Learning New Words From Storybooks: An Efficacy Study With At-Risk Kindergartners

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This efficacy study examined the learning of novel vocabulary words during 20 small-group storybook reading sessions for at-risk kindergartners, namely children attending predominantly low socioeconomic status (SES) schools who were experiencing challenges in early literacy and vocabulary development. The goals were threefold: (a) to examine students' learning of new words from the texts of storybooks read repeatedly over time; (b) to characterize the differential impact of elaborated versus non-elaborated encounters with new words; and (c) to study individual differences in response to treatment, namely the influence of a priori vocabulary skills.

MAKING THE CASE: VOCABULARY INTERVENTION FOR AT-RISK KINDERGARTNERS

Empirical investigation of strategies for supporting vocabulary development in young at-risk children has never seemed so important. Current educational policies mandate that "no child will be left behind." This presents a significant challenge to educators at all levels and of every type of specialization to ensure that all children develop in a timely manner those skills needed to succeed academically. Of particular concern to speech-language pathologists and

ABSTRACT: **Purpose**: The extant literature suggests that exposure to novel vocabulary words through repeated readings of storybooks influences children's word learning, and that adult elaboration of words in context can accelerate vocabulary growth. This study examined the influence of small-group storybook reading sessions on the acquisition of vocabulary words for at-risk kindergartners, and the impact of word elaboration on learning. An additional goal was to study differential responses to treatment for children with high versus low vocabulary skill.

Method: Using a pretest–posttest comparison group research design, 57 kindergartners were randomly assigned to a treatment (*n* = 29) or comparison (*n* = 28) group. Children were also differentiated into high (*n* = 31) versus low (*n* = 26) vocabulary skill groups using scores on a standardized receptive vocabulary test. Children in the treatment group completed 20 small-group storybook reading sessions during

which they were exposed to 60 novel words randomly assigned to non-elaborated and elaborated conditions. Pre- and posttest examined the quality of children's definitions for the 60 novel words.

Results: Overall, word-learning gains were modest. Children in the treatment group made significantly greater gains in elaborated words relative to children in the comparison group; no influence of storybook reading exposure was seen for non-elaborated words. Children with low vocabulary scores made the greatest gains on elaborated words.

Clinical Implications: Suggestions are offered for using storybooks as a clinical tool for fostering vocabulary development. As an efficacy study, results should inform future applied research on word learning for at-risk children.

KEY WORDS: language intervention, book reading, at-risk children, vocabulary, word learning

their close associates (e.g., reading specialists, special educators) is helping children develop the oral and written language skills required to succeed in the academic curriculum (see American Speech-Language-Hearing Association [ASHA], 2001).

The current research base suggests literacy performance to be closely linked to oral language skills in general and vocabulary development in particular (for reviews, see National Reading Panel [NRP], 2000; Scarborough, 1998), and that striking gaps are evident when comparing the vocabulary skills of lower SES children to their middle and upper SES peers (Bowey, 1995; Chaney, 1994; Dickinson & Snow, 1987; Walker, Greenwood, Hart, & Carta, 1994; Warren-Leubecker & Carter, 1988). Indeed, children who appear particularly vulnerable for experiencing academic difficulties—and who have historically been "left behind"—are children from low-SES backgrounds who arrive at school with limited oral language and early literacy experiences as compared to their higher SES peers. To be sure, the transition to kindergarten poses a considerable challenge to all young children given that the kindergarten ecology, and particularly its focus on academic skill development, differs substantially from those environments to which children have become familiar (i.e., homes, day care centers, preschools) (Rimm-Kaufman & Pianta, 2000). This transition poses an even greater challenge to those youngsters whose arrival to kindergarten is accompanied by underdeveloped skills in oral language and early literacy—areas of performance that are central to the academic and social demands of the kindergarten curricula.

There is remarkable stability between early and later school performance in a number of key areas of achievement (see Rimm-Kaufman & Pianta, 2000). Of relevance to the present study, early skills in oral language are predictive of later written language achievements, particularly in the area of reading (Bryant, Maclean, & Bradley, 1990; Catts, Fey, Zhang, & Tomblin, 2001, 2002; Chaney, 1998; Scarborough, 1989, 1998). Scarborough's (1998) meta-analysis studying associations between kindergarten oral and written language skills and later reading achievement showed kindergarten vocabulary to be associated consistently with later reading performance. The median r for studies investigating the association between receptive and expressive vocabulary in kindergarten and later reading achievement was .38 (20 samples) and .49 (5 samples), respectively. Of 19 predictors studied by Scarborough, expressive vocabulary was the second strongest predictor of later reading after alphabet knowledge, sharing second place with print concepts and story recall. By combining vocabulary indices with additional measures of oral language (e.g., story recall), the predictive relationship between preschool language and later reading is strengthened to approximately .75. A recent study of reading development in children with clinically depressed oral language skills showed integrative linkages between vocabulary and reading outcome (Catts et al., 2002), similar to earlier findings suggesting that early deficits in vocabulary skill may signal a child's risk for later reading problems (Scarborough, 1989).

Although a number of efficacy and effectiveness studies have critically examined strategies for supporting vocabulary development in young learners, the majority of these studies have focused on children in grades three through eight (see NRP, 2000). Indeed, the NRP's meta-analysis of experimental findings for strategies of vocabulary instruction found only five samples to have involved kindergarten children. Given the clear associations among kindergarten vocabulary skill and later reading achievement (Scarborough, 1998), systematic and programmatic evaluation of strategies for encouraging kindergartners' vocabulary development is a research area requiring focused attention. Because of the particular vulnerability of children reared in low-SES households for difficulties with vocabulary development (e.g., Bowey, 1995; Chaney, 1994; Dickinson & Snow, 1987; Walker et al., 1994), studies involving these youngsters are especially needed.

THEORETICAL PERSPECTIVES ON VOCABULARY DEVELOPMENT

Empirical investigations of strategies for supporting vocabulary growth in young children must be informed by theoretical accounts of word knowledge development. Despite the extensive amount of attention that has been directed toward understanding early vocabulary development, there remains much that is unknown about how children learn new words. Much of the difficulty in studying vocabulary phenomena can be linked to challenges in studying a developmental process that is both difficult to define (i.e., When is a word known?) and characterized by enormous growth in a fairly short period of time; by some accounts, young children learn approximately 9 to 10 new words each day (see Nagy & Herman, 1987). The theoretical perspectives of vocabulary development that informed the design of this investigation included the following: (a) Incidental exposure to novel words is a critical mechanism for word learning, (b) word learning is a gradual process, and (c) adult input variations can influence the rate of novel word learning. These perspectives are elaborated in the following paragraphs.

First, children's learning of new words was viewed as occurring primarily through incidental exposures to new words. Incidental exposures refer to situations in which children informally experience unknown words; for instance, a child may hear an unknown word on a television show, in a dinnertime conversation, or from a storybook reading. Young children show a remarkable propensity to rapidly and effectively acquire words that they experience incidentally in their daily activities (Nagy & Herman, 1987).

Second, children's novel word learning was viewed as a gradual process in which word representations progressively develop from immature, incomplete representations to mature, accurate representations. Children are able to acquire a general representation of a new word with only a single exposure through fast mapping (see McGregor, Friedman, Reilly, & Newman, 2002). This is followed by

slow mapping, during which representations are gradually refined over time with multiple exposures (Curtis, 1987). Curtis presented word knowledge development as a four-stage process, with Stage 1 describing no knowledge of a word ("I never saw it before."), Stage 2 reflecting emergent knowledge ("I've heard of it, but I don't know what it means."), Stage 3 describing contextual knowledge ("I recognize it in context—it has something to do with…."), and Stage 4 referencing full knowledge ("I know it.") (p. 43). Curtis argued that Stage 3 and Stage 4 knowledge can only be determined by examining the quality of children's definitions of particular words.

Third, children's novel word learning was viewed as a developmental process that is influenced by variations in adult input. When children are exposed to new words within the context of their interactions with adults, theoretical perspectives and empirical findings have suggested that certain types of incidental exposures may be more advantageous than others. Current theoretical perspectives view language acquisition as a psychobiological process, whereby both innate biological propensities and frequent well-tuned verbal input are critical for supporting language growth and for explaining individual differences in the rate of achievement (Chapman, 2000). For example, to accelerate the word-learning process, adults can elaborate the meanings of new words when they occur in storybooks (Penno, Wilkinson, & Moore, 2002). In such instances, children's exposures to new words are still considered incidental, although the adults' mediation of that exposure may be construed as instructional. In this report, the term "elaborated exposure" is used to describe children's incidental encounters with new words that are accompanied by decontextualized, meaning-focused adult explanations. Theoretical perspectives on word learning suggest that elaborated exposures may be more powerful for stimulating word learning relative to non-elaborated incidental encounters (see Nagy & Herman, 1987).

