching and support, is linked to later reading success. During story time, parental behaviour that encourages active participation in reading and discussing the book has potentially important benefits, but interaction patterns characteristic of parent-child reading change with the child's development. DeLoache and DeMendoza (1987) found that as children get older, parents abandon highly interactive reading throughout the story, and instead discuss larger units of text at the end of the story. Such interaction patterns are consistent with the notion of the zone of proximal development (Vygotsky, 1978). Parents control the elements of a task that are initially beyond the learner's capability, thus permitting the child to concentrate on elements within his or her range of competence (Sulzby & Teale, 1991); thus, the interaction styles of parents change as the child's linguistic sophistication increases.

Previous studies have concentrated on preschool parent-child literacy interaction (Crain-Thoreson & Dale, 1992; Kirby & Hogan, 2001). Bus, van Ijzendoorn, and Pellegrini (1995) found, in a meta-analysis, that the effect of preschool parent-child reading on reading achievement decreased when children were able to read on their own. Our study examined family literacy interactions occurring at the onset of formal reading instruction in school.

ACADEMIC SELF-CONCEPT

There are many definitions of self-concept. Byrne (1984) argued that self-concept is essentially a perception of the self in relation to others within

the social comparison group. Early research focused on self-concept as a global entity. More recent studies suggest that academic self-concept is a better predictor of academic achievement than is global self-concept. Marsh (1993) summarized a large number of studies involving students from Grade 4 and above, demonstrating that academic achievement was substantially related to academic self-concept but almost unrelated to global and nonacademic components of self-concept.

Some researchers suggest that during kindergarten and the early elementary school years, children have relatively undifferentiated and positive self-concepts (Harter & Pike, 1984; Stipek, 1981). In contrast, Eccles, Wigfield, Harold, and Blumenfeld (1993) reported that by Grade 1, children's perceptions of competence were differentiated across a range of self-concept domains. Marsh, Craven, and Debus (1991) claimed that children aged 5 to 8 were more able to differentiate among the multiple dimensions of self-concept than previously assumed. They found that with increasing age, the fit of the multi-factor model improved, the size of the correlations among the factors decreased, and self-concept became more differentiated. Marsh et al. (1991) did not, however, report the relationship among these multiple factors of academic self-concept and academic achievement.

Although Grade 1 children can differentiate between the subject-specific domains of academic self-concept (Marsh et al., 1991), it is not clear whether their self-concept scores correlate with reading achievement measures. Children's perceptions of their ability begin to correlate with performance around the third or fourth grade (Chapman & Tunmer, 1995, 1997; Chapman, Tunmer, & Prochnow, 2000; Nicholls, 1978). Nicholls (1978) found that the youngest children in his studies (aged 5 and 6) had difficulty distinguishing among effort, ability, and outcome. Grade 1 children's perceptions of competence provided ratings close to the maximum and declined, on average, thereafter (Marsh, Parker, & Barnes, 1985; Nicholls & Miller, 1984; Stipek & Mac Iver, 1989). The challenge for researchers has been to overcome Grade 1 children's difficulties in distinguishing between effort and ability. Marsh et al.'s (1991) findings that young children differentiated across academic domains suggest that academic self-concept has more promise for predicting early reading achievement than does domain specific reading self-concept.

SYNTHESIZING THE LITERATURE

Researchers investigating the effects of phonological processing, family support, and academic self-concept on reading have worked in isolation from each other. Rarely does a study include measures from other areas or refer to the other literature. As a result, little evidence exists regarding the

relationships among these variables, or the unique contribution of each to the prediction of reading when measured in the context of the others. The work of Chapman and Tunmer (1997) is an exception to this isolation (see also Chapman, Tunmer & Prochnow, 2000). Although primarily interested in the role of academic self-concept in reading development, Chapman and Tunmer have included measures of phonological processing. Their results demonstrated that phonological skills measured at the beginning of formal schooling are a better predictor of subsequent reading ability than is academic self-concept (Chapman & Tunmer, 1997). They also found that children who later develop more negative academic self-concepts had scored lower on phonological measures at the beginning of formal schooling.

