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CLINICAL FORUM

The Relationship Between Phonological Awareness and Reading: Implications for the Assessment of Phonological Awareness

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Abstract:

Purpose: Speech-language pathologists (SLPs) use phonological awareness assessments in many ways. This study examines the usefulness of these assessments in kindergarten and 2nd grade.

Method: Measures of phonological awareness and letter identification were administered in kindergarten, and measures of phonological awareness, phonetic decoding (i.e., nonword reading), and word reading were administered in 2nd and 4th grades to a sample of 570 children participating in a longitudinal study of reading and language impairments.

Results: A path analysis indicated that kindergarten measures of phonological awareness and letter identification provided information to the prediction of 2nd-grade reading. In 2nd grade, measures of reading offered information to the prediction of 4th-grade reading. Additionally, a reciprocal relationship was found between phonological awareness and word reading, with kindergarten phonological awareness predicting 2nd-grade word reading and, conversely, 2nd-grade word reading predicting 4th-grade phonological awareness.

Clinical Implications: Phonological awareness assessment provides information about reading in kindergarten but loses its predictive power at 2nd grade. At that time, phonological awareness and word reading become so highly correlated that phonological awareness does not add information to the prediction of 4th-grade reading.

Keywords: phonological awareness, assessment, reciprocal relationship, prediction, early reading

Speech-language pathologists (SLPs) are actively involved in the development of literacy skills and in the remediation of literacy problems (American Speech-Language-Hearing Association [ASHA], 2001). In particular, SLPs have an important role in the assessment of phonological awareness due to their knowledge of phonetics and phonological disorders (Catts, 1991). Phonological awareness has been shown to be a primary factor underlying early reading achievement (Ehri, et al., 2001). Additionally, deficits in phonological awareness have been linked to reading disabilities (Lyon, Shaywitz, & Shaywitz, 2003).

The assessment of phonological awareness during preschool and kindergarten provides critical insight into the skills that children use to learn to read (Adams, 1990). Lonigan, Burgess, and Anthony (2000) demonstrated that phonological awareness, when compared to many other predictors, was the most stable and robust indicator of later reading in a group of children who were followed from late preschool into kindergarten and first grade. In another data set, Catts, Fey, Zhang, and Tomblin (2001) found that a kindergarten measure of phonological awareness was one of five factors that predicted the presence of a reading disabil-

ity in second grade. Numerous other studies have documented the robust relationship between early phonological awareness and subsequent reading achievement (Calfee, Lindamood, & Lindamood, 1973; Lonigan, et al., 2000; Torgesen, Wagner, & Rashotte, 1994; Wagner et al., 1997).

Once children begin reading, however, the best indicator of current and future reading may simply be reading itself (Bell, McCallum, & Cox, 2003). This possibility has led reading researchers to question the usefulness of phonological awareness assessments once a certain level of reading achievement has been attained. Wagner and his colleagues (Wagner et al., 1997) considered this issue using a large, longitudinal data set. They examined the amount of information that a measure of phonological awareness could add to the prediction of reading once a measure of current word reading and vocabulary was considered. Results indicated that from kindergarten to second grade, phonological awareness predicted 23% unique variance in later word reading; from first to third, 8%; and from second to fourth, only 4%. The authors concluded that phonological awareness measures in the primary grades offered a small but statistically significant amount of information to the prediction of future word reading beyond that provided by a measure of current word reading. However, in a later review of this work, Torgesen (1999) concluded that the limited amount of information gained from the assessment of phonological awareness beyond second grade may not warrant the use of a phonological awareness assessment given the amount of time needed to administer, score, and interpret such an assessment.

The reduction in the amount of information offered by phonological awareness assessments once reading is underway may be explained, at least in part, by the reciprocal relationship between phonological awareness and reading. Initially, phonological awareness influences reading; but, once reading is underway, the process of learning to read influences phonological awareness. In support of the reciprocity between reading and phonological awareness, research has shown that reading instruction with an emphasis on decoding printed words highlights the sound structure of language and facilitates children's performance on tests of phonological awareness (Lundberg & Hoien, 1991; McGuinness, McGuinness, & Donohue, 1995; Perfetti, Beck, Bell, & Hughes, 1987). Because of this relationship, phonological awareness may become so highly correlated with word reading that it may offer little unique information to the prediction of reading once a measure of reading is available. At such time, tests of word reading may provide a majority of the information when predicting future reading, leaving no information to be accounted for by phonological awareness.

