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Research Article

# Moving Forward Four Words at a Time: Effects of a Supplemental Preschool Vocabulary Intervention

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**Purpose:** This study evaluated the effects of an automated, small-group intervention designed to teach preschoolers challenging vocabulary words. Previous studies have provided evidence of efficacy. In this study, we evaluated the effects of the program after doubling the number of words taught from 2 to 4 words per book.
**Method:** Seventeen preschool children listened to 1 prerecorded book per week for 9 weeks. Each storybook had embedded, interactive lessons for 4 target vocabulary words. Each lesson provided repeated exposures to words and their definitions, child-friendly contexts, and multiple opportunities for children to respond verbally to instructional prompts. Participants were asked to define the weekly targeted vocabulary before and after intervention. A repeated acquisition single-case design was used to examine the effects of the books and embedded lessons on learning of target vocabulary words.
**Results:** Treatment effects were observed for all children across many of the books. Learning of at least 2 points (i.e., 1 word) was replicated for 74.5% of 149 books tested across the 17 participants. On average, children learned to define 47% of the target vocabulary words (17 out of 36).
**Conclusions:** Results support including 4 challenging words per book, as children learned substantially more words when 4 words were taught, in comparison to previous studies. Within an iterative development process, results of the current study take us 1 step closer to creating an optimal vocabulary intervention that supports the language development of at-risk children.

Vocabulary development begins at an early age and is influenced by several factors. A young child's vocabulary opportunities, linguistic support, and literacy-related learning experiences at home can significantly affect their oral language development (Dickinson & Tabors, 2001; Greenwood et al., 2017; Hart & Risley, 1995). Fewer language experiences can result in limited oral language skills and slower rates of language development, which is evident as early as preschool, and often persist throughout a child's education. Children with limited oral language skills will struggle to acquire academic vocabulary crucial to comprehension, placing them at a higher risk for developing future reading difficulties.

The key to preventing reading difficulties is improved identification of at-risk children combined with early interventions that focus on language-related outcomes (Gettinger & Stoiber, 2008; Greenwood et al., 2013; Snow, Burns, & Griffin, 1998). Early childhood classrooms have begun to adopt a response to intervention model, which provides educators with a framework for identifying and differentiating instruction for children with limited language and early literacy skills (Greenwood et al., 2014). Once children are screened and identified, educators implement a response-to-intervention approach teaching specific skills and monitoring children's progress to ensure that children are learning.

Oral language programs that target vocabulary acquisition in early childhood are paramount. Research indicates that vocabulary knowledge is one of, if not "the," most important correlate to reading comprehension (Dickinson, Golinkoff, & Hirsh-Pasek, 2010; Taffe, Blachowicz, & Fisher, 2009). Several studies have shown significant links

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between children's early vocabulary knowledge and later reading comprehension success (Cunningham & Stanovich, 1997; Scarborough, 2001; Snow et al., 1998). In a meta-analysis of 37 studies evaluating the effect of vocabulary instruction on passage comprehension in students from prekindergarten through Grade 12, Elleman, Lindo, Morphy, and Compton (2009) reported a positive overall effect on passage comprehension outcomes. This effect was even greater for students who were identified with reading difficulties (e.g., Nash & Snowling, 2006).

Although vocabulary knowledge has been identified as an important component of emergent literacy skills, preschool vocabulary instruction is limited and varies greatly in early childhood classrooms (Dickinson, 2011; Greenwood et al., 2013). Explicit vocabulary instruction rarely occurs in early childhood classrooms and least frequently occurs in classrooms serving low-income students (Wright, 2012). The development of effective interventions that target vocabulary growth is needed to build foundational language skills necessary to become competent readers. With early intervention, it is more likely that at-risk children will progress to meet the rigorous grade-level literacy expectations dictated by state and federal education standards.