RESEARCH FOCUS

The developmental relationships among phonological processing, family support, academic self-concept, and reading are undoubtedly tangled and complex. We designed our study to assess the predictive relationships among these factors with students in Grade 1, to investigate measures that could help in the early identification of children at risk for reading difficulties. We see this as an important first step towards understanding the longer-term developmental and causal relationships among these factors.

METHOD

Subjects

We recruited subjects for this study from four Grade 1 classrooms in a small Ontario city. Of 94 potential participants in those classes, 72 children (36 male, 36 female) received parental permission to participate. The mean age of the subjects when we measured the three predictor variables was 6 years, 5 months. The four classroom teachers reported using a whole-language approach to reading, including some phonics instruction. The teachers also had home-reading programs in which they asked parents to read with their children every day. The children came primarily from middle-class backgrounds, and all but three were Caucasian. Four students did not complete the study: three moved away and one was absent at the time of the reading assessment, leaving 68 subjects.

Procedure

Linda Carson, the first author of this article, administered all measurements individually in the school library with research assistants whom she had trained. They withdrew children from their classroom to complete one or

two tests for about 10 minutes for each measure. They completed the phonological processing, family support for literacy, and academic self-concept measures in October, and the reading achievement measures in May. Carson conducted the parent interviews by telephone; each interview lasted about 10 minutes.

Measures

Phonological Processing. We measured children's skill in this area using two oral-language instruments adapted from Torgesen, Wagner, and Rashotte (1994) and used subsequently by Kirby and Parrila (1999). When a child made seven consecutive errors on a test, we discontinued our testing. The score for each test was the number of correct responses. Blending Onset-Rime is a phonological synthesis measure. In this test, the researchers orally presented the children with one-syllable words in two parts (the onset, initial consonant cluster, and the rime, remaining vowels and consonants), and asked them to pronounce the word that results from blending the parts (e.g., "p-ark"). There were 6 practice items and 15 test items. The second instrument, Phoneme Elision, is a phonological analysis measure. The researchers orally presented the children with a whole word and asked them to give the resulting word when a specified sound was removed (e.g., "bat" without the /b/). The deleted phonemes were consonants. Items 1–6 were final consonants; items 7–12, initial consonants; items 13–15, medial consonants. In each case, when the specified phoneme was removed, the remaining phonemes formed a word. There were 4 practice items and 15 test items. We have included a list of the items for these tests in Appendix A.

    Family Support for Literacy. In our study, *family support for literacy* refers to aspects of the home literacy environment that promote reading and to the types of interaction that occur during shared reading in the home.

    The researchers telephoned parents or guardians to conduct an interview about family support for literacy. In 96% of the cases (69 out of 72), the child's mother completed the interview. The researchers asked 15 questions, asking about such things as the amount of time spent reading with the child, the nature of that interaction, the amount of time spent on other activities, and the mother's level of education. The researchers used a scale of 5, 6, or 7 points to score participants' responses. For example, the researchers assigned points for number of books in the home as follows: 1 point for fewer than 25, 2 points for 25–50, 3 points for 51–100, 4 points for 101–200, and 5 points for more than 200; for each reading strategy, they assigned 1 point if the strategy was never used, 2 points if it was used rarely, 3 points for sometimes, 4 points for more than half the time, and

5 points for almost always. The researcher added responses to these items to form 3 scores (see Appendix A for the questions included in each score). The score for Home Reading was based upon the number of books in the home, the frequency of the child being read to at home, the frequency of six reading strategies used with the child (e.g., identifying individual letter sounds or words, discussing word meaning or storyline), the frequency of the child reading at home alone or with others (2 questions) , and the age of shared reading onset (scored so that earlier shared reading received more points). The Nonreading score was derived from combined total of the relative frequency of the child's involvement in three non-reading activities: watching TV, playing outside, or playing inside. We based the third score, Mother's Education, on the following scale: completed elementary school (1 point), completed secondary school (2), completed trade school (3), completed college (4), and completed university (5).