Study Questions

The present study investigated the usefulness of phonological awareness assessments in the prediction of reading in the early school grades. First, we sought to determine if phonological awareness, measured in kindergarten, would predict word reading in second grade beyond a measure of letter identification. Because most kindergarten children cannot decode words, a measure of letter identification was used in this grade as an indication of literacy experience. Indeed, letter identification has been found to be highly predictive of later word reading (see Scarborough, 1998, for a review). We hypothesized that both letter identification and phonological awareness would be significant predictors of second-grade word recognition.

Second, we sought to determine if phonological awareness, measured in second grade, would predict word reading in fourth grade beyond a measure of second-grade word reading. We predicted that second-grade phonological awareness would provide very little or no significant information toward the prediction of fourth-grade word reading once second-grade word reading was known. Related to this question, we also determined if a measure of second-grade nonword reading (i.e., phonetic decoding) would predict fourth-grade word reading beyond a measure of second-grade word reading. Similar to a measure of phonological awareness in kindergarten, phonetic decoding provides insight into the skills that children use to read words (Adams, 1990; Bell et al., 2003). We predicted that a second-grade measure of phonetic decoding would predict fourth-grade word reading beyond a measure of secondgrade word reading.

Finally, this study extends the work of Wagner et al. (1997) and others in several ways. First, we used a large, well-selected sample of children. Data from such a study add to the generalizability of findings to the population at large. Second, in our study, we evaluated the unique variance associated with phonetic decoding and phonological awareness in word reading. Previous studies have combined phonetic decoding with other word reading skills and have not allowed for the comparison of the unique contribution of phonetic decoding and phonological awareness to word reading.

Method

Participants

The participants in this investigation were a subsample of children who had taken part in an epidemiologic study of language impairments in kindergarten children (Tomblin, 1995). The epidemiologic study used a stratified cluster sample of more than 7,000 children, stratified by residential setting (i.e., rural, urban, suburban) and cluster sampled by school building. Out of this sample, 328 children with language impairment and/or nonverbal impairments in kindergarten consented to participate in a follow-up longitudinal investigation of language and reading development

1 Of the 328 children, 123 children had language impairment only (i.e., specific language impairment), 103 children evidenced nonverbal impairments only, and 102 children showed language and nonverbal impairments (i.e., nonspecific language impairment). For a detailed account of criteria for classification of these impairments, see Tomblin et al. (1997).

Table 1. Assessments used to measure phonological awareness, letter identification, phonetic decoding, and word reading.

Grade	*Construct*	*Assessment*
K, 2nd, 4th	Phonological awareness	Catts Deletion Task (Catts et al., 2001)
K	Letter identification	Letter Identification subtest of the Woodcock Reading Mastery Tests—Revised (WRMT–R; Woodcock, 1987)
2nd, 4th	Phonetic decoding	Word Attack subtest of the WRMT–R
2nd, 4th	Word reading	Word Identification subtest of the WRMT–R

K = kindergarten; 2nd = second grade; 4th = fourth grade.

(Tomblin, 1995).[1] Additionally, a random sample of those children without language impairments was recruited. The final longitudinal sample included 604 children (328 with language impairment; 276 unimpaired). All of the participants, regardless of language or nonverbal abilities, were monolingual English speakers with normal hearing and no history of significant emotional or neurological disorders. Furthermore, no child had been diagnosed with autism or mental retardation at the beginning of the longitudinal study. Over the course of the longitudinal study, 34 children left the study, leaving 570 children with complete data sets through fourth grade.

These 570 children comprised the sample for the present study.[2] Due to the participant selection procedure previously described, the sample contained higher percentages of children with language and nonverbal impairments than those found in the original epidemiologic study. Therefore, we employed a weighting procedure, described in the analysis section below, to ensure that our results were representative of the original epidemiologic sample.

Materials

In kindergarten, participants were administered tests of phonological awareness and letter identification, and in second and fourth grades, participants were administered tests of phonological awareness, phonetic decoding, and word reading. Table 1 provides a summary of the assessments described below and the grades at which these assessments were administered.

