

Language Impairment, Parent–Child Shared Reading, and Phonological Awareness:

A Feasibility Study

Laura M. Justice
University of Virginia

Joan Kaderavek
University of Toledo

Ryan Bowles
Kevin Grimm
University of Virginia

This study evaluated the feasibility and outcomes of a parent-implemented phonological awareness (PA) intervention for young children with specific language impairment. The intervention was delivered within the context of 40 parent-child shared storybook reading sessions conducted over a 10-week period in the families' homes. Children in an experimental group ($n = 11$) completed a rhyme and alliteration task at the end of each storybook reading session; children in a comparison group ($n = 11$) completed an alternate vocabulary-building task. Evaluation of pre- and posttest PA performance showed differential group effects for rhyme but not alliteration. The magnitude of PA change during intervention was influenced by children's age and level of speech and language impairment. Parents provided favorable reports concerning their delivery of the intervention and demonstrated a high degree of fidelity to the task conditions. Future research directions are discussed.

Specific language impairment (SLI) describes a developmental impairment that affects between 7% and 14% of 4- to 5-year-old children (e.g., Beitchman et al., 1989; Tomblin et al., 1997). By definition, children with SLI have language impairment in the absence of associated cognitive, physical, or hearing disability. Numerous studies have shown young children with SLI to be particularly vulnerable for later difficulties in reading achievement (e.g., Aram, Ekelman, & Nation, 1984; Bird, Bishop, & Freeman, 1995; Bishop & Adams, 1990; Catts, 1993; Catts, Fey, Tomblin, & Zhang, 2002; Catts, Fey, Zhang, & Tomblin, 1999; Flax et al., 2003; Rescorla, 2002; Scarborough, 1990). In a seminal work, Aram and Nation (1980) found that more than one third of preschoolers with SLI subsequently experienced school-age reading problems. More recently, in a retrospective examination, Catts et al. (1999) found that more than half of 183 second-grade poor readers exhibited significant deficits in oral language skills at kindergarten. In a separate report, these researchers (Catts et al., 2002) also found that kindergartners with SLI were about 6 times more likely than nonimpaired children to exhibit reading disability by fourth grade. Accordingly, experts have classified SLI as one of the most robust early indicators

of a child's later risk for reading disability (McCardle, Scarborough, & Catts, 2001).

A significant body of research has identified weaknesses in phonological awareness as a critical locus of disability for individuals with SLI as well as those with reading disability (RD) (Bryant, Maclean, & Bradley, 1990; Byrne & Fielding-Barnsley, 1989; Lonigan, Burgess, Anthony, & Barker, 1998; Stahl & Murray, 1994; for review, see Justice & Schuele, 2003; National Reading Panel, 2000; Stanovich, 2000). Phonological awareness, or PA, describes children's implicit and explicit sublexical sensitivity to the sound structure of language. Implicit awareness has been observed in children as young as 2 years of age, with use of tasks that require children to identify when two words share common phonological structures (e.g., rime units; see Chaney, 1992; Lonigan et al., 1998). Between 4 and 7 years of age, children gradually acquire higher and more explicit levels of sensitivity (e.g., Adams, 1990; Bradley & Bryant, 1983; Lonigan et al., 1998), moving from an awareness of phonological structures at the syllable level (e.g., onset rime distinctions) to the phonemic-level skills needed for phoneme blending and phoneme segmentation (Gillon, 2004).

Address: Laura M. Justice, University of Virginia, Preschool Language and Literacy Lab, Box 400873, Charlottesville, VA 22904-4873;
e-mail: lmj2t@virginia.edu

Numerous studies have shown children with SLI to have literacy difficulties specific to the attainment of PA (Boudreau & Hedberg, 1999; Catts, 1993; Fazio, Naremore, & Connell, 1996; Gillam & Johnston, 1985; Magnusson & Naucler, 1990, 1993) and have shown a link between early skills in PA and later reading achievement (Catts et al., 1999, 2002). Early delays in the attainment of PA present a likely barrier to reading development in children with SLI and provide some explanation for the increased prevalence of reading disability among children with SLI (e.g., Flax et al., 2003).

EVIDENCE-BASED PRACTICE, PA, AND SLI

There is an increasing emphasis on identifying evidence-based intervention strategies that effectively address the emergent literacy needs of young children with SLI, specifically in the area of PA. Interventions focused solely on oral language goals without explicit attention to PA have little effect on improving the literacy skills of children with SLI (Gillon, 2000; Gillon & Dodd, 1995; Justice, Chow, Capellini, Flanagan, & Colton, 2003). Although numerous studies have reported facilitative effects of PA intervention for young children (e.g., Schneider, Roth, & Ennemoser, 2000; Ukrainetz, Cooney, Dyer, Kysar, & Harris, 2000), relatively few have involved children with communicative impairments. Exceptions include works by Gillon (2000; Gillon & Dodd), Justice and colleagues (2003), O'Connor, Jenkins, Leicester, and Slocum (1993), van Kleeck, Gillam, and McFadden (1998), and Warrick, Rubin, and Rowe-Walsh (1993).

Gillon (2000) compared the outcomes of a 20-hr PA intervention to traditional language intervention focused on grammar and vocabulary for 5- to 7-year-old children with expressive phonological impairments (a particular variant of SLI). Clinician-directed one-on-one PA activities focused on awareness of rhymes, beginning and final sounds, and segmenting and blending phonemes. Children's scores on several measures of PA and early reading skills increased relative to children receiving traditional language therapy, suggesting an explicit focus on PA goals to be a potentially important element of effective language interventions. As an alternative to one-on-one treatment models, successful outcomes from classroom-based PA interventions were reported by O'Connor et al. (1993), van Kleeck et al. (1998), and Warrick et al. (1993). O'Connor and associates (1993) evaluated a 7-week program of PA instruction focused on sound identification and manipulation for children with SLI, conducted in the preschool setting by classroom teachers. Children participating in the program demonstrated significant gains on several PA measures. A similar program was evaluated by van Kleeck et al. (1998), who demonstrated that PA activities within the preschool cur-

ricula positively influenced PA for children with speech and language disorders. Justice, Chow, et al. (2003) studied the impact of *explicit* versus *implicit* early literacy intervention for 18 preschoolers exhibiting multiple risk factors, including SLI for 12 of the children. In a 6-week explicit condition, children completed activities deliberately focused on PA (e.g., rhyming and beginning-sound identification activities), whereas in the 6-week implicit condition, children participated in literature-based activities that included exposure to phonological concepts but without direct instruction (e.g., listening to storybooks with rhyming patterns). The intervention sessions were delivered collaboratively by a reading specialist and speech-language pathologist. This article showed explicit, didactic targeting of PA goals to have greater facilitating effects relative to the implicit approach.

This growing body of work shows that PA skills may be facilitated for children with language impairments in clinical and classroom contexts using carefully structured explicit activities delivered by well-trained teachers and specialists. On the one hand, such findings are not particularly surprising, given that scientists have repeatedly shown PA interventions to have a strong and readily replicable effect for typical learners. The National Reading Panel's 2000 report located 52 studies showing the effect of PA instruction on reading performance, resulting in Pressley's (2002) lament of researchers who continue to study PA interventions because they are so readily replicable and likely to result in significant outcomes, thereby increasing the likelihood of publication.