Intervention Contexts and Strategies: Adult–Child Storybook Reading

The report of the NRP (2000) suggests the importance of considering multiple avenues for vocabulary development in school-age children (also see Beck, McKeown, & Kucan, 2002). Although successful vocabulary instruction in elementary classrooms should emphasize explicit teaching of those words needed to access and succeed in the general curriculum, vocabulary instruction should also foster incidental learning opportunities. For older children, incidental exposure to new words occurs primarily through their own reading activities (Jenkins, Stein, & Wysocki, 1984; Nagy, Anderson, & Herman, 1987). For younger children who are not yet reading, incidental exposure to new words occurs through conversations with others, by overhearing words spoken in one's environment, and by being read to. Indeed, adult–child storybook reading interactions provide highly contextualized exposures to novel words in a routine that is authentic, familiar, and often motivating to young children (Roth, 2002).

Storybook reading as a potential vocabulary-building activity for young children has been discussed extensively in descriptive papers (Dickinson & Smith, 1994; Eller, Pappas, & Brown, 1988; Ninio, 1983; Pellegrini, Galda, Jones, & Perlmutter, 1995; Phillips & McNaughton, 1990; Senechal, Cornell, & Broda, 1995) and reports of experimental findings (e.g., Brett, Rothlein, & Hurley, 1996; Elley, 1989; Hargrave & Senechal, 2000; Justice, 2002; Karweit, 1989; Penno et al., 2002; Robbins & Ehri, 1994; Senechal & Cornell, 1993; Senechal, Thomas, & Monker, 1995; Wasik & Bond, 2001; Whitehurst et al., 1988). Although relatively few of these studies have involved kindergartners, and even fewer have focused on at-risk children, this growing corpus suggests the potential use of adult–child storybook reading as a context for supporting vocabulary development in young children. As a clinically useful tool for speech-language pathologists, the current literature suggests the importance of repeated exposure to novel words, the influence of adult mediation and instructional encounters, and the likelihood that vocabulary skill influences child response to treatment.

The Importance of Repeated Exposure

Repeated exposure to new words, either within the text of a single book or through repeated readings of the same book, facilitates children's learning of those words (Elley, 1989; Penno et al., 2002; Robbins & Ehri, 1994; Senechal, 1997). As has been discussed, vocabulary development is viewed as a gradual process whereby early representations are increasingly refined with time and exposure. Elley studied the acquisition of new vocabulary words by 8-year-old children in New Zealand over the course of three reading sessions for each of two storybooks. Children were pre- and posttested using a multiple-choice format on 36 unfamiliar words selected from the storybooks, as well as 5 control words that did not occur in the books. Elley's work showed that children made a gain of approximately three new words from pre- to posttest for the target vocabulary words as compared to no gains for the control words. Also, the number of times a particular word occurred in a storybook text was a powerful predictor in explaining which words children were most likely to acquire. Children's learning of new words was facilitated when words occurred multiple times in a single storybook.

Similar findings have been reported by Senechal (1997) for middle-SES preschoolers, by Robbins and Ehri (1994) for lower and middle-class kindergartners, and by Penno et al. (2002) for 5- to 8-year-old New Zealand children of diverse backgrounds. For instance, Robbins and Ehri's study of kindergartners, in which children participated in two reading sessions involving a single storybook, demonstrated that the probability of learning a new word was greater for words occurring twice in a storybook as compared to words occurring only once. The average gain was approximately one new word learned following two storybook exposures. Penno et al.'s research, in which children completed three repeated readings of two storybooks, showed the accuracy of children's use of new vocabulary words during story retellings to increase in a

progressive, linear manner from the first to the third reading session for each storybook. In this study, a multiple-choice test showed children's scores to increase approximately 16% (average increase of approximately one half of a word) through mere exposure over three readings.

The Influence of Adult Mediation and Elaborated Exposures

A number of studies have shown that the manner in which adults read to children matters considerably to children's language learning during storybook reading interactions. For instance, the manner in which adults introduce words occurring in text that are likely to be unknown to children seems to influence children's vocabulary development during storybook reading interactions. Although simple exposure to new words over as few as two readings of a single storybook can influence learning of those words (Elley, 1989; Justice, 2002; Robbins & Ehri, 1994), studies have shown that adults can elaborate new words at the point they occur in the storybook text in order to accelerate children's word learning (Brett et al., 1996; Elley, 1989; Penno et al., 2002).

In an experiment set in New Zealand, for instance, Elley (1989) examined 8-year-old children's vocabulary development over three repeated readings of two storybooks assigned to contrasting conditions: reading with explanation and reading without explanation. During the explanation condition, unfamiliar words were explained to children at the point they occurred in the storybook by providing a synonym, using role play (e.g., acting out a hornet flying and buzzing, for the word *hornet*), or pointing to an illustration depicting the unfamiliar word. In the contrastive condition, the storybooks were read verbatim with no explanation of unfamiliar vocabulary words. For one book, pre- to posttest vocabulary gains on a multiple-choice test were 15% for words in the no explanation condition and 40% for words in the explanation condition; in the second book, gains were 4% for no explanation and 17% for explanation. On average, children gained approximately 3 words from pre- to posttest in the no-explanation condition and 10 words in the explanation condition. Elley concluded that "explanations of unknown words as they are encountered can more than double vocabulary gains" (p. 184).

Similar findings concerning the facilitating effects of adults' explanations of unfamiliar words have been demonstrated by Brett et al. (1996) with fourth graders in the United States and by Penno et al. (2002) with 5- to 8-year-olds in New Zealand. Brett et al.'s work showed that teacher explanation of unknown words (i.e., providing a definition followed by use of the word in a sentence) during five repeated readings of two storybooks exerted a significant influence on fourth graders' vocabulary learning as compared to exposure to words without explanation. Penno et al. also contrasted exposure to unknown words in explanation versus no-explanation conditions during three investigator-led repeated readings for 5- to 8-year-old children. Children's accurate use of words in the explanation condition in posttest story retellings was more than

double that of accurate use of words in the no-explanation condition. From pre- to posttest, the gain from mere exposure in three readings was equivalent to approximately one half of a word, whereas approximately two words were gained for explanation words.

Vocabulary Skill Influences Child Response to Treatment

A number of recent studies have suggested that children respond differentially to word-learning opportunities on the basis of their existing level of vocabulary knowledge. Findings reported by Penno et al. (2002), Robbins and Ehri (1994), and Senechal, Thomas, and Monker (1995) have each shown children with higher vocabulary skills to make greater word-learning gains in short-term storybook reading interventions as compared to children with lower vocabulary skills. Penno and colleagues interpreted these findings as providing evidence for a "Matthew effect" (i.e., the rich get richer and the poor get poorer). Senechal, Thomas, and Monker hypothesized that children with larger vocabularies may have more efficient retrieval processes that enable greater word-learning gains from incidental exposures to novel words. Contrasting findings were reported by Elley (1989) in an investigation of word-learning gains over three repeated readings. Results of this study showed children with the lowest baseline vocabulary ability to make the greatest word-learning gains over time. Pre- to posttest performance on a multiple-choice vocabulary test increased approximately 20 percentage points for children in the lowest ability group as compared to an increase of approximately 15 percentage points for children in the highest ability group. It is important to note, however, that none of these studies included children with clinically depressed vocabulary skills (i.e., score of –1 SD of the mean on a standardized test of vocabulary).

Although these findings present a mixed picture, they do suggest the likelihood that children can be expected to respond differentially to word-learning opportunities, and that a priori vocabulary knowledge is an important aspect of individual differences. Nevertheless, the way in which word exposure during storybook reading differentially influences word learning in children with varying levels of vocabulary skill remains an empirical question.

THE PRESENT STUDY

On the basis of the extant literature, the following may be hypothesized: (a) Novel word learning is stimulated through repeated exposure to new words over the course of several reading sessions, (b) novel word learning is accelerated when the meanings of unfamiliar words are elaborated by adult readers, and (c) children respond differentially to word-learning opportunities on the basis of their vocabulary skill. This study tested these hypotheses with kindergarten children in need of vocabulary enhancement, given their attendance at high-poverty schools, their relatively low achievement on a school-wide literacy

screening, and their generally poor performance on standardized measures of receptive and expressive vocabulary.

The present work may be characterized as an efficacy study designed to examine the causal relationship between children's exposure to novel words during storybook reading and the extent to which differential exposure influences learning of those words. The emphasis in efficacy research is to document causality while promoting high levels of internal validity to ensure the certainty of findings (Fey, 2002). Results of efficacy research subsequently are used to inform effectiveness studies, which emphasize external validity (generalizability) in widespread clinical replications and extensions. Three research questions were addressed:

- To what extent do at-risk kindergartners acquire new vocabulary words through small-group storybook reading sessions?
- To what extent does elaborated exposure influence children's learning of new words?
- To what extent do word-learning outcomes vary for children with high versus low a priori vocabulary knowledge?