Phonological awareness. The phonological awareness task was a measure of syllable/phoneme deletion (Catts et al., 2001) that was adapted from Rosner's Auditory Analysis Test (Rosner & Simon, 1971). In this task, participants are asked to delete a syllable or phoneme from a word and say the remaining sound sequence. In kindergarten, the task consisted of 3 practice items and 21 test items. Thirteen of the items required deletion of the initial syllable in either a compound word (e.g., "Say baseball without the 'base'") or a two-syllable word (e.g., "Say baby without the 'ba'"). The remaining eight items required deletion of the first sound in a one-syllable word (e.g., "Say fat without the /f/"). In second and fourth grades, nine items were added to increase the task difficulty to a grade-appropriate level. Four of these new items required deletion of the final sound in a one-syllable word (e.g., "Say find without the /d/"), and five required deletion of a middle sound from a one-syllable word (e.g., "Say wives without the /v/"). In each grade, the task was discontinued after six consecutive errors. To quantify each participant's performance on the phonological awareness task in kindergarten, raw scores were converted to *z* scores based on the mean and standard deviation from the original study sample (N = 604). This procedure was also used in second and fourth grade (N = 570). The kindergarten version of this task may be found in its entirety in Catts et al. (2001).

Letter identification. Because relatively few kindergarten children can decode nonwords (Wagner et al., 1997), the Letter Identification subtest of the Woodcock Reading Mastery Tests—Revised (WRMT–R; Woodcock, 1987) was used in kindergarten as an early estimate of alphabetic knowledge and literacy experience. In this task, the participants were asked to name upper and lower case letters printed in various fonts. Standard scores were assigned using the grade-based assessment norms from the test manual because letter-name knowledge is largely dependent on instruction (Adams, 1990).

Word reading. To assess word reading in second and fourth grades, the Word Identification subtest of the WRMT–R was administered to each of the participants. In this task, the participants orally read real words, decreasing in frequency of occurrence from highly frequent words such as "go" to increasingly less frequent words such as "quench." Again, because of reliance on instruction, standard scores were assigned using the grade-based assessment norms from the test manual.

Phonetic decoding. In second and fourth grades, the Word Attack subtest of the WRMT–R was administered to measure phonetic decoding. This task required participants to orally decode nonwords increasing in length and complexity. The first and least complex item on the subtest requires the child to read the nonword "ree." An example of a more complex item is "untroikest." Standard scores were assigned using the grade-based assessment norms from the test manual because instruction plays a major part in learning to phonetically decode words (Adams, 1990).

2 Although our sample included missing data for 34 children due to attrition from kindergarten to second grade, a multiple EM imputation procedure was also employed as a secondary analysis to estimate these missing data. The results of the study were unchanged when using the data set containing the full sample of 604 children.

Table 2. Weighted descriptive statistics on all study variables at kindergarten, second, and fourth grades.

	M	SD	*Max*	*Min*
Kindergarten				
Phonological awareness	8.51	6.28	21.00	0.00
Letter identification	103.55	13.93	145.00	43.00
Second grade				
Phonological awareness	21.16	5.29	30.00	0.00
Phonetic decoding	94.26	16.79	129.00	44.00
Word reading	103.90	19.08	149.00	32.00
Fourth grade				
Phonological awareness	24.11	3.50	30.00	0.00
Phonetic decoding	93.79	16.22	133.00	28.00
Word reading	96.97	15.46	130.00	32.00

Procedures

Test administration. Testing was conducted by trained examiners with undergraduate or graduate degrees in speech-language sciences/pathology or education. The battery of tests was completed during two 2-hr sessions at each grade level—kindergarten, second grade, and fourth grade.

Weighting of scores. Table 2 shows the distribution of weighted scores for the measures in our analysis (N = 570). The phonological awareness tasks at each grade are presented as raw scores for ease of interpretation; the letter identification, word reading, and phonetic decoding tasks are represented by standard scores, with a mean of 100 and a standard deviation of 15.[3] As noted above, the sample of children used in this study had a higher prevalence of children with language impairments than the general population. To improve the representativeness of our data, we used weighted scores that took into consideration prevalence rates for language impairments and other characteristics in the general population; these data were taken from the original epidemiologic study (discussed in detail in Tomblin et al., 1997). Based on these data, each participant's scores were weighted according to the likelihood that a participant with his or her gender, language, and nonverbal IQ profile would have been part of the representative sample seen in the epidemiologic study. For example, the epidemiologic study estimated that boys with a language impairment and low nonverbal IQ composed 3.5% of the general population. In our sample (N = 570), however, these children composed 7.7%. To ensure that participants from this group did not contribute disproportionately to our results, their scores were adjusted by a constant that was equal to the expected prevalence of these children (3.5%) divided by their actual prevalence in our sample (7.7%; constant = .454). A similar procedure was used to weight the scores of other participants based on their specific characteristics. (For further details concerning the weighting procedure and evidence of its effectiveness, see Catts, Fey, Zhang, & Tomblin, 1999; Tomblin, Zhang, Buckwalter, & O'Brien, 2003.)