Academic Self-Concept. We measured academic self-concept using a version of the Self Description Questionnaire (SDQ-I) (Marsh, 1988), developed by Marsh et al. (1991) for subjects at the kindergarten to Grade 2 levels. Although this test consists of three scales – academic self-concept, nonacademic self-concept, and general self-concept – we used only academic self-concept in the current study. This scale contains 24 positively worded, 5-point, Likert-scale items, 8 each in the areas of reading, mathematics, and general school self-concept. The researcher read each statement aloud to each child (e.g., "I am good at reading"). The child responded either yes or no, and then the researcher prompted further to determine the degree of this response. For instance, if the child said yes, he or she was asked "yes sometimes or yes always?"; if no, then "no sometimes or no always?" From these responses, the researcher assigned a score between 1 (for "no always") and 5 (for "yes always") for each item. If the child was undecided, the researcher gave a score of 3. Marsh et al. (1991) found the reliability scores for the three academic self-concept scales ranged from .81 to .84 for children aged 5 to 8 years.

Reading Achievement. We had five indicators of early reading achievement. We used three subtests of the *Woodcock Reading Mastery Tests – Revised* (Woodcock, 1987). In Word Identification, children pronounced real words; in Word Attack, they pronounced pseudowords; and in Passage Comprehension, they supplied missing words in short passages. We used raw scores for each of these variables. We formed a fourth reading score, Total Reading, by standardizing and then adding the scores from the three Woodcock subtests (thus this score had a mean of 0.0). We intended the Total Reading score to represent a broad composite of reading ability; it did not replace the three separate variables. The narrow age range of the subjects justified the use of raw scores. We obtained the fifth reading score,

Teacher Appraisal, by asking the four classroom teachers to rate the reading skill of each child involved in the study. They based their appraisal on the student's total reading performance as a Grade 1 student at that particular time in the school year. The rating scale was from 0 to 10, with 0 indicating a very poor reader and 10 indicating a very strong reader.

RESULTS

Table 1 shows means and standard deviations for each of the measures. For the three Woodcock subtests, the grade-level scores corresponding to the raw scores are 1.9 for Word Identification, 1.6 for Word Attack, and 1.7 for Passage Comprehension, yielding an average of 1.7. We administered the tests in early May of Grade 1, when the expected grade-level score was 1.8.

Table 2 arrays the correlations among the variables. The correlation between self-concept and the reading outcomes was significant; among family support variables, only Mother's Education had significant correlations (in the .20 to .26 range); and the two phonological processing tests

TABLE 1

Means and Standard Deviations for Predictor and Outcome Variables

Variable	N	Mean	SD
Self-Concept			
Reading Self-Concept	72	35.2	5.1
Math Self-Concept	72	33.4	6.1
General Self-Concept	72	32.8	5.9
Family Support for Literacy			
Home Reading	72	36.0	5.0
Nonreading	72	11.9	0.3
Mother's Education	72	3.0	1.2
Phonological Processing			
Blending Onset-Rime	72	11.4	3.8
Phoneme Elision	72	4.4	3.3
Reading			
Word Identification	68	32.9	17.1
Word Attack	68	10.2	7.9
Passage Comprehension	68	14.7	7.8
Total Reading	68	0.0	2.8
Teacher Appraisal	68	6.6	2.5