On the other hand, demonstrating the effect of PA and other literacy interventions for children with SLI and other exceptionalities remains an important area of study for developmental disabilities researchers seeking to inform early childhood practices. An intervention that is effective for typical children may not be effective for children with exceptionalities, as shown by the literature base on dialogic reading. Dialogic reading is a strategy used to promote young children's oral language and emergent literacy skills, and impact studies have shown this approach to have positive benefits for syntactic, lexical, and early literacy development in typical and at-risk populations (e.g., Whitehurst et al., 1988, 1994). However, when this approach has been studied specifically for children with language impairment, effects are considerably attenuated (Crain-Thoreson & Dale, 1999; Dale, Crain-Thoreson, Notari-Syverson, & Cole, 1996). The same holds true when studying the effects of PA interventions for children with exceptionalities, which are not as robust as those seen with typical learners (National Reading Panel, 2000). Moreover, there is clear evidence that a number of children will resist treatment effects (Torgesen, 2000) or may require more intense instructional paradigms to improve PA ability (O'Connor,

Notari-Syverson, & Vadasy, 1996). This being the case, it is our belief that continued research on various models of PA intervention for children with exceptionalities is needed to identify those approaches most amenable to these youngsters' specific needs and strengths.

AIMS OF THE PRESENT WORK

The study described here was conducted to characterize the potential effectiveness of *home-based, parent-implemented PA intervention* for young children with SLI. Home-based, parent-implemented interventions have demonstrated effectiveness for promoting children's oral language development (e.g., Crain-Thoreson & Dale, 1999; Fey et al., 1994; Girolametto, Pearce, & Weitzman, 1996; Whitehurst et al., 1988) and other aspects of emergent literacy development, such as print awareness (e.g., Justice & Ezell, 2000, 2002; Saint-Laurent, Giasson, & Couture, 1998). Fey and colleagues (1994) argued that alternatives to clinician-directed interventions should be considered to promote the generality and breadth of treatment effects and to increase parental access to effective intervention. Enlisting parents as intervention agents is endorsed by policymakers (Snow, Burns, & Griffin, 1998) and is considered a viable alternative to clinician-directed center- or classroom-based treatments, which can be time-consuming, costly, and sometimes difficult for families to access. Accordingly, parent-implemented PA interventions require empirical scrutiny to determine if they do, in fact, provide a viable adjunct to current treatment options.

In the present research, the treatment package used by parents targeted children's abilities in recognizing and producing rhymes and beginning sounds, which represent areas of significant difficulty for children with language impairment (Boudreau & Hedberg, 1999). Parents implemented the PA tasks during one-on-one parent-child storybook readings over a 10-week period. Storybook reading was selected as an intervention context for several reasons. First, storybook reading has been shown to be a powerful context in which to enhance the print awareness and oral language skills of at-risk children and is increasingly used as an intervention context (e.g., Justice & Ezell, 2002; Whitehurst et al., 1988; Whitehurst et al., 1994). Second, delivery of PA intervention via shared storybook reading may have particular value for children with SLI, given the highly routinized and contextualized nature of this activity (McFadden, 1998). Experts have encouraged professionals who work with children with SLI to use storybook reading as a means for delivering PA interventions (Hoffman, 1997). Although the effectiveness of using the storybook reading context to deliver PA interventions has been documented for typically developing preschoolers (Ukrainetz et al.,

2000), it has not been studied for children with developmental disabilities.

We characterize the present research as a *feasibility study*, to place it as an exploratory and early step in a potential line of programmatic research focused on PA intervention within the home environment. Feasibility studies emphasize internal validity and documentation of treatment effects and are conducted to evaluate "the clinical viability of an untested intervention component or package" prior to fully powered randomized studies (Fey, 2002). Because home-based PA interventions have yet to be empirically examined for children with developmental disabilities, feasibility studies are needed to characterize intervention effects on children's PA skills, document whether parents are able to carry out the intervention, and determine whether children enjoy and tolerate the intervention (Fey, 2002). In the present study, we carefully scripted parental implementation of the PA tasks, considering that should the PA intervention be found efficacious, various approaches of parental training and implementation would then warrant study. Our specific research aims were fourfold: (1) to document PA growth for preschoolers with SLI over a 10-week period of regular parent-child home storybook reading, (2) to document the added benefits of integrating PA activities into book reading for a 10-week period, (3) to determine child characteristics most predictive of intervention outcome, and (4) to determine parental fidelity to and perceptions of the intervention methods.

METHOD

Participant Description

Twenty-two pre-kindergarten children (18 boys, 4 girls) with language impairment participated. The children ranged in age from 45 to 74 months, with a mean age of 5 years 2 months ($SD = 8.8$ months). All children were native English speakers and resided in homes in which English was the primary language spoken. Twenty children were Caucasian and 2 were Asian American. The families are best described as lower to upper middle class, and 21 of the 22 children resided in two-parent households. All but 1 of the mothers held a high school diploma, and 14 mothers had completed college (with 6 holding a 2-year degree and 8 holding a 4-year or advanced degree). Of the 21 fathers for whom educational information was available, all but 3 held a high school diploma, and 12 had completed college (with 2 holding a 2-year degree and 10 holding a 4-year or advanced degree).

Children were recruited through speech-language pathologists working in rural, suburban, and urban settings in two states. Eligibility for this study was determined through individual assessments conducted by one of two licensed speech-language pathologists (i.e., the

TABLE 1. Characteristics of Child Participants

Group and /variable	M	SD	Range
Experimental group (<i>n</i> = 11)			
Chronological age (in months)	57.1	7	47–71
Receptive language	93	12.9	80–116
Expressive language	83.3	3.6	79–91
Speech intelligibility	29	28	2–81
Comparison group (<i>n</i> = 11)			
Chronological age (in months)	61.5	8.8	45–74
Receptive language	92.2	14.5	77–122
Expressive language	75.7	4.9	67–82
Speech intelligibility	32	36	1–99

Note. *N* = 22. Language scores represent standard scores from the receptive and expressive subtests of the *Test of Early Language Development* (Hresko et al., 1991). Speech intelligibility score represents percentile rank on the *Goldman-Fristoe Test of Articulation* (Goldman & Fristoe, 1986).

first two authors). To be selected as a participant, children were required to receive a standard score of 85 or below (i.e., at least -1 SD) on the receptive and/or expressive subtest of a standardized measure of oral language proficiency, the *Test of Early Language Development* (TELD; Hresko, Reid, & Hammill, 1991). Fourteen children (64%) exhibited expressive SLI (i.e., a score of 85 or lower on the expressive subtest of the TELD), whereas the other 8 children (36%) exhibited mixed SLI (i.e., a score of 85 or lower on the receptive and expressive subtests of the TELD). Additionally, 13 (59%) of the children evidenced problems with speech intelligibility, as indicated by a percentile rank in the bottom quartile on the *Goldman-Fristoe Test of Articulation* (GFTA; Goldman & Fristoe, 1985), a measure of intelligibility at the single-word level. Participant characteristics are presented in Table 1.