Results

Path Analysis

Path analysis was used to analyze the data because of its ability to examine complex relationships between multiple measures (Pedhazur, 1997). Path analysis is similar to regression analysis with one main exception. In path analysis, an estimate of measurement error for each measure can be included by using an estimate of the reliability of that measure. This error estimate allows for a more robust test of the relationships between measures when comparing analyses that assume no error in the measurements. Similar to regression analysis, path analysis determines the amount of unique variance that one measure accounts for in another. Whereas in regression, this unique variance is represented by a partial correlation, in path analysis, this unique variance is represented by a path coefficient. Using path analysis, models of both direct and indirect influence are constructed to represent hypothesized relationships among measures. Once a model shows a good fit to the data, based on the chi-square fit statistic, various relationships within the model may be examined.

Our proposed model, shown in Figure 1, involved measurement at three time points. In kindergarten, measures of phonological awareness and letter identification were entered into the model. In second and fourth grade, measures of phonological awareness, phonetic decoding, and word reading were entered. Initially, all measurements were proposed to be related to the measurements directly preceding them in time. Each specified relationship is indicated by a line ending in an arrow, which represents the direction of the relationship. For example, kindergarten phonological awareness was proposed to account for second-grade phonological awareness, phonetic decoding, and word reading. As shown in Figure 1, three lines originate from kindergarten phonological awareness predicting second-grade phonological awareness, phonetic decoding, and word reading, respectively. Double arrowed lines represent the covariance associated with measurements co-occurring in time (e.g., phonological awareness and letter identification in kindergarten).

For each specified relationship, a path coefficient is obtained and examined for significance using a z test. This statistic was used to determine if the path coefficient was significantly different from 0. If the path coefficient was not significantly different from 0, then the path was removed from the model. In Figure 1, only one path was removed because it was not statistically significant. That path is rep-

3 Table 2 shows that our sample (after weighting scores) performed above the normative mean (i.e., 100) on the Letter Identification subtest in kindergarten and the Word Identification subtest in second grade. However, the sample performed below the mean on the second- and fourth-grade measures of phonetic decoding and on the fourth-grade Word Identification subtest. The latter finding may be the result of our sample receiving reading instruction that involved less emphasis on phonetics than that found in the WRMT–R normative sample.