TABLE 2

Correlations Between All Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Reading Self-Concept	—											
2. Math Self-Concept	.52**	—										
3. General Self-Concept	.49**	.76**	—									
4. Home Reading	.31**	.24*	.23*	—								
5. Nonreading	.06	–.07	–.06	.07	—							
6. Mother's Education	–.10	.04	.06	.24*	–.17	—						
7. Blending Onset-Rime	.10	.03	–.07	.24*	.08	.31**	—					
8. Phoneme Elision	–.01	–.10	–.20*	–.04	.04	.22*	.38**	—				
9. Word Identification	.00	–.03	–.14	–.01	–.06	.26*	.64**	.55**	—			
10. Word Attack	.01	.07	–.11	–.07	.03	.26*	.57**	.51**	.80**	—		
11. Passage Comprehension	.06	.00	–.06	.03	–.02	.12	.59**	.52**	.87**	.74**	—	
12. Total Reading	.02	–.02	–.07	.03	–.00	.20	.67**	.52**	.90**	.86**	.88**	—
13. Teacher Appraisal	.13	.03	–.03	.16	–.19	.24*	.59**	.57**	.79**	.60**	.80**	.74**

Note. For variables 9 to 13, N = 68; for all other variables, N = 72.
* $p < .05$. ** $p < .01$

were significantly correlated with each of the reading measures (in the .50 to .66 range). Because the correlations for the self-concept scores were low, we were concerned about the internal reliability of these measures. We calculated the scale reliabilities (alpha coefficients) for reading, mathematics, and general to be .78, .81, and .81, respectively; these values are very close to those reported by Marsh et al. (1991).

We conducted a series of regression analyses, with each reading measure used in turn as the outcome variable, and with various combinations of the predictor variables, to examine every predictor for significance and to ensure that other predictors did not mask potential significant relationships. Because the results for the five dependent variables were very similar, only those for Total Reading are reported, though we mention variations in the results when they occurred.

In the first analysis, the eight predictor variables (two for phonological processing, three for family support, and three for academic self-concept) were entered into a regression equation with Total Reading as the outcome. This model (see Table 3) accounted for approximately 55% of the variability in reading achievement. The two phonological processing measures were the only significant variables. When we used alternative combinations of predictors, no other predictor was significant if the two phonological variables were in the equation. The two phonological variables by themselves accounted for 52.9% of the variance. The analyses with the other dependent variables yielded similar results, R^2 ranging from .48 to .56. The two phonological processing measures made significant contributions in every model. With all eight predictors in the equations, Home Reading had one significant effect (negative) in the Word Attack model, beta $= -.225$, $p < .05$, and Nonreading had one significant effect, again negative, in the teacher appraisal model, beta $= -.266$, $p < .01$.

To illustrate one of the simpler models, we report in Table 4 an analysis with five predictors. We retained the two phonological variables because they had been significant in every other analysis, but also included Home Reading, Mother's Education, and Reading Self-Concept. Home Reading was included because it came closest to the notion of family support for literacy; Mother's Education was included because of the evidence from previous studies and because of its significant correlation with several reading measures (see Table 2); and Reading Self-Concept was included because of its conceptual relevance to reading.

This model accounted for 54% of the variance in total reading achievement. However, only the two phonological processing variables made significant contributions to the model. We obtained similar results when the analysis was repeated using the other four measures of reading achievement as the outcomes. The total amount of variance accounted for by the

TABLE 3

Regression Analysis Predicting Total Reading Score From Eight Predictors

Predictor	Coefficient	Standardized Coefficient (beta)	t	p
Reading Self-Concept	−.019	−.036	−.323	.75
Math Self-Concept	−.026	−.057	−.408	.68
General Self-Concept	.053	.116	.817	.42
Home Reading	−.051	−.090	−.907	.37
Nonreading	−.579	−.068	−.751	.46
Mother's Education	−.132	−.058	−.578	.57
Blending Onset-Rime	.437	.606	5.915	.001
Phoneme Elision	.270	.320	3.230	.002
constant	2.877			

$N = 68$. $R^2 = .549$. $F(8,59) = 8.98$. $p < .001$

predictors ranged from 47% to 53%. In general, only the two measures of phonological processing (blending and elision) contributed significantly to the variance accounted for by the criterion variables. When we used a hierarchical regression approach, forcing different orders of entry for the predictors, Mother's Education yielded significant effects ($p < .05$) if it was included first, but the two phonological predictors were still significant when entered subsequently.