Method

Research design and study overview. A pretest–posttest comparison group research design served as the framework for this study. Fifty-seven kindergartners from two urban elementary schools were randomly assigned to a treatment ($n = 29$) or comparison ($n = 28$) group. All children were pretested to determine their knowledge of 60 target vocabulary words selected from 10 storybooks. Subsequently, children in the treatment group completed a book reading intervention using the 10 storybooks in 20 small-group reading sessions. During the reading sessions, 30 of the 60 target vocabulary words were *elaborated* by the adult reader; that is, the adult reader provided the meaning of the word followed by an example of its use in a sentence. The other 30 vocabulary words were not elaborated; rather, the children were incidentally exposed to these words only through their occurrence in the text. At the end of the 10-week reading period, children were posttested on the 60 target vocabulary words. Following posttest, children in the comparison group completed the intervention in the same manner as those in the original treatment group.

Participants

Sampling frame. Participants were drawn from six kindergarten classrooms in two elementary schools. The two schools were located within several miles of one another in a small urban community in a Mid-Atlantic state. Each school contained approximately 300 kindergarten through fourth-grade students and served primarily lower SES children (i.e., more than two thirds of the children in each school qualified for free or reduced meals). Both schools were ethnically diverse: The composition of one school was 60% African American, 30%

Caucasian, 5% Hispanic, and 5% other; the composition of the other school was 72% African American, 18% Caucasian, 3% Hispanic, 3% Asian, and 4% other. These schools were recipients of Reading Excellence Act awards from the state, and school personnel were engaged in considerable in-service opportunities to promote literacy at all grade levels. As a result, shared storybook reading was a regular experience of the children in these classrooms.

Approximately half of the 120 kindergartners in the two schools were solicited to participate in this study. Participants were selected on the basis of their performance on an early literacy screening protocol administered to all kindergartners in the two schools as part of a statewide screening program. Specifically, 1 month before the start of this study, the children were administered the Phonological Awareness Literacy Screening–Kindergarten (Invernizzi, Meier, Swank, & Juel, 2000). Using children's sum scores from this screening, a median score was calculated for the kindergartners in each school. Excluding children exhibiting limited English proficiency and children placed in self-contained special education classrooms, all children whose screening score was below the median were invited to participate. Consent was provided for 58 children; one child subsequently left the study, resulting in 57 participants.

Participant description. The 57 kindergartners (35 males, 22 females) ranged in age from 5 to 6.5 years, with a mean age of 5.6 years ($SD = 4$ months) at entry to the study. Forty-eight children were African American, 5 were Caucasian, and 4 were of Asian descent. The children were administered two standardized measures of vocabulary at the start of the study by trained research assistants. The mean standard score on the Peabody Picture Vocabulary Test–Third Edition (PPVT-III; Dunn & Dunn, 1997), a measure of single-word receptive vocabulary, was 86 ($SD = 9.3$, range 68–107). The performance of 26 children (46%) was ≤ -1 SD on this measure. The mean standard score on the Expressive One Word Picture Vocabulary Test–Revised (EOWPVT-R; Gardner, 1990), a measure of single-word expressive vocabulary, was 77 ($SD = 9.4$, range 58–99). Forty-four children (77%) received scores ≤ -1 SD of the mean on the EOWPVT-R.

Stimuli: Storybooks and Words

Storybook selection procedures. Ten storybooks were used in the intervention reading sessions (see Appendix). We adopted Hargrave and Senechal's (2000) criteria for making our book selections, primarily that the books used (a) contained colorful illustrations that helped to narrate the story, (b) contained vocabulary words in text that were unlikely to be known by the children (six such words were required for each book), (c) were neither excessively long nor heavily reliant on text for telling the story, (d) were of the narrative genre, and (e) were developmentally appropriate. The set of 10 books selected for use included a range of older and newer titles.

Target word selection procedures. Six words occurring in the text were selected from each of the 10 storybooks used in this study, for a total of 60 words. The words are

provided in the Appendix. Words were selected from storybooks in a series of collaborative discussions involving four individuals (two speech-language pathologists and two reading specialists). Nouns, verbs, and adjectives were considered, as these three classes of words have been shown to be "learnable" by kindergartners during two repeated readings (Robbins & Ehri, 1994). Of the three classes, verbs show the highest probability of being learned; the investigators therefore looked closely for verbs to serve as target words. To be selected, a word needed to meet four criteria. First, a word was required to meet the categorization of a "tier two" word, that is, a medium- to high-frequency word that occurs across a variety of contexts for mature language users (Beck et al., 2002). These words add precision to an individual's vocabulary (e.g., *stale, awful, snuggle, twitch*) by providing new ways to express concepts that are already understood. By way of contrast, tier one words are basic-level nonspecific words (e.g., *dog, write, desk, pretty*), and tier three words are used rarely and only in highly specific situations (e.g., *decibel, cataclysm, atom*). Second, words needed to be judged as likely unknown by kindergarten children. Third, target words needed to occur in the storybook text in a nondirective manner (i.e., the context provides no or little assistance in denoting the word's meaning) (Beck et al., 2002). Fourth, a target word could occur only one time in the text of the storybook from which it was selected. The final word set contained 28 verbs, 16 nouns, and 16 adjectives.

Once the final corpus of 60 target words was selected, the words were stratified by class (noun, verb, adjective) and randomly assigned to one of two categories: elaborated and non-elaborated. Each category therefore consisted of 30 words (8 nouns, 14 verbs, and 8 adjectives). This categorization determined how children experienced individual words during the reading sessions.

General Procedures

Data collection involved three phases: pretest, intervention, and posttest.

Pretest and posttest assessment. Children were individually administered an informal, criterion-referenced assessment examining their knowledge of the 60 target vocabulary words. Assessments were administered in a private setting in the children's schools by one of the authors or a trained, supervised graduate student in the week preceding (pretest) and the week following (posttest) the intervention. The assessment examined children's definitions of the target words as an indicator of their word knowledge. Examining children's definitions as a means for approximating growth in word knowledge focuses less on children's general sense of a word and more on their incremental movement toward decontextualized word knowledge (Beck et al., 2002). Although producing definitions is a particularly rigorous test of vocabulary skill (Kaméenui, Dixon, & Carnine, 1987), definitions have been studied as outcome variables in descriptive and applied studies of kindergarten vocabulary development (e.g., Eller et al., 1988; Leung, 1992; Leung & Pikulski, 1990; Penno et al., 2002; Snow, Tabors, Nicholson, & Kurland, 1995).

The 60 target words were presented to children at pre- and posttest as a randomized list. The examiner told the child that she was going to say some words and that she wanted to see if the child knew the words. For each word, the examiner asked: "Do you know what [target word] means?" If the child did not produce a response, the examiner followed with one additional prompt: "Tell me another word that means the same as [target word]." Three practice items were used to train children in the assessment protocol; for these, corrective feedback and praise were used liberally to ensure children's task understanding. Subsequently, the 60 target items were administered, during which no praise or reinforcement was given with the exception of praise for on-task behavior if needed (e.g., "I like how you are sitting/paying attention.").

Children's responses to each item were transcribed verbatim on a score sheet and subsequently scored by a trained research assistant using a protocol adapted from Curtis (1987; see also Eller et al., 1988). Items were scored as reflecting no knowledge (0 points), incomplete knowledge (1 point), or complete knowledge (2 points). Table 1 presents the scoring protocol. Raw scores for individual items were summed to derive a total score at each assessment point; scores could potentially range from 0 to 120. It is important to note that pretest scores were expected to be positively skewed, as words selected for assessment were presumed to be unfamiliar to kindergarten children. After all words were scored, the words were categorized into non-elaborated versus elaborated words; 60 points were possible for each. Children's scores for non-elaborated and elaborated words served as the dependent variables in this study.

Interrater reliability of the scoring protocol was established by randomly selecting 15 tests for independent scoring by a second trained coder. An item-by-item comparison was made of the original scoring and the scores of the second coder. For each test, an agreement percentage was calculated by dividing the total number of agreements by the number of agreements plus disagreements and multiplying this figure by 100. Agreement scores for individual tests ranged from 90% to 100%, with a mean score of 95%.

Intervention phase. Stratified by school, the children were randomly assigned to the treatment ($n = 29$) or comparison ($n = 28$) group. Children in the treatment group were further subdivided into six small groups for receiving the intervention; group sizes ranged from 3 to 6 children ($M = 5$, $SD = 1.3$). To facilitate delivery of the intervention, children assigned to a particular reading group were members of the same class. Children in the treatment group completed 20 small-group storybook reading sessions over a 10-week period; comparison children received the regular kindergarten curriculum.