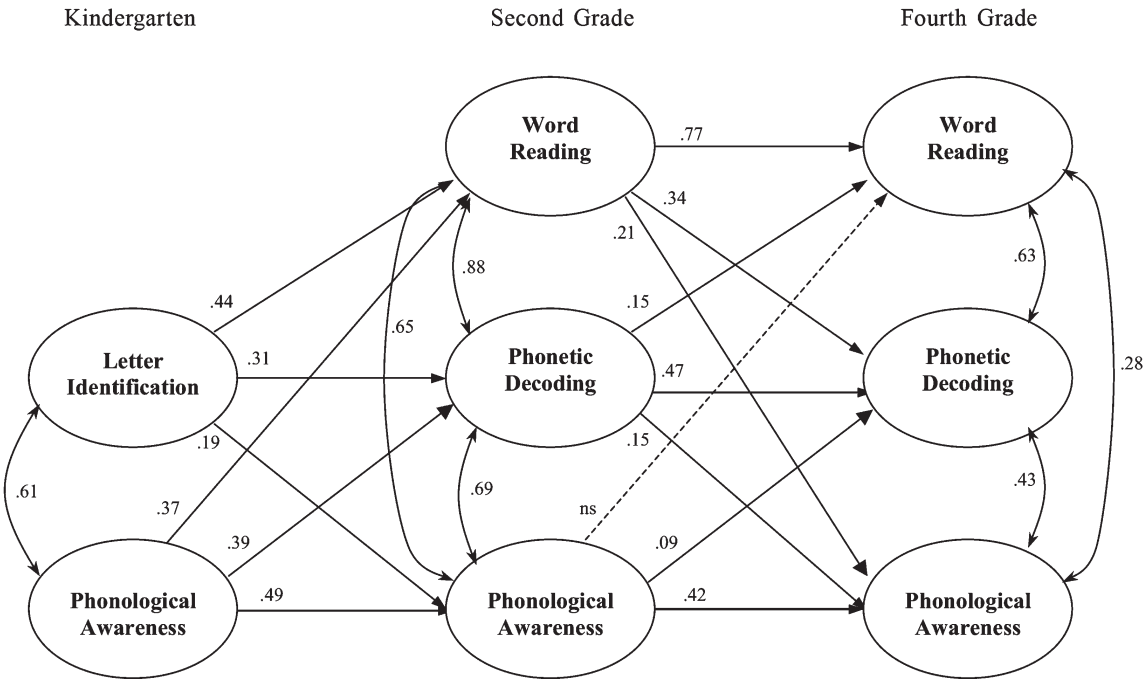

Figure 1. Path analysis of sample (N = 570); ns = not statistically significant.

resented by a dotted line. Paths may also be added to a model if they are found to be significant. In our model, no paths were added beyond the ones initially specified.

Model Statistics

The path model was tested using the covariance matrix associated with our measurements employing the LISREL 8.54 (Joreskog & Sorbom, 2003) program with maximum likelihood estimation. The correlations are shown in Table 3, with the split-half reliability for each measure shown on the diagonal. These reliabilities served as an estimate of measurement error. Model fit was assessed using the minimum fit function chi-square statistic (Joreskog & Sorbom, 2003). The chi-square statistic is the most familiar and stringent model statistic. Our final model (i.e., Figure 1) had a chi-square value of 10.34, with 7 degrees of freedom (p = 0.17). This statistic indicated that the data did not significantly deviate from the proposed model and that an excellent to outstanding fit of the model to the data was found (Joreskog & Sorbom, 2003).

Study Questions

The results for each study question will be described using a simplification of the model shown in Figure 1 (see Figure 2). First, we sought to determine if phonological awareness, measured in kindergarten, would predict word reading in second grade beyond a measure of letter identification. In line with our hypothesis, we found that a kindergarten measure of phonological awareness accounted for unique variance in second-grade word reading (β = .37; path 2) beyond that accounted for by letter identification (β = .44; path 1).

Table 3. Correlations and split-half reliabilities for the sample (N = 570).

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Phonological awareness, K	(.93)							
2. Letter identification, K	.48	(.94)						
3. Phonological awareness, 2nd	.58	.43	(.86)					
4. Phonetic decoding, 2nd	.54	.50	.71	(.91)				
5. Word reading, 2nd	.59	.62	.70	.88	(.97)			
6. Phonological awareness, 4th	.48	.38	.67	.63	.63	(.83)		
7. Phonetic decoding, 4th	.52	.46	.68	.84	.82	.69	(.89)	
8. Word reading, 4th	.55	.56	.67	.83	.90	.65	.87	(.91)

Split-half reliabilities for each measure are in parentheses on the diagonal; all correlations are significant at $p < .05$.