Eligibility procedures were used to rule out SLI occurring as a secondary impairment. All children (a) passed a bilateral hearing screening at 25 or 30 dB (depending on ambient noise level at time of testing) at 500, 1000, 2000, and 4000 Hz; (b) received a standard score of 80 or higher on the matrices subtest of the *Kaufman Brief Intelligence Test* (KBIT; Kaufman & Kaufman, 1990), or, for two children younger than 4 years of age, demonstrated age-appropriate symbolic play skills based on the Linder (1993) *Transdisciplinary Play-Based Assessment* (TPBA; see Note 1); and (c) had no known history of gross sensory or neurological impairment, as indicated by a parental questionnaire regarding their children's developmental history. Eligibility on these measures clarified that no child was experiencing language impairment as a function of hearing loss, general developmental delay or mental retardation, or neurological impairment (e.g., autism).

Group Assignment

Following affirmation of their eligibility, children were randomly assigned to an experimental or comparison group, each composed of 11 children. Equivalency of the two groups was examined post hoc for the following variables: chronological age, oral language proficiency (composite language score from the TELD), and nonverbal intelligence (standard score on the KBIT). Group equivalency was determined using a series of independent-samples *t* tests, which showed that the two groups did not substantially differ for chronological age, $t(20) = .131$, $p = .21$; oral language proficiency, $t(20) = -1.42$, $p = .17$; or nonverbal intelligence, $t(18) = 0.25$, $p = .78$.

General Procedure

After eligibility procedures were conducted, children were individually pretested to establish baseline/pretest PA. Within 1 week of pretest, parents were provided an orientation to the book-reading intervention by one of the first two authors. The orientation was conducted as follows.

First, parents were provided 10 storybooks and a reading schedule based on four storybook readings per week for a 10-week period. The storybooks used in the intervention represented a variety of developmentally appropriate genres and included both rhyming books and narrative picture books. Four of the books included features to promote children's active involvement in the reading sessions (e.g., lift-the-flap). The storybooks were provided to parents in five sets of 2 books each; each set was given in a sealed envelope marked with the 2-week segment during which it was to be read. Parents were instructed to read each book four times during the 2-week period in which it was scheduled. Books were read in the

TABLE 2. Storybook Titles and PA Target Words

Title (author, year)	PA target words (rhyme/alliteration)
Weeks 1–2	
<i>A Squirrel's Tale</i> (Fowler, 1983) ^a	box/pet
<i>The Gigantic Turnip</i> (Tolstoy & Sharkey, 1999)	mouse/corn
Weeks 3–4	
<i>It's the Bear</i> (Alborough, 1994) ^a	fly/book
<i>The Blue Balloon</i> (Inkpen, 1989)	log/key
Weeks 5–6	
<i>The Right Number of Elephants</i> (Sheppard, 1990)	man/gum
<i>There's a Mouse About the House</i> (Fowler, 1983b) ^a	rat/doll
Weeks 7–8	
<i>The Day Jimmy's Boa Ate the Wash</i> (Noble, 1980)	cake/boat
<i>Where's Tim's Ted?</i> (Whybrow, 1999) ^a	dig/ham
Weeks 9–10	
<i>The Awful Aardvarks Go to School</i> (Lindbergh, 1997) ^a	drink/nose
<i>There's A Dragon in My School</i> (Tyler & Hawthorn, 1996) ^a	four/sun

Note. PA = phonological awareness.

^aBook features a rhyming pattern.

same order across individual families. Table 2 provides the storybook titles and sequence of reading.

Second, parents were provided instructions and materials for audio-recording home reading sessions. Each parent was provided a battery-powered handheld tape recorder and five audiotapes and was instructed to record all sessions in their entirety. Parents were also provided stamped, addressed cassette mailers for returning audiotapes to research personnel at the end of each 2-week segment; each submission thus included eight reading sessions.

Third, instructions for conducting individual reading sessions were described for each parent. Specifically, parents were instructed to read the storybooks with their children in the way they normally read at home. At the end of each storybook reading, parents were asked to help their children complete two tasks. These tasks were printed on two "task cards" placed in a pocket on the inside back cover of each storybook. Specific task instructions differed for experimental and comparison group parents.

Experimental Group Task. Parents in the experimental group were trained to engage their children in two PA tasks at the end of each storybook reading. The tasks were explicitly described on two cards placed in a pocket in the back of each storybook. One task involved rhyme awareness, whereas the other involved beginning-

sound awareness. The tasks were implemented in a "search and find" manner, whereby children were given a target word by their parents (provided on the task card in print with an accompanying picture) and were helped to find another word in the book sharing specific phonological similarities with that target. The rhyme task cards featured a labeled picture (e.g., mouse) and the printed instruction "Can you find a word that rhymes with [mouse]?" Similarly, the beginning-sound cards featured a labeled picture (e.g., corn) and the printed instruction "Can you find a word starting with the same sound as [corn]?" In selecting rhyme and alliteration target words from the books, we selected single-syllable words that were concretely illustrated in the storybooks. For the alliteration words, we selected only words starting with singleton consonants. The target words are presented in Table 2.

The parent training was conducted in families' homes in 15-min individual sessions with one of the first two authors. The trainer explained the goal of the tasks (e.g., to help your child develop rhyming skills), followed by a modeling of each of the tasks for the parent. Parents then practiced the tasks with the examiner using the first book of the program and received feedback until they delivered the tasks with 100% accuracy, which averaged one or two trials per task for most parents. Given that the parents' tasks were scripted on the cards provided, training focused primarily on providing parents with as-

sistance in helping their children complete the tasks. The trainers explained to parents that these tasks might be difficult for their children to accomplish and that they were to give their children as much help as needed to achieve success, such as modeling the correct response, providing adequate wait time, and withdrawing support over time as children gained competence.

Comparison Group Task. At the end of each storybook reading, parents in the comparison group also completed two “search and find” tasks that focused on vocabulary building. Like the PA tasks, these comparison tasks were described on two task cards placed in a pocket at the end of each storybook. Each task card featured a labeled, illustrated item (e.g., doll) and the printed instruction “Can you find a [doll] in this book?” The words selected for the comparison vocabulary tasks were all nouns that were clearly depicted in the storybook illustrations. The words were different from those used in the PA sessions.

The parent training for the comparison group was similar to that of the experimental group. Training was conducted in families’ homes in 15-min individual sessions with one of the first two authors. The trainer explained the goal of the tasks (e.g., to help your child develop knowledge of new words), followed by a modeling of the tasks for the parent. Parents then practiced the tasks with the examiner using the first book of the program and received feedback until tasks were delivered with 100% accuracy. Like the experimental tasks, parents’ tasks were scripted on the cards provided with each book; thus, training focused primarily on providing parents with assistance in helping their children complete the tasks, using such techniques as modeling the correct response, providing adequate wait time, and withdrawing support over time in response to children’s changing competence on the tasks.

Measures

Measures included assessment of children’s PA at pre- and posttest and examination of parental perceptions regarding the intervention at posttest.

PA Assessment. We individually administered each child a battery of informal criterion-referenced measures of PA at pre- and posttest. These measures were adapted from the extant literature to examine both detection and production of two early indicators in the development of PA: rhyme and alliteration (beginning sounds). All measures commenced with simple instructions, demonstration, and at least two practice items with corrective feedback. No praise, reinforcement, or corrective feedback was given during testing, with the exception of

praise for on-task behavior as needed. All pictured stimuli were named by the examiner to control for vocabulary skill (see Note 2).