The intervention was administered by three readers (graduate students in education) who were experienced in working with young children. During each reading session, two storybooks were read in their entirety. Each of the 10 books used in this study was therefore read four times over the course of the investigation; the order of the books was randomized, and all groups experienced the books in the same order. The reading sessions were held one to three times weekly in a private setting in each school. Sessions

Table 1. Scoring protocol for children's definitions.

Point	Criterion	Example (for "stale")
0	**No Knowledge**	
	No response	
	Inappropriate use in phrase or sentence	*He stale on this*
	Inappropriate definition	*Stale means a hat*
	Restatement	*Stale is stale*
	Phonological manipulation	*Stale bale*
1	**Incomplete Knowledge**	
	Appropriate use in phrase or sentence	*Bread is stale*
	Vague or imprecise definition	*Stale means yucky*
	Imprecise synonym	*No good*
2	**Complete Knowledge**	
	Precise use in phrase or sentence	*The food is old, so it's stale now*
	Precise definition	*Food that's old, it's not fresh*

lasted approximately 20 min. The readers adhered to a strict reading protocol both to ensure procedural fidelity across readers and sessions and to keep children's attention focused on the storybook. Similar to the protocols used by Penno et al. (2002) and Morrow and Smith (1990), the adult readers departed from the text only to (a) manage the interaction (i.e., introduce the story, maintain children's attention, and redirect children to the story as needed) and (b) elaborate words occurring in the text that were assigned to the elaboration condition.

As previously noted, the 60 words selected from the 10 storybooks were randomly assigned to the elaboration (30 words) or non-elaboration (30 words) condition. Each book contained three words in each category. Children experienced the non-elaborated words only through their exposure to the words as they occurred in the text of the storybooks, and the adult readers had no knowledge of which words were assigned to this condition. The elaborated words, in contrast, were explicitly defined by the adult readers at the point they occurred in the storybook text. Specifically, at the end of a sentence in which an elaborated word occurred, the adult reader stopped reading to provide the definition of the word followed by use of the word in a supportive context (i.e., a sentence in which the meaning of the word could be readily defined by the context). The definitions used were derived from two sources, the *Primary Dictionary* (1991) and the *School Dictionary* (1981). To ensure the readers' fidelity to the elaboration procedures, a script for each word was printed on a label and placed in an unobtrusive manner on the storybook page on which it was to occur. The following is an example of an elaboration sequence for *Possum and the Peeper* (Hunter, 1998):

1. Adult reads text: "They came down to a *marsh* where they saw a muskrat spring-cleaning his house."

2. Adult provides definition: A *marsh* is a very wet place where there are wet lands covered with grasses.

3. Adult uses word in supportive context: Like, we took a boat through the *marsh* and we saw lots of birds and alligators.

RESULTS

Group Equivalency

Equivalency of the two groups (treatment, comparison) was examined at pretest across the following variables: chronological age, receptive vocabulary (standard scores from PPVT-III), expressive vocabulary (standard scores from EOWPVT-R), and their raw sum score for the pretest target vocabulary words. Comparison of the two groups on these variables appears in Table 2. Preliminary analysis of variance showed no preexisting differences in the sample by group assignment for chronological age, $F(1, 55) = .24$, $p = .624$; receptive vocabulary, $F(1, 55) = .07$, $p = .793$; expressive vocabulary, $F(1, 54) = .31$, $p = .582$; or target vocabulary, $F(1, 55) = 1.07$, $p = .306$. The groups were also compared on their pretest raw scores for the two categories of words: non-elaborated versus elaborated words. There were no preexisting differences in either case: $F(1, 55) = .53$, $p = .469$, and $F(1, 55) = 1.53$, $p = .222$, respectively.

Table 2. Participant characteristics at the start of intervention.

	Treatment		Comparison	
Variable	M	SD	M	SD
Chronological age (in months)	66.2	4.5	66.8	3.2
Receptive vocabulary	86.5	10.1	85.9	8.6
Expressive vocabulary	78.1	9.0	76.7	10.0
Target vocabulary	5.7	4.5	4.4	5.3

Note. Receptive vocabulary = standard score on the Peabody Picture Vocabulary Test–III (Dunn & Dunn, 1997); expressive vocabulary = standard score on the One Word Picture Vocabulary Test–Revised (Gardner, 1990); target vocabulary = raw score on the pretest target vocabulary list.

Influence of Storybook Reading on Word Learning

The first goal of the study was to determine the extent to which the kindergartners acquired novel vocabulary words during the small-group storybook reading sessions, which involved four repeated readings of each book. The second goal was to determine the extent to which meaning elaboration influenced children's learning of new words.

To address these aims, a repeated-measures multivariate analysis of variance (MANOVA) was used for hypothesis testing. Time (pretest, posttest) served as the within-subjects factor and group (treatment, comparison) served as the between-subjects factor. Children's raw scores for elaborated and non-elaborated words served as dependent measures. Although analysis of covariance (ANCOVA) is often used as a test statistic in experimental designs, the ANCOVA was not used in this work because the correlation between pretest and posttest scores for each of the dependent measures was less than .4 (see Myers, 1972). Specifically, the correlation between pretest and posttest elaborated and non-elaborated scores was .28 and .11, respectively, suggesting that a repeated-measures design would be more appropriate. Because of the nature of the pretest instrument, which was designed for a floor effect (i.e., words were selected that children would likely not know), pretest raw scores were positively skewed (μ^3 = 1.21, *SEM* = .316 for elaborated scores and μ^3 = 1.1, *SEM* = .316 for non-elaborated scores). However, the distributions normalized at posttest for both elaborated (μ^3 = .326, *SEM* = .316) and non-elaborated (μ^3 = .225, *SEM* = .316) raw scores, thus the raw scores were maintained as dependent variables rather than using a transformation. To characterize the magnitude of treatment effects, the multivariate effect-size estimate, partial eta squared (η_p^2) is reported, for which .01 is small, .06 is medium, and .14 is large, as indicated by Stevens (1996). Standardized post-treatment differences between groups are also reported using Cohen's *d* (Cohen, 1977), for which 0.2 is small, 0.5 is medium, and 0.8 is large. The two groups' pre- and posttest scores on the dependent measures are presented in Figure 1.

Results of the MANOVA showed a significant main effect for group, $F(2, 54)$ = 8.61, p = .001 (η_p^2 = .242) and for time, $F(2, 54)$ = 30.96, $p < .001$ (η_p^2 = .524). A Time × Group interaction superceded these main effects, $F(2, 54)$ = 6.38, p = .003 (η_p^2 = .191). Univariate analysis of the interaction was significant for elaborated words, $F(1, 55)$ = 11.77, p = .001 (η_p^2 = .176, d = 1.22), but not for non-elaborated words, $F(1, 55)$ = 1.321, p = .255 (η_p^2 = .023, d = 0.53). These results show a large-sized effect for the multivariate interaction, attributable primarily to the large posttreatment difference for elaborated words for treatment versus comparison children. Table 3 presents standardized posttreatment differences between the treatment and comparison groups and interprets the effect-size estimates. Table 4 presents data concerning children's performance on individual elaborated words.

Influence of Vocabulary Skill

The third goal was to determine the extent to which a priori vocabulary skill differentially influenced children's outcomes from non-elaborated and elaborated word-learning opportunities. To address this goal, children were

Table 3. Effect-size estimates for group comparisons of posttreatment differences.

Group	Posttest difference (d)	Interpretation
All children (*n* = 57)		
Elaborated words	1.22	Large effect
Non-elaborated words	0.53	Medium effect*
Low-vocabulary children (*n* = 26)		
Elaborated words	1.34	Large effect
Non-elaborated words	0.10	No effect*
High-vocabulary children (*n* = 31)		
Elaborated words	1.00	Large effect
Non-elaborated words	0.85	Large effect*

*$p > .05$.

Figure 1. Raw scores on word-learning measures for the treatment group and the comparison group.
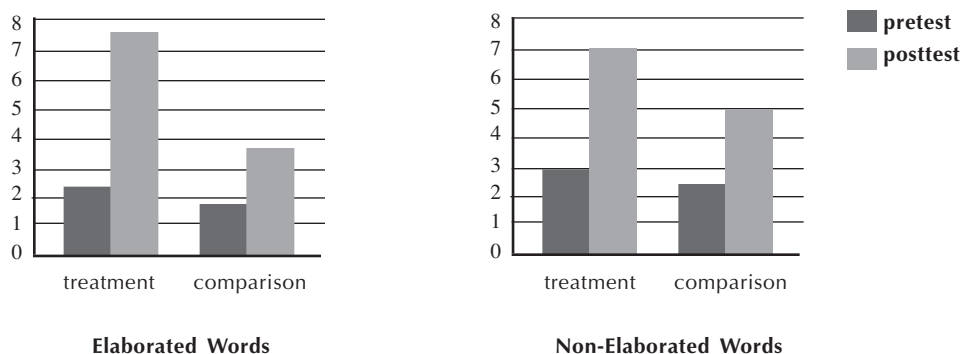
Table 4. Number of children displaying knowledge of elaborated vocabulary words (*N* = 57).