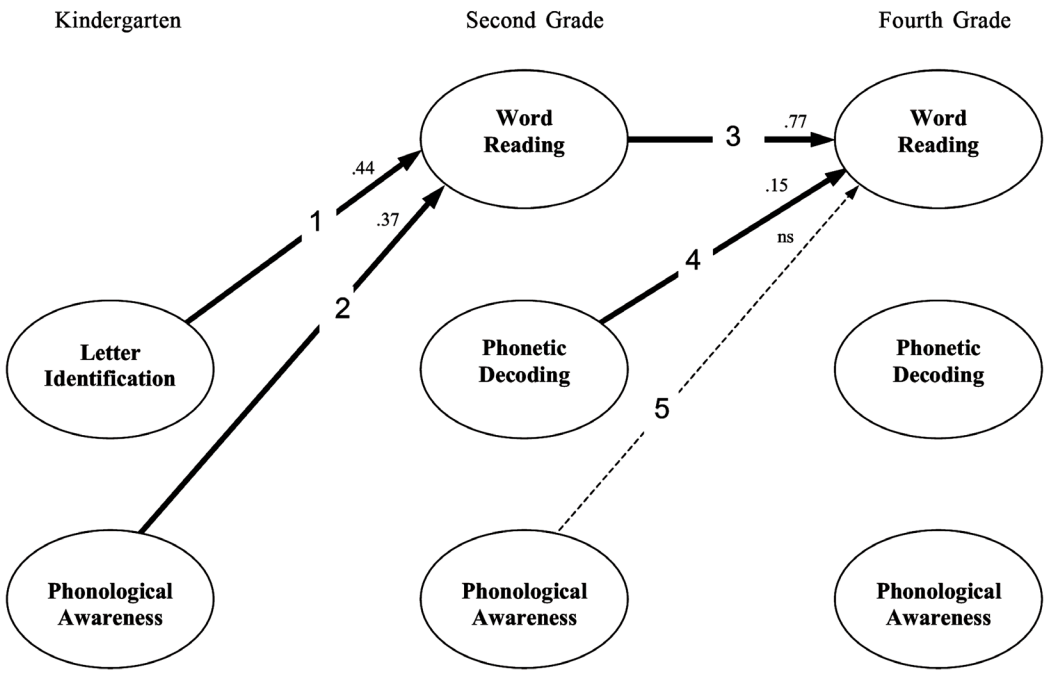

Figure 2. Path coefficients for kindergarten phonological awareness and letter identification and second- and fourth-grade phonological awareness, phonetic decoding, and word reading extracted from our path analysis shown in Figure 1.

Second, we examined whether phonological awareness, measured in second grade, would predict word reading in fourth grade beyond a measure of second-grade word reading. As predicted, a second-grade measure of phonological awareness added no information (β = ns; path 5) to the prediction of fourth-grade word reading beyond that provided by the second-grade measure of word reading (β = .77; path 3).

Next, we determined if a measure of second-grade phonetic decoding would predict fourth-grade word reading beyond a measure of second-grade word reading. We predicted that a measure of phonetic decoding would provide significant information to the prediction of fourthgrade word reading beyond that provided by a second-grade measure and this prediction was validated. Second-grade phonetic decoding predicted a small but significant amount of variance in fourth-grade reading (β = .15; path 4) beyond second-grade word reading (β = .77; path 3).

Considering that phonological awareness contributed significant information to the prediction of word reading from kindergarten to second grade but not from second to fourth, we examined the potential reciprocity between phonological awareness and word reading across these grades to better understand our results. We hypothesized that kindergarten phonological awareness would be more strongly related to second-grade word reading than kindergarten letter identification would be to second-grade phonological awareness. We expected that the inverse would be shown from second to fourth grade; that is, second-grade word reading would be more strongly related to fourth-grade phonological awareness than second-grade phonological awareness would be to fourth-grade word reading. This finding would shed light on the limited information offered by second-grade phonological awareness to the prediction of fourth-grade word reading by indicating that initially, phonological awareness influenced word reading and then, word reading influenced phonological awareness. Figure 3 contains data pertinent to this question. The results show that our hypothesis was confirmed. Kindergarten phonological awareness and second-grade word reading were more strongly correlated (β = .37; path 1) than kindergarten letter identification and secondgrade phonological awareness (β = .19; path 2; $\Delta\chi^2_{(1,\, n = 570)} = 14.52$, $p < .05$). In contrast, second-grade word reading and fourth-grade phonological awareness were correlated (β = .21; path 3), whereas second-grade phonological awareness and fourth-grade word reading were not significantly correlated (β = ns; path 4).

Finally, SLPs assess and treat children who have, or are suspected to have, deficient speech, language, and/or reading skills. In this study, we examined our questions using a sample of children with a wide range of skills, from high to low language functioning. We acknowledge that the majority of the children in our sample will not likely be evaluated by an SLP because the majority of our sample exhibited typical reading/language development. In an attempt to better approximate the children most likely to be seen by an SLP, we reexamined our study questions in two subsamples of below-average readers; one subsample included those who scored below the 40th percentile on the Oral Reading Accuracy Index of the Gray Oral Reading Tests—Third Edition (Wiederholt & Bryant, 1994), a measure of word reading, and the other subsample included a more impaired group who scored below the 25th percentile