1. *Rhyme detection.* In this task, adapted from Chaney (1992), the child was introduced to a puppet named Zack and was told that Zack only likes words rhyming with his name. The child was then presented with a series of 8 illustrated target words (e.g., *book, crack, sack*) and for each was asked to tell whether Zack liked or did not like the word. Eight points were possible.
2. *Rhyme production.* In this task, adapted from Maclean, Bryant, and Bradley (1987), the child was provided a series of 18 single-syllable illustrated target words (e.g., *fox, cat, pie*) and was asked to produce a word rhyming with the target. Eighteen points were possible.
3. *Alliteration detection.* In this task, adapted from Chaney’s (1992) protocol, the child was introduced to a puppet named Max and was told that Max only likes words that start with /m/, like his name. A series of 8 illustrated target words (e.g., *worm, milk, mom*) were then presented, and the child was asked to tell whether Max liked or did not like each word. Eight points were possible.
4. *Alliteration production.* In this task, also adapted from Maclean et al. (1987), the child was provided a series of 18 single-syllable illustrated target words (e.g., *pot, door, bear*) and was asked to produce a word starting with the same sound as each target. Eighteen points were possible.

Parental Perception of Intervention Effectiveness.

Parents’ perceptions regarding various elements of the home-based intervention program were evaluated using a five-item questionnaire developed for the purpose of this study. The questionnaire was administered to both experimental and comparison group parents. Questionnaire items examined parents’ enjoyment of the reading sessions and the storybooks, as well as parental perceptions regarding how useful the sessions were to their children’s development and how much their children enjoyed the sessions. Parents responded to each item using a 5-point Likert-type scale (1 = *not at all*, 5 = *very much*). Parents completed the questionnaire during their children’s posttest assessment. Parents were asked to complete the questionnaire anonymously and to answer each question as accurately as possible.

Treatment Fidelity

Parents recorded their four home-based reading sessions per week using the cassette tapes and tape recorder provided. One tape was provided for each 2-week period, for a total of five possible audiotape submissions per parent. Each tape contained up to eight separate storybook reading sessions (four per week for each of the two books). These were forwarded to project staff by parents at the end of each 2-week segment using cassette mailers. Ninety-six tapes (out of a possible 110) were returned, encompassing 768 home reading sessions. To ensure that parents implemented the home reading program as instructed, 310 (40%) of the 768 submitted reading sessions were randomly selected and analyzed. Trained coders listened to each selected reading session in its entirety and coded it for three possible points: (a) Was the storybook read in its entirety? (0/1 point); (b) was Task 1 implemented according to the task card instructions? (0/1 point); and (c) was Task 2 implemented according to the task card instructions? (0/1 point).

RESULTS

Results are presented pursuant to the four objectives of this study:

1. to document PA growth for preschoolers with SLI over a 10-week period of regular parent-child home storybook reading,
2. to document the added benefits of integrating PA activities into book reading for a 10-week period,
3. to determine child characteristics most predictive of intervention outcome, and
4. to determine parental fidelity to and perceptions of the intervention methods.

Children's raw scores on the four PA tasks at both pretest and posttest are presented in Table 3. Prior to conducting analyses, we used data reduction procedures to reduce the number of dependent variables from eight pretest/posttest scores to four, given our small sample size of 22 children. We converted each of the original eight scores to z scores using across-time pooled standard deviations. Then, we summed the two pretest rhyme and two posttest rhyme measures to create pretest and posttest rhyme composite variables representing both detection and production. We did the same for the two alliteration measures, creating pretest and posttest alliteration composites. The composite scores were then converted into z scores using the across-time pooled standard deviation. Because of the small sample size and the study's exploratory goals, in all analyses we set the alpha to .10 to lessen Type II error.

PA Growth for Comparison Book-Reading Sessions

Our experimental design provided us the opportunity to estimate the amount of PA growth over 40 home-based parent-child shared reading sessions for 11 preschoolers with SLI. The comparison treatment group participated in 10 weeks of storybook reading, with guided activities focusing on vocabulary rather than PA skills. Some of the books, however, included rhyme and alliteration features in the text. Figure 1 depicts the amount of change in rhyme and alliteration composite scores for these 11 children from pretest to posttest. The mean change for rhyme was 0.14 of a standard deviation unit ($SD_{\text{change}} = .79$) and 0.40 for alliteration ($SD_{\text{change}} = 1.13$). A paired-samples t test on the composite scores showed that pretest and posttest scores were not significantly different for rhyme, $t(10) = 0.60$ ($p = .56$), or alliteration, $t(10) = 1.17$ ($p = .27$). This finding shows that PA growth over

TABLE 3. Pretest- and Posttest Raw Scores (Percentage Correct) on Dependent Measures by Group

Measure	Group	Pretest		Posttest	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Rhyme					
Detection	Experimental	47	20	61	25
	Comparison	65	28	67	30
Production	Experimental	15	29	41	45
	Comparison	31	40	38	39
Alliteration					
Detection	Experimental	55	18	58	14
	Comparison	60	21	63	19
Production	Experimental	03	04	09	15
	Comparison	06	10	13	24

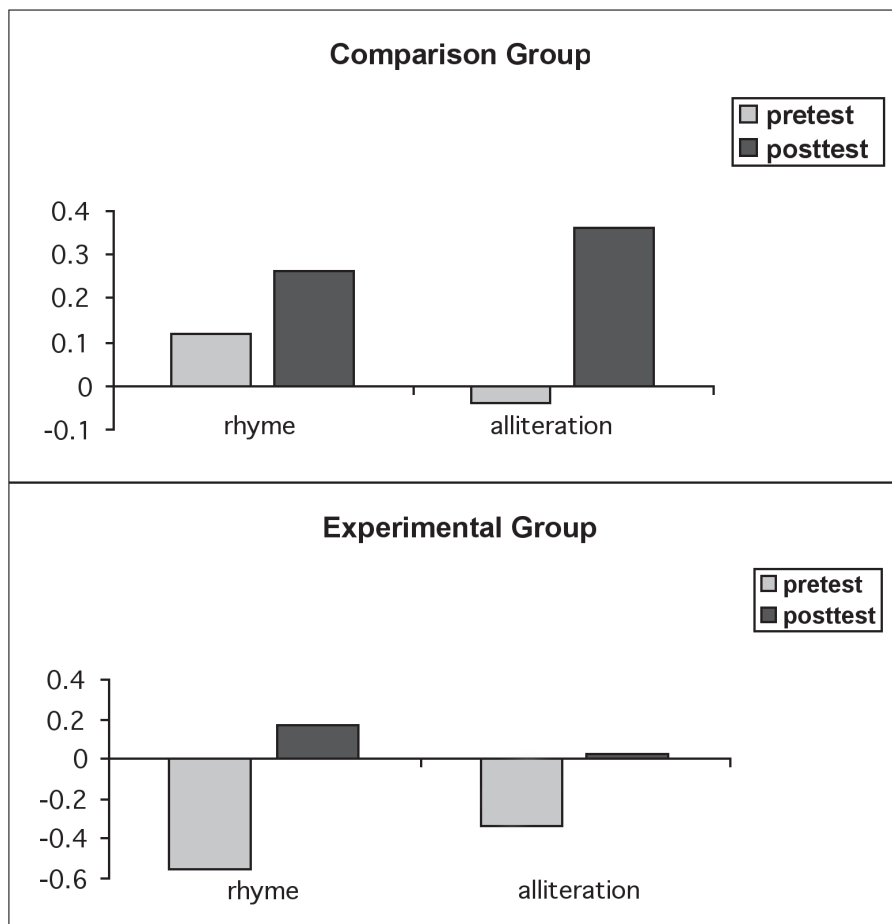


FIGURE 1. Pretest to posttest change in the rhyme and alliteration composite z scores for comparison group children ($n = 11$) and experimental group children ($n = 11$).