	Pretest score		Posttest score	
Word	*1*	*2*	*1*	*2*
heaved	2	0	2	0
pouted	7	3	15	11
ruffle	0	0	3	0
discovered	4	0	6	2
furnace	3	0	6	0
gloomy	3	0	1	0
overjoyed	8	0	15	4
rare	0	0	3	0
wandered	2	0	6	1
hauled	1	0	2	0
ripe	0	0	1	1
sidelines	0	0	6	1
marsh	1	0	0	0
racket	5	0	6	6
squinting	0	0	1	1
embarrassed	3	0	22	3
murmured	0	0	0	0
trembled	0	0	2	1
gulp	2	1	8	11
marvel	2	0	0	0
midday	5	0	13	3
decided	6	1	12	3
notice	3	0	10	0
tight	17	0	28	2
gaze	0	0	0	0
ripples	0	0	1	0
surface	1	0	2	0
flashing	24	0	31	2
frayed	0	0	0	0
stale	8	0	11	3

Table 5. Word-learning gains for low- versus high-vocabulary groups.

	Treatment		Comparison	
Measure	M	SD	M	SD
Low-Vocabulary Group (n = 26)				
Elaborated				
Pretest	2.8	2.0	1.9	2.3
Posttest	7.4	3.7	3.1	2.6
Non-elaborated				
Pretest	3.2	2.9	3.3	3.8
Posttest	5.5	4.3	5.1	3.4
High-Vocabulary Group (n = 31)				
Elaborated				
Pretest	2.2	2.6	1.5	2.1
Posttest	7.6	3.0	4.4	3.4
Non-elaborated				
Pretest	3.4	2.8	2.1	2.9
Posttest	8.3	3.5	5.1	4.0

differentiated into low- versus high-vocabulary groups on the basis of their performance on the PPVT-III (Dunn & Dunn, 1997). Children whose receptive vocabulary skill was –1 *SD* of the mean (standard score ≤85) were placed into the low-vocabulary group (*n* = 26; experimental = 12, comparison = 14), whereas children receiving a score of 86 or higher were placed in the high-vocabulary group (*n* = 31; experimental = 17, comparison = 14). For each group, growth for elaborated and non-elaborated words was evaluated (see Table 5).

Two repeated-measures MANOVAs were conducted using children's pre- and posttest raw scores for non-elaborated and elaborated words as the dependent variables. The first MANOVA studied growth for elaborated and non-elaborated words for the low-vocabulary group. Results showed a significant main effect for group, $F(2, 23) = 11.46$, $p < .001$ ($\eta_p^2 = .5$) and for time, $F(2, 23) = 16.21$, $p < .001$ ($\eta_p^2 = .59$); a significant Time × Group interaction superceded these two main effects, $F(2, 23) = 6.54$, $p < .006$ ($\eta_p^2 = .36$). Univariate analysis of the interaction was significant for elaborated words, $F(1, 24) = 11.62$, $p = .002$ ($\eta_p^2 = .36$, $d = 1.34$) but not for non-elaborated words, $F(1, 24) = .1$, $p = .752$ ($\eta_p^2 = .004$, $d = 0.1$). These results show a large-sized multivariate effect for treatment group gains for the low-vocabulary group, attributable to the posttreatment difference for

elaborated words for treatment versus comparison children (see Table 3).

The second MANOVA studied growth for elaborated and non-elaborated words for the high-vocabulary group. The test statistics showed a similar pattern of results. At the multivariate level, there was a significant main effect for group and for time, respectively: $F(2, 28) = 4.75$, $p = .017$ ($\eta_p^2 = .253$), and $F(2, 28) = 16.61$, $p < .001$ ($\eta_p^2 = .543$). The Time × Group interaction was not significant: $F(2, 28) = 1.62$, $p = .216$ ($\eta_p^2 = .1$). The main effect for time was significant for elaborated, $F(2, 28) = 33.72$, $p < .001$ ($\eta_p^2 = .54$) and non-elaborated words, $F(2, 28) = 19.55$, $p < .001$ ($\eta_p^2 = .4$), as was the main effect for group: $F(2, 28) = 7.74$, $p = .009$ ($\eta_p^2 = .211$) for elaborated, and $F(2, 28) = 7.79$, $p = .009$ ($\eta_p^2 = .212$) for non-elaborated. Although the Time × Group interaction at the multivariate and univariate levels was not significant, $F(2, 28) = 3.32$, $p = .08$ ($\eta_p^2 = .103$, $d = 1$), the effect-size estimates suggest that this difference may be of some importance. By comparison, this was not the case for non-elaborated words, $F(2, 28) = 1.12$, $p = .3$ ($\eta_p^2 = .037$, $d = 0.85$), because the difference between groups here accounted for less than 4% of the variance.

Magnitude of Word-Learning Gains

As a final analysis, the magnitude of word-learning gains was considered for individual children. On average, children made pre- to posttest gains of 3.6 points for elaborated words and 3.1 points for non-elaborated words, corresponding to average gains of roughly 6 words per child. Overall gains were greater for those in the treatment group (*M* = 8.96, *SD* = 7) as compared to those in the comparison group (*M* = 4.42, *SD* = 7.6), $t(55) = 2.35$, $p = .022$ ($d = 0.62$). Previous studies have shown that children can be expected to gain between one and three words from repeated readings (Elley, 1989; Justice, 2002; Penno et al., 2002; Robbins & Ehri, 1994).

Using previous research as a guide, we thus characterized a meaningful gain in vocabulary as an increase of at least 4 points from pretest to posttest, corresponding to an increase of approximately three to four words. (Although this figure may seem low, note that the words selected were likely unfamiliar to kindergarten children, the children had relatively few exposures to the words, and the vocabulary assessment was fairly rigorous.) Thirty-four out of 57 children (60% of the sample) had gains of this magnitude, of which 21 were in the treatment group and 13 were in the comparison group. A two-way contingency table analysis was conducted to determine the extent to which these discrepancies were significant. A higher proportion of children in the treatment group achieved meaningful gains as compared to children in the comparison group, $\chi^2(1, N = 57) = 4$, $p = .046$. Specifically, 21 of 29 (72.4%) children in the treatment group had overall meaningful gains as compared to 13 of 28 (46.4%) children in the comparison group.

Elaborated and non-elaborated gains were subsequently considered separately. A total of 26 children made gains of 4 or more points on elaborated words. Specifically, 77% ($n = 20$) of children in the treatment group made meaningful gains relative to only 21% ($n = 6$) of children in the comparison group, a difference that was proportionally significant, $\chi^2(1, N = 57) = 12.97$, $p < .001$. Similarly, the number of children making word-learning gains of 4 or more points on non-elaborated words was studied. Thirty of the 57 participants made meaningful gains on non-elaborated words, 17 in the treatment group and 13 in the comparison group. These proportions were not different across the two groups, as indicated by the two-way contingency table analysis, $\chi^2(1, N = 57) = .849$, $p = .357$.

DISCUSSION

To summarize the results of this study, the first major finding was that incidental (non-elaborated) exposure to novel words over four repeated readings in a 10-week period resulted in negligible, nonsignificant word-learning gains for at-risk kindergartners. The second major finding was that children in the treatment group showed significantly greater gains from pre- to posttest for elaborated words relative to children in the comparison group. The difference at posttest between the treatment and comparison groups for elaborated words was approximately four words, which is consistent with a large effect size. This finding suggests that elaboration—rather than mere exposure— encourages word learning through storybook reading. By comparison, the difference at posttest between the two groups for non-elaborated words was approximately two words. The third major finding was demonstration of a differential effect for children with low versus high vocabulary skills. Children in the treatment group with low vocabulary scores made significantly greater pre- to posttest gains on elaborated words as compared to their no-treatment peers, with a between-group posttreatment difference of approximately five words (consistent with a very large effect size). In contrast, there was little difference (approximately

one word) when comparing posttest performance on non-elaborated words. This finding suggests the value of word elaboration for facilitating learning for children with low vocabulary knowledge. Similar patterns were observed for the children with high vocabulary skills, albeit the elaborated effect was of relatively less magnitude than that seen with the low-vocabulary group.

Impact of Non-Elaborated Word Exposure During Reading

The first finding, which showed a group-level negligible influence of non-elaborated incidental exposures over four repeated readings, was a somewhat surprising result. Previous studies have shown non-elaborated incidental exposures to unknown words during as few as two or three repeated readings to result in significant word-learning gains for preschoolers (Senechal, 1997), kindergartners (Robbins & Ehri, 1994) and older students (Elley, 1989; Penno et al., 2002). Despite this preponderance of evidence to the contrary, this study found incidental exposure to unknown words during small-group storybook reading to be insufficient for significant word-learning gains for at-risk kindergartners.