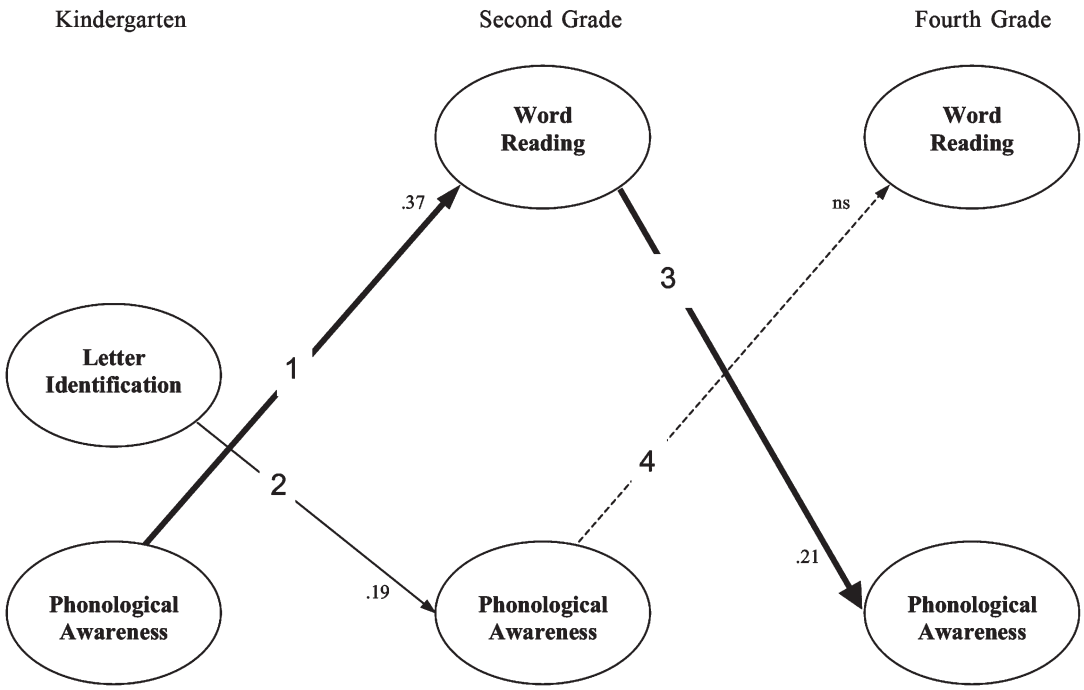

Figure 3. Path coefficients for kindergarten phonological awareness and letter identification and second- and fourth-grade phonological awareness and word reading extracted from our path analysis shown in Figure 1.

on the same measure. The results from these subsamples were essentially the same as those obtained using our full sample. Only one difference was apparent in the analyses using the subsamples: Kindergarten phonological awareness and second-grade word reading were no longer more strongly correlated than kindergarten letter identification and second-grade word reading. Overall, these findings indicate that our results are consistent with those of children at the lower end of the normal distribution (i.e., those likely to be seen by an SLP); although these findings do not directly determine if there is a level of word reading at which phonological awareness may still contribute unique variance to its prediction.

Discussion

This study investigated the usefulness of phonological awareness assessments in the prediction of word reading during the early school grades. We found that a measure of phonological awareness in kindergarten predicted secondgrade word reading beyond a measure of letter identification. This pattern was not the case from second to fourth grade, when a second-grade measure of phonological awareness did not provide unique information to the prediction of fourth-grade word reading beyond that provided by second-grade measures of word reading and phonetic decoding. In an attempt to understand the loss of unique information gained from phonological awareness in second grade, we examined the relationship between phonological awareness and word reading. We found that phonological awareness predicted word reading from kindergarten to second grade, whereas from second to fourth grade, this relationship reversed; second-grade word reading predicted fourth-grade phonological awareness. This finding was consistent with a reciprocal relationship between phonological awareness and word reading. These results have several clinical implications.

First, our findings converge with a large body of research indicating that the measurement of phonological awareness in kindergarten adds useful information to the prediction of word reading (Ehri et al., 2001). This information is beyond that which can be gained from other strong kindergarten literacy predictors such as letter identification. Therefore, measures of phonological awareness should be included when assessing kindergarten children to determine future reading outcomes and/or risk for reading disability. SLPs have the skills needed to assess and interpret measures of phonological awareness in kindergarten and should play a significant role in this process.

Second, our results indicate that beyond kindergarten (at least by second grade), a measure of phonological awareness may offer little unique information to the prediction of word reading. We found that by second grade, the best predictor of word reading is word reading itself. Therefore, rather than use a measure of phonological awareness at this time, a measure of word reading should be used to make predictions about future reading outcomes. Because we also found that phonetic decoding provided unique information beyond that obtained from word reading, a measure of this ability might also be included in assessments of reading outcome. Such a measure provides useful information concerning how children are using their orthographic knowledge and phonological awareness to read novel printed words.