TABLE 4

Regression Analysis Predicting Total Reading Score From Five Predictors

Predictor	Coefficient	Standardised Coefficient (beta)	t	p
Reading Self-Concept	−.003	−.006	−.069	.94
Home Reading	−.054	−.095	−.977	.33
Mother's Education	−.062	−.027	−.286	.78
Blending Onset-Rime	.423	.585	5.893	.001
Phoneme Elision	.252	.300	3.140	.003
constant	−3.546			

$N = 68$. $R^2 = .539$. $F(5,62) = 14.52$. $p < .001$

DISCUSSION

This study assessed the predictive effects of phonological processing, family support, and academic self-concept, measured in the presence of each other at the beginning of Grade 1, on reading achievement at the end of Grade 1. The results are clear: phonological processing at the beginning of Grade 1 is a powerful predictor, and the two other groups of predictors have little discernible effect. This conclusion is limited, of course, by the nature of the study, and by when and how the variables were measured.

Phonological Processing

There has been some controversy about whether different aspects of phonological processing make unique contributions to early reading achievement (Wagner et al., 1993). The results of this study support existing research arguing that skill in phonological processing is essential for early reading success (e.g., National Reading Panel, 2000). The low correlation between the two (.383) and the significance of each as a predictor in the presence of the other suggests that the two are differentiated and important abilities in phonological processing. The correlation of blending (a measure of synthesis) with total reading achievement was .668, somewhat higher than the correlation for elision (a measure of analysis) with total reading achievement, which was .522. This is consistent with Perfetti et al.'s (1987) finding that synthesis tasks are better predictors of early reading than are analysis tasks, when these tasks were measured at the beginning of Grade 1.

Both of these phonological measures were oral, and neither involved reading. Inclusion of measures such as letter knowledge or letter-sound knowledge (Kirby & Parrila, 1999) would presumably have only increased the degree of prediction.

These findings indicate that two 5-minute tests early in Grade 1 can predict 50% of the variance in reading achievement at the end of the year. These tests, then, are an efficient and reliable method of identifying children at risk for reading difficulties; it is possible to carry out the screening assessment in kindergarten. Taken in conjunction with the literature on early instruction in phonological processing (e.g., Ball & Blachman, 1991; Hatcher, Hulme, & Ellis, 1994; Martinussen, Kirby, & Das, 1998), these results suggest that Grade 1 teachers, and perhaps kindergarten teachers, too, might do well to concentrate more on instruction in the phonological processes underlying early reading development.

Family Support for Literacy

Measures of family support for reading during early reading instruction in Grade 1 proved to be poor predictors of early reading achievement. Only Mother's Education was significantly correlated (around 0.2) with measures of reading achievement, and in the regression models even this measure was not a significant indicator of early reading achievement. The two other family-support measures each had only one significant effect, but these were negative and difficult to interpret. Given their weakness and scarcity, it may be best to see these as the result of chance factors.

Two considerations limit the degree to which these family support results should be generalized. First, all parents in this study had been encouraged by the classroom teachers to read to their children at home. Although this is hardly unusual, it may have eliminated the usual finding of substantial correlations between spontaneous home literacy factors and reading achievement (Crain-Thoreson & Dale, 1992; Kirby & Hogan, 2001). More generally, stronger relationships between family support or SES and achievement may be found in more diverse samples. Second, the parents in this study were asked about their current home literacy practices, whereas those in previous studies were asked about their practices before their children began school. It is possible that some parents of successful readers in Grade 1 had curtailed their joint reading activities at home, whereas some parents of very poor readers may have greatly increased their home literacy activities, thus altering the prior relationship between family support and reading achievement. Further study of family support is merited. The preschool age range may be most critical, and on-site observation may yield more predictive measures than self-report. Finally, future studies should consider how family factors contribute to phonological development.