40 shared reading sessions for comparison group children was modest.

PA Growth During Experimental Book-Reading Sessions

As we did with the comparison group in the previous section, we studied the magnitude of PA gains for the 11 children in the experimental group specifically (see Figure 1). The mean change for rhyme was 0.72 of a standard deviation unit ($SD_{\text{change}} = .71$) and 0.38 for alliteration ($SD_{\text{change}} = 1.06$). A paired-samples t test on the composite scores showed that pretest and posttest scores were significantly different for rhyme, $t(10) = 3.39$ ($p < .01$), but not for alliteration, $t(10) = 1.18$ ($p = .27$). Comparing change for the experimental group relative to the comparison group suggests that the experimental conditions accelerated children's rhyme awareness four-fold over the comparison condition, whereas no acceleration occurred for alliteration.

To directly compare the magnitude of change across the two groups, we conducted a repeated measures multivariate analyses of variance (MANOVA) with group as the between-participants variable, time as the within-participants variable, and the pretest and posttest rhyme and alliteration composite scores as the dependent variables. The repeated-measures MANOVA provides a direct test of change over time across the two groups. The test statistics showed a significant time effect for rhyme, $F(1, 20) = 7.34$, $p = .01$ ($\eta_p^2 = .27$), but not for alliteration, $F(1, 20) = 2.77$, $p = .11$ ($\eta_p^2 = .12$), and a time by group interaction for rhyme to favor the experimental group, $F(1, 20) = 3.30$, $p = .08$ ($\eta_p^2 = .14$). The time by group interaction for alliteration was not significant, $F(1, 20) < .01$, $p = .96$ ($\eta_p^2 = 0$).

Predictors of Child Outcome

In these analyses, three indices were explored as possible predictors of the magnitude of PA change over the 40

TABLE 4. Predicting PA Intervention Outcome

Predictor	Regression coefficient (SE)	β	<i>p</i> value
Predicting rhyme change			
Pretest rhyming score	-0.717 (0.221)	-0.92	< 0.01
Chronological age	0.059 (0.023)	0.61	0.02
Oral language skill	0.042 (0.018)	0.45	0.03
Speech intelligibility	-0.144 (0.533)	-0.06	0.79
Predicting alliteration change			
Pretest alliteration score	-1.029 (0.330)	-0.76	< 0.01
Chronological age	0.070 (0.027)	0.53	0.02
Oral language skill	0.029 (0.023)	0.23	0.22
Speech intelligibility	1.710 (0.718)	0.50	0.03

Note. Caution should be exercised when interpreting the regression weights associated with the pretest scores, because the outcome variable was created in part from the pretest variable. Therefore, the regression weights reflect partially true correlation, and partially shared measurement error. β is the standardized regression coefficient. PA = phonological awareness.

reading sessions considering both experimental and comparison group children: chronological age, oral language skill (composite language score from the TELD), and speech intelligibility (percentile rank on the GFTA). These predictors were selected on the basis of recent arguments concerning their potential contribution to PA development in typical and at-risk children (e.g., Boudreau & Hedberg, 1999; Justice et al., 2003; Justice & Ezell, 2002; Magnusson & Naucler, 1993; Nathan, Stackhouse, Goulandris, & Snowling, 2004). The extant literature has yet to clarify the relative contribution of these variables; thus, no a priori hypotheses concerning the predictive power of specific variables were advanced, and the three variables were entered into regression models simultaneously. Two multiple regression analyses were conducted so as to separately study rhyme and alliteration outcome.

In the first analysis, gain scores created by subtracting pretest rhyme from posttest rhyme were regressed onto the three predictors. Pretest rhyme was also included in the regression to remove baseline differences. The predictors (viz., age, oral language, speech intelligibility) and pretest rhyme together accounted for 52% of the variation in rhyme outcome, $F(4, 17) = 4.65, p = .01$. The parameter estimates are presented in Table 4. Age and oral language had significant positive effects on the child's rhyme outcome independent of pretest rhyming score and speech intelligibility, indicating that older children and children with better language skills made greater gains in rhyme over the 10-week intervention period.

The regression analysis was then repeated with change in alliteration as the outcome variable. Results

are also presented in Table 4. The regression yielded a multiple correlation (R^2) of .70, $F(4, 17) = 4.04, p = .02$. Age and speech intelligibility were significant positive predictors of alliteration change, showing that older children and children with greater speech intelligibility gained more on the alliteration measure.

Parental Fidelity to and Perceptions of the Intervention

As an initial inquiry into the use of parent-implemented, home-based intervention for addressing the PA needs of children with SLI, it seemed of particular importance to examine fidelity of implementation. As noted earlier in this article, 96 tapes out of a possible 110 were returned by parents, consisting of 768 reading sessions. Of these, 41% ($n = 314$) were randomly selected and coded for reading of the storybook and task implementation. Each session was scored for three possible points: one point was scored when the book was read in its entirety, and one point was scored for each task implemented according to the task instructions. Fidelity coding showed that for 100% of sessions ($n = 314$), the storybook was read in its entirety. Coding also showed that both tasks were implemented in 287 (91%) of the 314 sessions analyzed. Of the 27 sessions in which one or both tasks were not implemented accurately, 24 occurred in the comparison group and 3 occurred in the experimental group. A two-way contingency table analysis examined differences between the two groups for the proportion of sessions achieving fidelity. The chi-square test statistic was not significant, $\chi^2(4, N = 152) = .38, p = .98$, showing there

TABLE 5. Parental Responses to Questionnaire by Group

Questionnaire item	Experimental group	Comparison group
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
1. How much did your child enjoy the reading sessions?	4.7 (.5)	4.6 (.69)
2. How much did you (the parent) enjoy the reading sessions?	5.0 (.0)	4.5 (.85)
3. How much did the reading sessions help your child's language skills?	3.4 (.88)	3.8 (.92)
4. How much did your child enjoy the books used in the reading sessions?	4.9 (.33)	4.9 (.32)
5. How likely would you be to do a program like this again?	4.9 (.33)	4.8 (.42)

Note. Parents rated their perceptions on a 5-point Likert-type scale (1 = *not at all*, 5 = *very much*).

to be no difference between the two groups in fidelity of implementation.

An additional aim was to examine parents' perceptions regarding methodology and outcome. Questionnaires were completed by 19 of the 22 parents (10 comparison, 9 experimental). Table 5 shows parental responses to the five questionnaire items by group. These data suggest that both parents and children enjoyed the storybook reading sessions and the reading materials that were central to this investigation. To a lesser extent, these data suggest that parents viewed the storybook reading sessions as helpful to their children's language development. Independent-samples *t* tests were used to compare parental perceptions across the two groups for the five questions. Only the comparison for Question 2 (How much did you [the parent] enjoy the reading sessions?) was significant, $t(17) = 1.76$, $p = .096$, with parents in the experimental group providing relatively higher ratings.