Several explanations appear tenable for explaining this finding. First, participants in this work were experiencing multiple risk factors, including attendance at high-poverty schools and relatively low performance on literacy screening tasks. Nearly half of our sample had scores that were more than 1 SD below the mean on the PPVT-III (Dunn & Dunn, 1997), a standardized and purportedly culturally fair test of receptive vocabulary knowledge (Washington & Craig, 1999). For learning to occur, children experiencing such challenges may require more intensive and diverse exposures to novel words than occurred in this study (Roth, 2002). Indeed, studies to date investigating word learning during book reading have tended to involve children experiencing favorable developmental circumstances. The present results are consistent with those found by Senechal, Thomas, and Monker (1995), in which children with relatively low vocabulary knowledge showed no word-learning gains following exposure over two storybook readings, compared to gains of approximately 1.5 words for children with high vocabulary skills.

A second possible explanation is that previous studies of novel word learning have typically involved briefer periods of intervention (e.g., 2 weeks) and fewer storybooks (e.g., one or two storybooks) than occurred in this study. The influential novel word-learning study by Elley (1989), for instance, involved three repeated readings of two storybooks over a 2-week period. Similar methodologies were used by Brett et al. (1996), Leung and Pikulski (1990), Penno et al. (2002), and Robbins and Ehri (1994). In the present study, children's incidental exposures to novel words were considerably less concentrated, with possibly three or more weeks spanning children's exposures to specific words. It is possible that word learning is facilitated by more concentrated exposures, particularly for at-risk children, and that diffuse exposure is insufficient for significant gains in word learning to occur.

A third possibility for the nonsignificant finding for non-elaborated exposures is that this investigation used children's definitions as a means for evaluating word learning. Although this approach may more readily approximate the incremental manner in which children develop word knowledge (Beck et al., 2002), and reflects the end-goal of vocabulary instruction (i.e., decontextualized knowledge of word meanings), the cognitive and linguistic complexities of the definitional task may have impacted on its sensitivity for demonstrating children's vocabulary growth. Nevertheless, definitional tasks provide a particularly promising means for further efficacy and effectiveness research on vocabulary interventions. Definition tasks have been used successfully to document early language and literacy skills of young low-income children, and they correlate well with standardized receptive vocabulary scores ($r = .53$) and early and later reading performance (see Snow et al., 1995). Additionally, developmental models of word learning suggest that children gradually refine their knowledge from general to more precise representations. There are few tasks available for documenting later stages of word knowledge (contextual knowledge and full knowledge), and Curtis (1987) has advocated examining definitions for documenting more advanced stages of word knowledge. Multiple-choice tasks for studying word-learning outcomes, as used by Robbins and Ehri (1994) and Senechal (1997), do little to document more refined levels of knowledge and are unduly influenced by chance performance. The results of the present study suggest that such instruments may in fact overestimate the learning that occurs during book reading.

Impact of Elaborated Word Exposure During Reading

Word-learning gains from elaborated exposure were not dramatic, although the effect-size estimates supported its advantage over non-elaborated exposure. The elaboration procedure provided an advantage of approximately two to four words over mere exposure—a finding that converged with previous reports in the extant literature. The influence of word elaboration was strongest for the low-vocabulary children, with posttreatment comparisons consistent with a very large effect size. Brett et al. (1996), Elley (1989), and Penno et al. (2002) have shown that elaborating words when they occur in a storybook by providing definitions (Brett et al., 1996) or synonyms (Elley, 1989; Penno et al., 2002) can positively influence children's novel word learning within book reading interactions. Penno et al. showed an advantage of approximately two words for elaborated words for 5- and 6-year-old children in New Zealand. Although the effect of elaboration remains relatively modest—offering a word-learning advantage of only several words—the present findings show it to be definitively better than mere exposure.

The goal of efficacy research is to elucidate causal relationships under tight controls. The present findings therefore suggest the value of future applied studies of the potential impact of elaborated exposures of novel words for facilitating vocabulary development for at-risk children, as word elaboration has been shown to be more influential than non-elaborated exposure for stimulating word learning. Future studies may implement more focused concentrations of elaborated words or the use of elaborated words in interactive reading sessions to further explore the benefit of this strategy.

Differential Effect of Vocabulary Knowledge

Previous research, particularly work by Senechal, Thomas, and Monker (1995), and Penno et al. (2002), has shown evidence of a Matthew effect for word learning from storybook reading, whereby children with higher vocabulary skills make greater word-learning gains. Elley (1989), in contrast, found that children with lower vocabulary skills learned more new words over three storybook readings as compared to children with higher vocabulary skills. None of these studies has included children with standardized vocabulary scores more than 1 *SD* below the mean.

The present findings showed children with clinically depressed vocabulary skills to make the greatest gains during the intervention period, specifically for elaborated words. The posttest between-group difference for elaborated words was consistent with a large-sized effect for treatment versus comparison children; in contrast, there was no differential effect at posttest for non-elaborated words. This finding indicates the importance of elaboration for facilitating word learning from storybooks for children with low vocabulary skills. For children with high vocabulary skills, the effect-size estimate for posttreatment performance was also much larger when comparing elaborated and non-elaborated words, suggesting that elaboration also provided an advantage for these children. These findings are similar to those reported by Penno et al. (2002), for which elaborated exposure produced greater gains than non-elaborated exposure for New Zealand 5- through 7-year-olds from undisclosed socioeconomic backgrounds.

The results of this efficacy study highlight several valuable areas for further clinical research, as there are several reasonable explanations for these results. One tenable explanation is that children with low vocabulary skills benefit from greater adult mediation when exposed to novel words. These youngsters may not learn new vocabulary words in uncontrolled incidental exposures as well as children with higher vocabulary skills, and thus benefit from more controlled and elaborated exposures. Children with higher vocabulary skills may require less structured adult mediation for learning to occur, although even for these youngsters, elaboration provided additional assistance in word learning. It is also possible that children with low vocabulary skills uniquely benefited from the word elaboration protocol. Reese and Cox (1999) suggested that an adult reading style characterized by frequent questioning and labeling promoted vocabulary learning in children with low vocabulary skills, whereas a reading style emphasizing more cognitively challenging talk benefited children with higher vocabulary skills. Given that the strict implementation protocol used in this study precluded adult initiation of cognitively challenging talk (e.g., predicting, reasoning), it

may be that children with low vocabulary skills benefited as much from the adult interactive style as from the word elaboration procedure itself.

CLINICAL IMPLICATIONS

Evidence-based practice describes the clinical decision-making process in which the preponderance of evidence concerning a particular approach is used to guide therapeutic interventions. The evidence used includes observational, feasibility, efficacy, and effectiveness studies (Justice & Fey, 2003). As an efficacy study, the present findings must be considered within the broader corpus of research on facilitating word learning within storybook reading and other contexts.

Using Storybooks for Facilitating Vocabulary

There are several key clinical implications of this work. The first concerns using storybooks as a potential vocabulary-building activity. The survey of potential storybooks and target words for use in this study showed children's storybooks to readily provide a rich cache of potentially unknown words to be targeted during reading interactions. The books used in this study were attractive, inexpensive, and widely available picture books that, on the surface, did not appear to present a particular learning challenge to young children. On the contrary, however, when the books were surveyed closely for potential target words, an abundance of words that were likely to present a linguistic challenge to kindergartners were identified. Pretest performance confirmed that the words selected tended to be unfamiliar to the children (see Table 5), and that some of the words seemed more readily learned by children during elaboration. Verbs, in particular, such as *discovered, pouted, wandered,* and *decided,* comprised a preponderance of the words learned by relatively large numbers of children. Storybooks can provide a readily accessible, low-cost, and authentic activity within which to target vocabulary development, including verbs, for at-risk children. Speech-language pathologists, reading specialists, and other educators are therefore encouraged to survey storybooks in their schools and clinics for words that may be unknown by the children with whom they work, and to use book reading as an occasion for triggering children's learning of those words. Beck et al. (2002) provide exemplary guidance for selecting words and measuring children's learning; Kaderavek and Justice (2002) provide suggestions for structuring reading interactions to maximize success.

The second point concerns the use of word elaboration as a means for encouraging novel word learning during storybook reading. The results of this efficacy study suggest that elaborating unfamiliar words during storybook reading may be a viable strategy for fostering word learning for at-risk kindergartners, particularly those with low vocabulary knowledge. Speech-language pathologists and other professionals are encouraged to use this strategy when reading with young children. At the same time, it is important to note that word elaboration during book reading is but one strategy for promoting vocabulary growth. Indeed, as can be seen from our participants' posttest performance, word-learning gains were fairly minimal over the 10-week intervention for the 30 words targeted through elaboration. Combined with the larger body of book reading research, this corpus of evidence suggests that vocabulary gains through storybook reading are fairly modest. The children learned few of the words targeted, and word knowledge for specific words was typically incomplete. Further efficacy and effectiveness studies are needed to document strategies that result in widespread, sustainable change.