Academic Self-Concept

Although self-concept has long been thought to contribute to reading achievement, our findings show that even a domain-specific measure does not predict early reading achievement in Grade 1. We know that academic self-concept and reading achievement are correlated by Grade 4 (e.g., Chapman, Tunmer, & Prochnow, 2000; Marsh, 1993), but since early reading success is strongly correlated with subsequent reading ability, the later correlations between self-concept and reading are possibly due to the influence of reading success upon academic self-concept. The self-concept measures we used yielded reliability estimates similar to those found by Marsh et al. (1991), so reliability in the sense of internal consistency cannot

be the issue. The measures may instead be unreliable in the sense of test-retest reliability, with the early Grade 1 estimates being poorly related to academic self-concept later in Grade 1. If this is the case, it casts doubt on the usefulness of such measures as predictors. Instead, these measures may not be valid indicators of young children's self-concepts; it is also possible that the construct of academic self-concept does not exist in Grade 1 children. Future research should investigate what causal role, if any, academic self-concept plays in the development of reading competence.

CONCLUSION

The findings of our study are consistent with much research emphasizing the importance of phonological processing for the development of reading competency, but they do not support the importance of either family support for literacy or academic self-concept. Family support for literacy may have been a poor predictor in this study because of how and when it was measured; thus our results should not be taken as evidence against the value of family support for literacy. There is no comparable explanation for the results not showing a relation between academic self-concept and reading. It is not clear to us what academic self-concept measures are measuring in Grade 1 children, but whatever it is, it was not related, in our sample, to later success in reading. Self-concept may be important in itself, but we found no indication that it leads to reading competence.

Any study is limited by its approach and methods. Our purpose was to examine predictive relationships, both as a step towards the fuller understanding of reading development and as part of a search for practical tools to identify children at risk for reading difficulties. Deeper understanding of reading and the causal factors that underlie it will come from many other types of studies, ones that can examine the roots of reading in more detail. These studies will investigate factors such as family support and phonological processing in far more detail and will employ a range of research methods. Such extensive investigations, however, are unlikely to have much direct practical value for screening children at the beginning of formal schooling. Our results indicate that a brief assessment of phonological skills would effectively identify those at risk for reading problems; the use of such methods would help to ensure that children who need help receive it as early as possible.

Those investigating phonological processes in learning to read may be encouraged by our results, for they show that the relationship between phonological processing and reading is not due to the covariation of these constructs with family support for literacy or self-concept, as measured here. Those studying family support for literacy may be advised to focus

on the preschool period, particularly on specific characteristics and behaviours rather than on broader factors such as socioeconomic status (Kirby & Hogan, 2001; Morrison et al., 1995), and on factors that promote phonological development. Those interested in the effects of self-concept on reading face the challenge of finding evidence of such a causal relationship.

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APPENDIX A

Blending Onset-Rime
The items in this measure were: m-ouse, s-ick, sh-eep, p-ark, l-ight, ch-air, h-ill, b-and, d-ance, sh-irt, st-ore, ch-ild, th-ird, ch-eck, and sh-op.

Phoneme Elision
The items in this measure were: no(te), see(d), ti(me), car(d), hea(t), goa(l), (b)at, (f)or, (m)an, (h)it, (p)in, (g)one, ti(g)er, dri(v)er, and s(w)ing.

Family Support for Literacy
The questions were assigned to 3 scales as follows (number of points per question in parentheses).
    Home Reading
        Number of children's books in home (5 points)
        Age of reading onset (7)
        Frequency of reading to child (6)
        Frequency of identifying individual words in reading to child (5)
        Frequency of identifying individual letter sounds in reading to child (5)
        Frequency of discussing meaning of words in reading to child (5)
        Frequency of discussing storyline in reading to child (5)
        Frequency of asking comprehension questions in reading to child (5)
        Frequency of discussing pictures in reading to child (5)
        Frequency of child reading alone (5)
        Frequency of child reading with others (5)
    Nonreading
        Frequency of watching TV (5)
        Frequency of playing outside (5)
        Frequency of playing inside (5)
    Mother's education
        Mother's level of education (5)