DISCUSSION

The present article describes a feasibility study documenting the potential value of home-based, parent-implemented intervention as a means for meeting the PA needs of children with SLI. Feasibility studies represent an important early step in programmatic intervention research by evaluating the clinical viability of an untested intervention component or package. If outcomes of feasibility research are positive, then research should progress to larger-scale efficacy and effectiveness studies.

In the following sections, we consider five major findings from this research:

1. Parent-implemented PA intervention accelerates children's rhyme awareness.

2. Parent-implemented PA intervention has little differential impact on alliteration awareness.
3. Implicit exposure to phonological concepts through storybook reading has little impact on children's PA.
4. Children's age and oral language skills moderate PA growth over time.
5. Parents and children view shared reading interventions favorably.

To summarize the first major finding, repeated participation in parent-guided PA tasks by children with SLI was shown to accelerate children's rhyme awareness. Children in the experimental group made significant gains in rhyme from pretest to posttest, an effect that was not present for the comparison group children. This finding indicates that parent-implemented PA intervention warrants further investigation as a possible means to deliver early literacy interventions for children with SLI specifically and children with developmental disabilities more generally. Future research is needed to further examine processes associated with impact (e.g., quality of task implementation by parents, children's persistence and engagement in PA tasks), strategies to improve impact for individual children, and the maintenance of effects over time. An additional need is further studies that compare different parental training approaches and intervention programs for their differential effects on children's PA performance.

Our second major finding was that the PA intervention had little effect on children's alliteration. Children in both the comparison and the experimental group made similar gains in alliteration from pretest to posttest, corresponding to about two fifths of a standard deviation. We are unable to elucidate from our research design whether the storybook reading sessions them-

selves improved children's alliteration skills or whether these gains reflect developmental maturation, as we did not include a no-treatment comparison group. Nonetheless, we are intrigued by the finding that experimental group children's participation in explicit alliteration activities did not result in an acceleration of skills over the comparison group, and we believe the explanation for this finding resides in the hierarchical, developmental nature of PA growth. Anthony and colleagues recently showed that typical children's sensitivity to phonological patterns proceeds from syllable-level mastery (e.g., rhyme awareness) to onset-rime-level mastery (e.g., beginning-sound awareness) (Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003). Considering that children's rhyme awareness was underdeveloped at the start of our study, it is plausible that we would not see an acceleration of alliteration awareness until after a threshold of syllable-level skill and rhyme awareness is achieved. Future investigation of children's growth trajectories in syllable- and onset-rime-level skills for a longer intervention period will be useful for testing this hypothesis in clinical populations.

Our third major finding relates to the magnitude of PA growth achieved by children in the comparison group, who, like those in the experimental group, also completed 40 shared reading sessions with their parents over a 10-week period. Our data provide an enlightening glimpse into the amount of PA growth that occurs during frequent home-based book reading that does not include an explicit focus on PA but—importantly—does include implicit exposure to rhyme concepts. Of the 10 books used during home reading, 5 featured rhyming patterns, indicating regular rhyme exposure through storybooks for the children in 20 of 40 reading sessions. Nonetheless, children's rhyme gains corresponded to only .14 of a standard deviation unit, which is considered negligible as an index of effect size (Cohen, 1988). We interpret these findings as showing that PA growth is not a natural outcome of shared reading interactions between parents and their children and, moreover, that explicit rather than implicit attention to the phonological structure of language is required to accelerate children's rhyme awareness.

The fourth major finding of this study resulted from delineation of those child characteristics most predictive of intervention outcome. Descriptive studies in recent years have begun to explore the contribution of oral language proficiency, including speech production skills and expressive phonological abilities, to the achievement of PA for children with SLI (e.g., Bird et al., 1995; Bishop & Adams, 1990; Catts et al., 1999; Magnusson & Naucler, 1993; Nathan et al., 2004). In the present study, regression analyses showed children's age, oral language, and speech intelligibility to explain unique, significant portions of the variance in intervention change for rhyme

and alliteration. When parceling out the effects of baseline PA skills, age and general oral language proficiency contributed uniquely to the variance in rhyme outcome, whereas age and speech intelligibility contributed uniquely to variance in alliteration outcome. The positive associations between age and intervention change suggested that older children made greater growth relative to younger children for both rhyme and alliteration. Speech intelligibility and language proficiency also appear to support children's growth. Although the exact nature of these interrelationships will need to be borne out in future studies, they suggest that different intervention strategies may be required for younger children and for those experiencing significant difficulties with oral language skills, including intelligibility.

As for the fifth finding of this study, we found that parents reported notably positive regard for the intervention methodology, providing unequivocally high ratings concerning their own and their children's enjoyment of the storybook reading sessions. Additionally, the parents conducted the intervention with a high degree of fidelity, an important consideration given the demands of the home-based intervention. We found no differences between the comparison and experimental groups in their fidelity to the intervention. As a feasibility study, this finding is significant, given that parents in this study completed a demanding schedule that involved taping 40 storybook reading sessions with their children over a 10-week period. Investigation of fidelity showed that most parents did not deviate from this schedule. Additionally, there were few appreciable differences between experimental and comparison group parents in their perceptions of the intervention. This finding suggests that parent-child shared storybook reading may provide an appealing and welcome context for conducting interventions for young children with SLI. Researchers have argued this point previously, as storybook reading tends to be a context that is meaningful, interesting, and motivating to the preschool child (Kadavek & Justice, 2002; McFadden, 1998; Watkins & Bunce, 1996).

Several limitations and future research directions should be noted. The first limitation involves the lack of an untreated control. All of the parents and children participating in this study completed 40 parent-child shared storybook readings differing only in use of experimental tasks. Without pre- and posttest PA data from an untreated control group, it is not possible to isolate the influence of the parent-implemented PA tasks from the overall effects that might be associated with children's participation in storybook reading. Future research involving an untreated control group will be informative for determining the influence of parent-child shared storybook reading interactions with and without an explicit PA focus to children's PA outcomes.

The second limitation involves the potential influence of parents' reading style and task implementation skill on the intervention outcome. Although parental fidelity in implementing the tasks was evaluated, we did not qualitatively examine the manner in which parents executed the tasks or supported their children's attempts in the PA activities. It may be that some parents were particularly skilled in scaffolding their children's task attempts, whereas other parents were less skilled. Over the course of 40 shared reading sessions, such differences would have likely influenced children's PA task performance and developmental gains. Future studies that closely examine associations between parental scaffolding behaviors and children's treatment outcomes are warranted.

A third limitation involves the sample participants. Involving only 22 children and their parents, the sample size for this initial feasibility study was small. The small sample size may have attenuated the statistical power available for hypothesis testing. In addition, there was considerable heterogeneity among the children in age and language proficiency, two variables appearing to be associated with intervention outcomes. In contrast, our sample was generally homogenous in several other aspects, including ethnicity, linguistic background, and SES. The extent to which our findings may be generalized is therefore unknown. Replication and extension of this work with more diverse samples of children would be particularly informative.

In sum, the present study provides an important first step in programmatic evaluation of home-based, parent-implemented programs for improving PA in children with SLI. Effective models of PA intervention are greatly needed by professionals serving young children with SLI, given that early indicators of PA have been decisively linked to later reading outcomes (for a review, see Scarborough, 1998). A number of scholars (e.g., McFadden, 1998; Snow et al., 1998) have argued that adult-child shared storybook reading should be explored as a potentially powerful context through which to promote young children's emergent literacy skills. In this regard, the present findings are important for guiding both practice and research concerning PA. Although it is important to involve parents in early childhood language interventions, it is necessary that the facilitative effects of specific parental involvement techniques be evaluated for their clinical value. Future research should clarify how parents can most effectively contribute to PA interventions that support successful literacy development for children with SLI. ♦

AUTHORS' NOTES

1. Financial support for this project was provided by a New Investigator Award from the American Speech-Language-Hearing Association to the first author.