Although this study specifically addressed the use of phonological awareness assessments when predicting word reading, the results could be extended to concurrent assessments directed at determining the underlying nature of a reading problem and/or assessing treatment progress. Using path analysis, we were only directly able to address issues of prediction. However, our model provides some suggestions concerning the possible nature of concurrent relationships. As shown in Figure 1, concurrent measures of phonetic decoding and word reading were more highly related than were those involving phonological awareness and word reading (.88 vs. .65 in second grade and .63 vs. .28 in fourth grade). Of course, these data do not speak to the unique contribution of concurrent measures of phonetic decoding versus phonological awareness to word reading. However, in an earlier study using these same data, we employed hierarchical regression analyses to examine concurrent relationships (Catts & Hogan, 2002). This study showed that concurrent measures of phonetic decoding accounted for a considerable amount of the unique variance in word reading, whereas phonological awareness added little or no unique variance at second and fourth grades.

Before proceeding, it should be noted that our results concerning phonological awareness assessment may be dependent on the way in which we measured phonological awareness. Recall that our measure was one involving syllable/phoneme deletion. This measure was chosen because of its close relationship to word reading ability (Torgesen et al., 1994). It is possible that if another measure of phonological awareness was used (e.g., phoneme segmentation), the results could have differed. Further research is necessary to address this issue.

The results of our study suggest that at least by second grade, measures of phonetic decoding may provide more unique information about concurrent word reading than will phonological awareness, as measured in this study. Again, the reason for this finding may be the reciprocal relationship between phonological awareness and reading. This relationship ensures that by second grade, measures of phonetic decoding and phonological awareness tap somewhat similar skills and knowledge. That is, measures of phonological awareness and phonetic decoding essentially become overlapping assessments, each providing information about orthographic and phonological knowledge and skills. However, because measures of phonetic decoding overlap more with word reading, such measures typically will be a better choice for reading-related assessments than will measures of phonological awareness. A test of phonetic decoding provides information about how a child uses his or her orthographic knowledge and phonological awareness to decode novel words. For example, a measure of phonetic decoding allows educators to determine if a child can decode simple consonant-vowel-consonant words but has trouble decoding more complex words—an ability directly related to early word reading. Additionally, such an assessment provides the opportunity to gain pertinent information regarding the child's phonological awareness. For example, the child may skip over a sound, leave off ending sounds, or have trouble blending sounds together to form a word because he or she lacks the necessary phonological awareness to do so. This type of information is relevant to determining the underlying nature of a reading disability and/or assessing treatment progress.

Even in light of our results and the above discussion, it is conceivable that phonological awareness probes may still be helpful to determine more specific intervention goals and assess treatment progress in second grade and beyond for some children. For example, when planning specific intervention goals, an SLP may suspect that a child has difficulty segmenting sounds in initial blends based on the types of words that the child incorrectly decoded on a phonetic decoding assessment (e.g., "blue" was read as "bue"). Further in-depth exploration of the child's ability to segment initial blends using a phonological awareness probe of this skill will likely aid in intervention planning. Likewise, an SLP working with a child to improve his ability to blend printed words containing stop consonants (e.g., "/b/ /o/ /t/ goes together to make 'boat'") may find that a probe of this skill offers important additional information about the effects of treatment beyond that provided by a test of word reading or phonetic decoding. These uses seem appropriate as long as the relationship between reading and phonological awareness is considered and the phonological awareness assessment (or probe) is not the primary assessment of reading outcomes for the reasons described above.

Even though phonetic decoding assessments have typically been administered by reading specialists, it is not outside of an SLP's scope of practice to administer and interpret such an assessment (ASHA, 2001). Tests of phonetic decoding measure children's knowledge of English orthography as a phonetic transcription, and in some cases, specific nonwords additionally assess morphological knowledge (e.g., "gaked" and "mancingful," from the WRMT–R Word Attack subtest). SLPs have phonetic transcription skills as well as knowledge of phonological development. These skills and knowledge provide the foundation for transcribing and analyzing decoding errors using information on sound contrasts, phonological processes, and sound development. Reading specialists and classroom teachers greatly enhance their ability to understand decoding breakdowns through collaboration with SLPs. As such, SLPs should collaborate with reading specialists and classroom teachers to enhance the understanding of word reading problems. This collaboration is necessary to provide the most effective assessment and treatment for children with reading disabilities (Snow, Scarborough, & Burns, 1999).

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