To bolster children's word learning during reading interactions, additional strategies are likely required. Several evidence-based techniques are included here.

- Increasing the number of exposures to particular words may be helpful, as suggested by Elley's (1989) research showing the number of text occurrences to be the most important predictor of children's learning of new words.

- Providing greater interactional opportunities during reading may also facilitate learning, such as asking questions and making spontaneous comments; active participation by children has been shown to contribute to vocabulary development during book reading (Senechal, Thomas et al., 1995).

- Providing children with the meaning of novel words in more salient, contextualized ways (e.g., using concrete props to represent unfamiliar words) might accelerate vocabulary development (Wasik & Bond, 2001).

- Encouraging children's exposure to and use of novel words outside of the book reading context may prove helpful for promoting flexible and generalized use of target words (Kaderavek & Justice, 2002; Roth, 2002).

General Guidelines for Facilitating Vocabulary

The importance of supporting early vocabulary achievements has been emphasized throughout this report. Although the value of elaborating words in storybooks was suggested by our findings, children's gains were modest. Research must clarify how storybook reading can most effectively be used as an intervention context when working with at-risk children, and how it can be combined with other techniques for robust outcomes. Although storybook reading provides a familiar and often-used context for exposing young children to novel words, it may not provide a particularly *efficient* route to novel word learning. Several general suggestions for supporting vocabulary in young children are provided here, as informed by vocabulary research with school-age children, specifically Stahl and Fairbanks' 1986 meta-analysis of 52 studies. These have been supported by naturalistic inquiry associating the amount and type of verbal input that children experience and their vocabulary gains (see Hart & Risley, 1995):

- *Mixed-methods emphasis*: A mixed-methods approach emphasizes children's exposure to both contextual and definitional information regarding novel words. Young children should be provided with highly contextualized encounters with novel words throughout the day (e.g., "This is a lion. He looks very fierce."), balanced with explicit decontextualized definitional information (e.g., "Fierce means that he is very mean and angry."). Neither contextualization nor definitional encounters alone are sufficient for the acquisition of new words.

- *Depth of processing*: Depth of processing refers to the activity a child engages in when he or she is exposed to a new word. Vocabulary instruction should include both associative processing, in which children are merely exposed to new words, as well as generative processing, in which they act on the word in some capacity (e.g., use it in a sentence). The facilitative connections among lexical and phonological representations (Storkel & Morrisette, 2002) suggest the importance of children's use of words in the word-learning process.

- *Time allocation*: The more time allocated to a particular word, the more likely a child is to learn it. The number of exposures to a word is one of the more powerful predictors of whether a word is learned or not. Although repeated practice in using a word in a single context may be helpful for promoting speed of access, exposure to words across diverse contexts—including storybook reading routines—contributes to decontextualized understanding.

Clinicians should consider mixed-methods approaches, depth of processing, and time allocation when targeting vocabulary development for at-risk children during storybook reading and many other diverse contexts.

LIMITATIONS AND FUTURE DIRECTIONS

As an efficacy study, the results of this study provide guidance for further applied research on vocabulary enhancement techniques. However, several of the more salient limitations of this work warrant discussion. First, the adult–child storybook reading interactions in which children participated were only minimally interactive. That is, in an effort to promote internal validity and procedural fidelity, the adult readers were restricted to using (and not using) particular behaviors. The extent to which our findings may generalize to more naturalistic reading interactions is currently unknown. Second, although the word elaboration procedure was found to accelerate word learning for at-risk kindergartners, it is not presently clear *which part* of the procedure was most influential to vocabulary growth. That is, the elaboration procedure involved at least three potentially influential features: hearing a definition, hearing the word in a supportive context, and hearing the word multiple times (in the text, in the definition, and in the supportive context). The extent to which each feature (in isolation or in combination with the other features) contributed to word learning was not studied. Third, the vocabulary assessment in this study examined children's definitions as an indicator of word knowledge; however, vocabulary development is a gradual process in which receptive knowledge of words tends to precede expressive knowledge (Senechal, 1997) and contextualized understanding precedes decontextualized understanding (Beck et al., 2002). The assessment protocol used in this study may have underestimated children's word learning by not being sensitive to children's word knowledge in the earliest stages of maturation. Use of assessment tasks designed for tapping receptive or highly contextualized knowledge may have provided a more complete picture of intervention effects.

These limitations, in addition to consideration of the key findings of this work, suggest several important areas for further research. First, word learning in naturalistic book reading interactions involving considerable opportunities for children's active participation is a much needed area of inquiry. Experimental evaluations featuring more rather than less interactive styles of participation by children and adults would more closely approximate the naturalistic reading interactions of young children, and therefore would have greater external validity than more contrived interactions. Including exposures to targeted words outside of the book reading routine would be helpful for understanding the exact contributions of book reading relative to exposures in other activities (e.g., dramatic play). Second, the study of vocabulary development for young children, particularly those at risk, requires refined methods for evaluating incremental changes in word knowledge. The inherent weaknesses to the several approaches that have predominated the literature (e.g., multiple-choice, definitions, role play, story retellings) suggest the need for determining more sensitive ways to evaluate vocabulary growth, particularly dynamic strategies that are ecologically, culturally, and developmentally appropriate. This avenue of research has important implications to interpretations of outcomes of efficacy and effectiveness studies. Finally, a call is made for an increased focus on determining the relative and absolute effectiveness of various strategies for enhancing the vocabulary skills of at-risk children, with a particular emphasis on kindergartners. It was argued early in this report that the kindergarten year presents a unique challenge to children who have underdeveloped oral language and literacy skills. The association between kindergarten vocabulary skill and later written language achievements implicates the responsibility of speech-language pathologists and other educators for ensuring that vulnerable kindergartners develop robust vocabulary skills. Inevitably, the success of specialists in such efforts is dependent on their access to a wide array of evidence-based strategies.

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REFERENCES

American Speech-Language-Hearing Association. (2001). *Roles and responsibilities of speech-language pathologists with respect to reading and writing in children and adolescents.* Rockville, MD: Author.

Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life.* New York: Guilford Press.

Bowey, J. (1995). Socioeconomic status differences in preschool phonological sensitivity and first-grade reading achievement. *Journal of Educational Psychology, 87,* 476–487.

Brett, A., Rothlein, L., & Hurley, M. (1996). Vocabulary acquisition from listening to stories and explanations of target words. *Elementary School Journal, 96,* 415–422.

Bruss, D. (2001). *Book! Book! Book!* New York: Arthur A. Levine Books.

Bryant, P., Maclean, M., & Bradley, L. (1990). Rhyme, language, and children's reading. *Applied Psycholinguistics, 11,* 237–252.

Bynum, J. (2000). *Otis.* New York: Harcourt.

Catts, H. W., Fey, M. E., Zhang, X., & Tomblin, J. B. (2001). Estimating the risk of future reading difficulties in kindergarten children: A research-based model and its clinical implementation. *Language, Speech, and Hearing Services in Schools, 32,* 38–50.

Catts, H. W., Fey, M. E., Zhang, X., & Tomblin, J. B. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language, and Hearing Research, 45,* 1142–1157.

Chaney, C. (1994). Language development, metalinguistic awareness, and emergent literacy skills of 3-year-old children in relation to social class. *Applied Psycholinguistics, 15,* 371–394.

Chaney, C. (1998). Preschool language and metalinguistic skills are links to reading success. *Applied Psycholinguistics, 19,* 433–446.

Chapman, R. (2000). Children's language learning: An interactionist perspective. *Journal of Child Psychology and Psychiatry, 41,* 33–54.

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences.* New York: Academic Press.

Cooper, H. (1993). *The bear under the stairs.* New York: Penguin Books.

Curtis, M. E. (1987). Vocabulary testing and instruction. In M. G. McKeown & M. E. Curtis (Eds.), *The nature of vocabulary acquisition* (pp. 37–51). Hillsdale, NJ: Erlbaum.

Dickinson, D. K., & Smith, M. W. (1994). Long-term effects of preschool teachers' book readings on low-income children's vocabulary and story comprehension. *Reading Research Quarterly, 29,* 105–122.

Dickinson, D. K., & Snow, C. E. (1987). Interrelationships among prereading and oral language skills in kindergartners from two social classes. *Early Childhood Research Quarterly, 2,* 1–25.

Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test—Third Edition.* Circle Pines, MN: American Guidance Service.

Eller, R. G., Pappas, C. C., & Brown, E. (1988). The lexical development of kindergartners: Learning from written context. *Journal of Reading Behavior, 20,* 5–24.

Elley, W. B. (1989). Vocabulary acquisition from listening to stories. *Reading Research Quarterly, 24,* 174–187.