2. The authors would like to thank Heidi Justice and Marie Ireland, both of whom assisted with participant recruitment.

NOTES

1. We considered age-appropriate symbolic play skills to be present, per the TPBA protocol, for children who used imaginary objects in play, such as acting out sequences with miniature toys (e.g., farm; see Linder, 1993).
2. We also administered children two oddity tasks: rhyme oddity and alliteration oddity. These tasks asked children to identify one of three words that did not rhyme (e.g., *cat*, *bat*, *bell*) and to identify one of three words that did not start with the same sound (e.g., *pin*, *peg*, *tree*). The children's performance at pretest for both measures did not exceed chance, at 33%, indicating a floor effect. We therefore did not use these measures in the present impact study.

REFERENCES

- Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.
- Alborough, J. (1994). *It's the bear!* Cambridge, MA: Candlewick Press.
- American Speech-Language-Hearing Association. (2001). Roles and responsibilities of speech-language pathologists with respect to reading and writing in children and adolescents (position statement, executive summary of guidelines, technical report). *ASHA Supplement*, 21, 17-27.
- Anthony, J. L., Lonigan, C. J., Driscoll, K., Phillips, B. M., & Burgess, S. R. (2003). Phonological sensitivity: A quasi-parallel progression of word structure units and cognitive operations. *Reading Research Quarterly*, 38, 470-487.
- Aram, D. M., Ekelman, B., & Nation, J. E. (1984). Preschoolers with language disorders: 10 years later. *Journal of Speech and Hearing Research*, 27, 232-244.
- Aram, D. M., & Nation, J. E. (1980). Preschool language disorders and subsequent language and academic difficulties. *Journal of Communication Disorders*, 13, 159-170.
- Beitchman, J., Hood, J., Rochon, J., Peterson, M., Mantini, T., & Majumdar, S. (1989). Empirical classification of speech/language impairment in children: Identification of speech/language categories. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 112-117.
- Bird, J., Bishop, D. V. M., & Freeman, N. H. (1995). Phonological awareness and literacy development in children with expressive phonological impairments. *Journal of Speech and Hearing Research*, 38, 446-462.
- Bishop, D. V. M., & Adams, C. (1990). A prospective study of the relationship between specific language impairment, phonological disorders and reading retardation. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 31, 1027-1050.
- Boudreau, D. M., & Hedberg, N. L. (1999). A comparison of early literacy skills in children with specific language impairment and their typically developing peers. *American Journal of Speech-Language Pathology*, 8, 249-260.
- Bradley, L., & Bryant, P. E. (1983). Categorizing sounds and learning to read—A causal connection. *Nature*, 301, 419-421.
- Bryant, P., Maclean, M., & Bradley, L. (1990). Rhyme, language, and children's reading. *Applied Psycholinguistics*, 11, 237-252.
- Byrne, B., & Fielding-Barnsley, R. (1989). Phonemic awareness and letter knowledge in the child's acquisition of the alphabetic principle. *Journal of Educational Psychology*, 81, 313-321.
- Catts, H. W. (1993). The relationship between speech-language impairments and reading disabilities. *Journal of Speech and Hearing Research*, 36, 948-958.
- Catts, H. W., Fey, M. E., Zhang, X., & Tomblin, J. B. (1999). Language