Fey, M. E. (2002, March). *Intervention research in child language disorders: Some problems and solutions.* Paper presented at the 32nd annual Mid-South Conference on Communicative Disorders, Memphis, TN.

Gackenbach, D. (1977). *Harry and the terrible whatzit.* New York: Clarion Books.

Gardner, M. F. (1990). *Expressive One Word Picture Vocabulary Test–Revised.* Novato, CA: Academic Therapy Publications.

Hargrave, A. C., & Senechal, M. (2000). A book reading intervention with preschool children who have limited vocabularies: The benefits of regular reading and dialogic reading. *Early Childhood Research Quarterly, 15,* 75–90.

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children.* Baltimore: Paul H. Brookes.

Hunter, A. (1998). *Possum and the peeper.* Boston: Houghton Mifflin.

Invernizzi, M., Meier, J. D., Swank, L., & Juel, C. (2000). *Phonological Awareness Literacy Screening: Kindergarten.* Charlottesville, VA: University of Virginia.

Jenkins, J. R., Stein, M. L., & Wysocki, K. (1984). Learning vocabulary through reading. *American Educational Research Journal, 21,* 767–787.

Justice, L. M. (2002). Word exposure conditions and preschoolers' novel word learning during shared storybook reading. *Reading Psychology, 23,* 87–106.

Justice, L. M., & Fey, M. (2003, November). *Evidence-based practices in schools.* Paper presented at the annual convention of the American Speech-Language-Hearing Association, Chicago, IL.

Kaderavek, J. N., & Justice, L. M. (2002). Shared storybook reading as an intervention context: Practices and potential pitfalls. *American Journal of Speech-Language Pathology, 11,* 395–406.

Kaméenui, E. J., Dixon, D. W., & Carnine, R. C. (1987). Issues in the design of vocabulary instruction. In M. G. McKeown & M. E. Curtis (Eds.), *The nature of vocabulary acquisition* (pp. 129–145). Hillsdale, NJ: Erlbaum.

Karweit, N. (1989). The effects of a story-reading program on the vocabulary and story comprehension skills of disadvantaged prekindergarten and kindergarten students. *Early Education and Development, 1,* 105–114.

Lawrence, M. (2000). *The caterpillar that roared.* New York: Dorling Kindersley.

Leung, C. B. (1992). Effects of word-related variables on vocabulary growth through repeated read-aloud events. *National Reading Conference Yearbook, 41,* 491–498.

Leung, C. B., & Pikulski, J. J. (1990). Incidental learning of word meanings by kindergarten and first-grade children through repeated read aloud events. *National Reading Conference Yearbook, 39,* 231–239.

Lionni, L. (1963). *Swimmy.* New York: Alfred A. Knopf.

Mayer, M. (1973). *What do you do with a kangaroo?* New York: Scholastic.

McGregor, K. K., Friedman, R. M., Reilly, R. M., & Newman, R. M. (2002). Semantic representations and naming in young

children. *Journal of Speech, Language, and Hearing Research, 45*, 332–346.

Morrow, L. M., & Smith, J. K. (1990). The effects of group size on interactive storybook reading. *Reading Research Quarterly, 25*, 213–231.

Myers, J. L. (1972). *Fundamentals of experimental design.* Boston: Allyn & Bacon.

Nagy, W. E., Anderson, R. C., & Herman, P. A. (1987). Learning word meanings from context during normal reading. *American Educational Research Journal, 24*, 237–270.

Nagy, W. E., & Herman, P. A. (1987). Breadth and depth of vocabulary knowledge: Implications for acquisition and instruction. In M. G. McKeown & M. E. Curtis (Eds.), *The nature of vocabulary acquisition* (pp. 19–36). Hillsdale, NJ: Erlbaum.

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.* Washington, DC: U.S. National Institute for Literacy.

Ninio, A. (1983). Joint book reading as a multiple vocabulary acquisition device. *Developmental Psychology, 19*, 445–451.

Pellegrini, A. D., Galda, L., Jones, I., & Perlmutter, J. (1995). Joint reading between mothers and their Head Start children: Vocabulary development in two text formats. *Discourse Processes, 19*, 441–463.

Penno, J. F., Wilkinson, I. A., & Moore, D. W. (2002). Vocabulary acquisition from teacher explanation and repeated listening to stories: Do they overcome the Matthew effect? *Journal of Educational Psychology, 94*, 23–33.

Phillips, G., & McNaughton, S. (1990). The practice of storybook reading to preschool children in mainstream New Zealand families. *Reading Research Quarterly, 25*, 196–212.

Primary dictionary. (1991). New York: Macmillan/McGraw-Hill School Division.

Reese, E., & Cox, A. (1999). Quality of adult book reading affects children's emergent literacy. *Developmental Psychology, 35*, 20–28.

Rimm-Kaufman, S. E., & Pianta, R. C. (2000). An ecological perspective on the transition to kindergarten: A theoretical framework to guide empirical research. *Journal of Applied Developmental Psychology, 21*, 491–511.

Robbins, C., & Ehri, L. C. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology, 86*, 54–64.

Roth, F. (2002). Vocabulary instruction for young children with language impairments. *Perspectives on Language Learning and Education, 9*(3), 3–7.

Scarborough, H. S. (1989). Prediction of reading disability from familial and individual differences. *Journal of Educational Psychology, 81*, 101–108.

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.

School dictionary. (1981). New York: Macmillan.

Senechal, M. (1997). The differential effect of storybook reading on preschoolers' acquisition of expressive and receptive vocabulary. *Journal of Child Language, 24*, 123–138.

Senechal, M., & Cornell, E. H. (1993). Vocabulary acquisition through shared reading experiences. *Reading Research Quarterly, 28*, 361–373.

Senechal, M., Cornell, E. H., & Broda, L. (1995). Vocabulary acquisition through shared reading experiences. *Early Childhood Research Quarterly, 27*, 317–337.

Senechal, M., Thomas, E., & Monker, J. (1995). Individual differences in 4-year-old children's acquisition of vocabulary during storybook reading. *Journal of Educational Psychology, 87*, 218–229.

Small, D. (1985). *Imogene's antlers.* New York: Crown.

Snow, C. E., Tabors, P. O., Nicholson, P. A., & Kurland, B. F. (1995). SHELL: Oral language and early literacy skills in kindergarten and first-grade children. *Journal of Research in Childhood Education, 10*, 37–48.

Stahl, S. A., & Fairbanks, M. M. (1986). The effects of vocabulary instruction: A model-based meta-analysis. *Review of Educational Research, 56*(1), 72–110.

Stevens, J. (1996). *Applied multivariate statistics for the social sciences.* Mahwah, NJ: Erlbaum.

Storkel, H. L., & Morrisette, M. L. (2002). The lexicon and phonology: Interactions in language acquisition. *Language, Speech, and Hearing Services in Schools, 33*, 24–37.

Walker, D., Greenwood, C., Hart, B., & Carta, J. (1994). Prediction of school outcomes based on early language production and socioeconomic factors. *Child Development, 65*, 606–621.

Warren-Leubecker, A., & Carter, B. W. (1988). Reading and growth in metalinguistic awareness: Relations to socioeconomic status and reading readiness skills. *Child Development, 59*, 728–742.

Washington, J. A., & Craig, H. (1999). Performances of at-risk, African American preschoolers on the Peabody Picture Vocabulary Test–III. *Language, Speech, and Hearing Services in Schools, 30*, 75–82.

Wasik, B. A., & Bond, M. A. (2001). Beyond the pages of a book: Interactive book reading and language development in preschool classrooms. *Journal of Educational Psychology, 93*, 243–250.

Wells, R. (1988). *Shy Charles.* New York: Penguin Books.

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.

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APPENDIX. STORYBOOK TITLES AND TARGET WORDS

Title (author, year)	# pages/average # words per page	Elaborated words	Non-elaborated words
Book! Book! Book! (Bruss, 2001)	29/19	heaved pouted ruffle	gathered squawked whinnied
The Caterpillar That Roared (Lawrence, 2000)	26/23	gaze ripples surface	horrified snuggled twitch
Harry and the Terrible Whatzit (Gackenbach, 1977)	30/25	discovered furnace gloomy	damp swat swung
Imogene's Antlers (Small, 1985)	26/12	overjoyed rare wandered	advice glared prodded
Otis (Bynum, 2000)	33/19	hauled ripe sidelines	hooves silky spotless
Possum and the Peeper (Hunter, 1998)	28/32	marsh racket squinting	clamor grumbling peering
Shy Charles (Wells, 1988)	28/16	embarrassed murmured trembled	nervous scarlet success
Swimmy (Lionni, 1963)	28/21	gulp marvel midday	invisible swaying swift
The Bear Under the Stairs (Cooper, 1993)	28/19	decided notice tight	awful crept haddock
What Do You Do With a Kangaroo? (Mayer, 1973)	40/26	flashing frayed stale	smooth tailor worn