- bases of reading and reading disabilities: Evidence from a longitudinal investigation. *Scientific Studies of Reading*, 3, 331–362.
- Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language, and Hearing Research*, 45, 1142–1157.
- Chaney, C. (1992). Language development, metalinguistic skills, and print awareness in 3-year-old children. *Applied Psycholinguistics*, 13, 485–514.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Crain-Thoreson, C., & Dale, P. S. (1999). Enhancing linguistic performance: Parents and teachers as book reading partners for children with language delays. *Topics in Early Childhood Special Education*, 19, 28–39.
- Dale, P. S., Crain-Thoreson, C., Notari-Syverson, A., & Cole, K. (1996). Parent-child book reading as an intervention technique for young children with language delays. *Topics in Early Childhood Special Education*, 16, 213–235.
- Fazio, B. B., Naremore, R. C., & Connell, P. J. (1996). Tracking children from poverty at risk for specific language impairment: A 3-year longitudinal study. *Journal of Speech and Hearing Research*, 39, 611–624.
- Fey, M. E. (2002, March 1). *Intervention research in child language disorders: Some problems and solutions*. Paper presented at the 32nd Annual Mid-South Conference on Communicative Disorders, Memphis, Tennessee.
- Fey, M. E., Cleave, P. L., Ravida, A. I., Long, S. H., Dejmaj, A. E., & Easton, D. L. (1994). Effects of grammar facilitation on the phonological performance of children with speech and language impairments. *Journal of Speech and Hearing Research*, 37, 594–607.
- Flax, J. F., Realpe-Bonilla, T., Hirsch, L. S., Brzustowicz, L. M., Bartlett, C. W., & Tallal, P. (2003). Specific language impairment in families: Evidence for co-occurrence with reading impairments. *Journal of Speech, Language, and Hearing Research*, 46, 530–543.
- Fowler, R. (1983a). *A squirrel's tale*. Tulsa, OK: EDC Publishing.
- Fowler, R. (1983b). *There's a mouse about the house*. Tulsa, OK: EDC Publishing.
- Gillam, R. B., & Johnston, J. R. (1985). Development of print awareness in language-disordered preschoolers. *Journal of Speech and Hearing Research*, 28, 521–526.
- Gillon, G. T. (2000). The efficacy of phonological awareness intervention for children with spoken language impairment. *Language, Speech, and Hearing Services in the Schools*, 31, 126–141.
- Gillon, G. T. (2004). *Phonological awareness: From research to practice*. New York: Guilford Press.
- Gillon, G. T., & Dodd, B. (1995). The effects of training phonological, semantic, and syntactic processing skills in spoken language on reading ability. *Language, Speech, and Hearing Services in Schools*, 26, 58–68.
- Girolametto, L., Pearce, P., & Weitzman, E. (1996). Effects of lexical intervention on phonology of late talkers. *Journal of Speech, Language, and Hearing Research*, 40, 338–348.
- Goldman, R., & Fristoe, M. (1985). *Goldman-Fristoe test of articulation*. Circle Pines, MN: American Guidance Service.
- Hoffman, P. R. (1997). Phonological intervention within storybook reading. *Topics in Language Disorders*, 17(2), 69–88.
- Hresko, W. P., Reid, K., & Hammill, D. D. (1991). *Test of early language development*. Austin, TX: PRO-ED.
- Inkpen, M. (1989). *The blue balloon*. Hong Kong: Hodder and Stoughton.
- Justice, L. M., Chow, S. M., Capellini, C., Flanigan, K., & Colton, S. (2003). Emergent literacy intervention for vulnerable preschoolers: Relative effects of two approaches. *American Journal of Speech-Language Pathology*, 12, 1–14.
- Justice, L. M., & Ezell, H. K. (2000). Stimulating children's emergent literacy skills through home-based parent intervention. *American Journal of Speech-Language Pathology*, 9, 257–268.
- Justice, L. M., & Ezell, H. K. (2002). Use of storybook reading to increase print awareness in at-risk children. *American Journal of Speech-Language Pathology*, 11, 17–29.
- Justice, L. M., & Schuele, M. (2003). Phonological awareness: Description, assessment, and intervention. In J. Bernthal & N. Bankson (Eds.), *Articulation and phonological disorders* (5th ed., pp. 376–406). New York: Allyn & Bacon.
- Kaderavek, J. N., & Justice, L. M. (2002). Shared storybook reading as an intervention context: Promises and potential pitfalls. *American Journal of Speech-Language Pathology*, 11, 395–406.
- Kaufman, A. S., & Kaufman, N. L. (1990). *Kaufman brief intelligence test*. Circle Pines, MN: American Guidance Service.
- Lazer, J., Goodson, B., Bernstein, L., & Price, C. (2001). *National evaluation of family support programs final report: Volume A, The meta-analysis*. Cambridge, MA: Abt Associates.
- Lindbergh, R. (1997). *The awful aardvarks go to school*. New York: Puffin.
- Linder, T. (1993). *Transdisciplinary Play-Based Assessment*. Baltimore: Brookes.
- Lonigan, C. J., Burgess, S. R., Anthony, J. L., & Barker, T. A. (1998). Development of phonological sensitivity in 2- to 5-year-old children. *Journal of Educational Psychology*, 90, 294–311.
- Lundberg, I., Frost, J., & Peterson, O. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly*, 23, 263–284.
- Maclean, M., Bryant, P., & Bradley, L. (1987). Rhymes, nursery rhymes, and reading in early childhood. *Merrill-Palmer Quarterly*, 33, 255–281.
- Magnusson, E., & Naucler, K. (1990). Reading and spelling in language-disordered children—linguistic and metalinguistic prerequisites: Report on a longitudinal study. *Clinical Linguistics & Phonetics*, 4, 49–61.
- Magnusson, E., & Naucler, K. (1993). The development of linguistic awareness in language-disordered children. *First Language*, 13, 93–111.
- McCardle, P., Scarborough, H., & Catts, H. (2001). Predicting, explaining, and preventing children's reading disabilities. *Learning Disabilities Research & Practice*, 16, 230–239.
- McFadden, T. (1998). Sounds and stories: Teaching phonemic awareness in print contexts. *American Journal of Speech-Language Pathology*, 7, 5–13.
- Moran, M. J., & Fitch, J. L. (2001). Phonological awareness skills of university students: Implications for teaching phonetics. *Contemporary Issues in Communication Science and Disorders*, 28, 85–90.
- Nathan, L., Stackhouse, J., Goulandris, N., & Snowling, M. J. (2004). The development of early literacy skills among children with speech difficulties: A test of the “critical age hypothesis.” *Journal of Speech, Language, and Hearing Research*, 47, 377–391.
- National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Report of the subgroups*. Washington, DC: National Institute of Child Health and Development.
- Noble, T. H. (1980). *The day Jimmy's boa ate the wash*. New York: Puffin.
- O'Connor, R., Jenkins, J., Leicester, N., & Slocum, T. (1993). Teaching phonological awareness to young children with learning disabilities. *Exceptional Children*, 59, 532–546.
- O'Connor, R., Notari-Syverson, A., & Vadasy, P. (1996). Ladders to literacy: The effects of teacher-led phonological activities for kindergarten children with and without disabilities. *Exceptional Children*, 63, 117–130.
- Pressley, M. (2002). What I have learned up until now about research methods in reading education. In D. L. Schallert, C. M. Fairbanks, J. Worthy, B. Maloch, & J. V. Hoffman (Eds.), *51st yearbook of the*

- National Reading Conference (pp. 33–45). Oak Creek, WI: National Reading Conference.
- Rescorla, L. (2002). Language and reading outcomes to age 9 in late-talking toddlers. *Journal of Speech, Language, and Hearing Research, 45*, 360–371.
- Saint-Laurent, L., Giasson, J., & Couture, C. (1998). Emergent literacy and intellectual disabilities. *Journal of Early Intervention, 21*, 267–281.
- Scarborough, H. S. (1990). Very early language deficits in dyslexic children. *Child Development, 61*, 1728–1743.
- Scarborough, H. S. (1998). Early identification of children at risk for reading difficulties: Phonological awareness and some other promising predictors. In B. K. Shapiro, P. J. Accardo, & A. J. Capute (Eds.), *Specific reading disability: A view of the spectrum* (pp. 75–199). Timonium, MD: York Press.
- Sheppard, J. (1990). *The right number of elephants*. New York: HarperCollins.
- Schneider, W., Roth, E., & Ennemoser, M. (2000). Training phonological skills and letter knowledge in children at risk for dyslexia: A comparison of three kindergarten intervention programs. *Journal of Educational Psychology, 92*, 284–295.
- Snow, C., Burns, M. S., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.
- Stahl, S. A., & Murray, B. A. (1994). Defining phonological awareness and its relationship to early reading. *Journal of Educational Psychology, 86*, 221–234.
- Stanovich, K. E. (2000). *Progress in understanding reading*. New York: Guilford Press.
- Tolstoy, A., & Sharkey, N. (1999). *The gigantic turnip*. New York: Barefoot Books.
- Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research, 40*, 1245–1260.
- Torgesen, J. K. (2000). Individual differences in response to early interventions in reading: The lingering problem of treatment resisters. *Learning Disabilities Research & Practice, 15*, 55–64.
- Tyler, J., & Hawthorn, P. (1996). *There's a dragon in my school*. Tulsa, OK: EDC Publishing.
- Ukrainetz, T. A., Cooney, M. H., Dyer, S. K., Kysar, A. J., & Harris, T. J. (2000). An investigation into teaching phonemic awareness through shared reading and writing. *Early Childhood Research Quarterly, 15*, 331–355.
- van Kleeck, A., Gillam, R. B., & McFadden, T. U. (1998). A study of classroom-based phonological awareness training for preschoolers with speech and/or language disorders. *American Journal of Speech-Language Pathology, 7*, 65–76.
- Warrick, N., Rubin, H., & Rowe-Walsh, S. (1993). Phoneme awareness in language-delayed children: Comparative studies and intervention. *Annals of Dyslexia, 43*, 153–173.
- Watkins, R. V., & Bunce, B. H. (1996). Natural literacy: Theory and practice for preschool intervention programs. *Topics in Early Childhood Special Education, 16*, 191–212.
- Whitehurst, G. J., Arnold, D. S., Epstein, J. N., Angell, A. L., Smith, M., & Fischehl, J. E. (1994). A picture book reading intervention in day care and home for children from low-income families. *Developmental Psychology, 30*, 679–689.
- Whitehurst, G. J., Falco, F. L., Lonigan, C. J., Fischel, J. E., DeBaryshe, B. D., Valdez Menchaca, M. C., et al. (1988). Accelerating language development through picture book reading. *Developmental Psychology, 24*, 552–559.
- Whybrow, I. (1999). *Where's Tim's Ted?* New York: Barron's.

Copyright of Topics in Early Childhood Special Education is the property of PRO-ED. The copyright in an individual article may be maintained by the author in certain cases. Content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.