### *Vocabulary Selection*

To maximize the time spent teaching in the classroom, it is important to select the right words for instruction. Beck, McKeown, and Kucan (2002) developed a tiered framework for word selection. They recommend targeting challenging, high-utility words for instruction as these are words children will not hear often in everyday conversation but will encounter in academic texts (e.g., *significant, establish, obvious*). These are typically new terms for familiar concepts. For example, a child may already know the concept of *important,* so he or she will be able to use that knowledge to understand the more sophisticated term s*ignificant*. Biemiller (2006) takes a more developmental approach to word selection. For preliterate children (before third grade), he suggests specific instructional targets, which are known by 40%–70% of children at the end of second grade (e.g., *buckle, parcel, blab*). In contrast, Beck, McKeown, and Kucan (2013) argue that children do not learn words in a specific developmental order or a highly sequenced manner. Several researchers place emphasis on using guidelines for appropriate word selection versus teaching words from a predetermined list (Beck et al., 2002; Nation, 2001; Stahl & Nagy, 2007). One concern about selecting words from a predetermined word list is that many of the words on that list will require little to no explicit instruction (e.g., *flood, listen, stab*). Classroom teachers have been found to spend time teaching more of these basic words, which young children will typically learn without the need for instruction (Wright & Neuman, 2014). Instead, valuable instructional time should be devoted to sophisticated words because these words warrant more attention and explanation. For this reason, many researchers of vocabulary instruction have favored using carefully developed guidelines, such as those provided by Beck and colleagues (Beck et al., 2002, 2013), to select words for vocabulary instruction (e.g., Coyne, McCoach, Loftus, Zipoli, & Kapp, 2009; Neuman & Dwyer, 2009; Pollard-Durodola et al., 2011; Storkel et al., 2017; Tuckwiller, Pullen, & Coyne, 2010).

### *Vocabulary Instruction*

Reading aloud to children has been widely recommended as a means to facilitate young children's vocabulary growth (Bus, van Ijzendoorn, & Pellegrini, 1995; Lane & Wright, 2007). However, simply reading stories to children does not appear sufficient to significantly impact the learning of challenging, more sophisticated vocabulary words. Additional explanation and explicit instruction are necessary for a read aloud to impact word learning (Dickinson & Smith, 1994; Hargrave & Sénéchal, 2000). Beck and McKeown (2007) refer to this as rich instruction. During rich instruction, word meanings are explained using child-friendly language, and multiple examples of the words in a variety of contexts were provided for the children. Children learn and retain more target words when read alouds employ rich, direct instruction embedded within storybooks that provide repeated exposures to words and their meanings than when compared to reading alone in elementary grades (Beck & McKeown, 2007; Coyne et al., 2009; Justice, Meier, & Walpole, 2005; Storkel et al., 2017) and preschool classrooms (Goldstein et al., 2016; Kelley, Goldstein, Spencer, & Sherman, 2015; Spencer et al., 2012; Vuattoux, Japel, Dion, & Dupéré, 2014). For example, Justice et al. (2005) examined the effects of a storybook intervention that included elaborated instruction for targeted vocabulary. Using popular storybooks, six vocabulary words were selected that were unlikely to be familiar to kindergarten children. Half of the words were elaborated during the read aloud (i.e., taught explicitly), and the other half were not. They found that children made significant learning gains for elaborated words compared to nonelaborated words and compared to their peers in the comparison group who received business as usual. Storkel et al. (2017) expanded upon the study conducted by Justice et al. by using the same treatment condition and investigated the number of exposures children with specific language impairment required to enhance word learning. They found that 36 exposures to a word lead to optimal learning and that exposures distributed over time were better than exposures that were concentrated to a specific time period.

The majority of these studies utilized a group design to examine the effects of instruction on word learning (Beck & McKeown, 2007; Coyne et al., 2009; Goldstein et al., 2016; Justice et al., 2005; Vuattoux et al., 2014). Treatment effects from group experimental designs are generalizable to a population in general, yet it is impossible to examine the nuances associated with individual performance when comparing outcomes at the group level. Single-case experimental designs allow for a more individualized examination of treatment effects (Horner et al., 2005). Few

researchers have used this approach when investigating the effects of an instructional program on word learning (Kelley et al., 2015; Spencer et al., 2012). However, analyzing response to instruction at the individual level is a beneficial approach to intervention development because it helps elucidate the individual differences that may facilitate or hinder learning.

Considerable evidence speaks to the potential for embedding intervention into book reading contexts when teaching young children new vocabulary. Yet, there is much to be learned about the effects of such intervention. For example, we need to investigate the differential effects these instructional methods have on preschoolers with varying language levels and learning profiles. Researchers have presented contradictory evidence on the effects of children's initial language ability on vocabulary acquisition. Several studies found those with higher initial language abilities made greater word learning gains compared to peers with lower initial abilities (Coyne, Simmons, Kame'enui, & Stoolmiller, 2004; Goldstein et al., 2017; Penno, Wilkinson, & Moore, 2002; Robbins & Ehri, 1994), while others found no difference in word learning outcomes between at-risk and typically developing children (Biemiller & Slonim, 2001). More studies are needed to better understand the relative benefits explicit vocabulary instruction has on all children and how intervention could be adapted to maximize learning for children with varying experiences and abilities.

### *Story Friends Intervention*

Story Friends (Goldstein & Kelley, 2016) is an oral language intervention program designed for preschool that provides explicit vocabulary instruction. Small groups of children listen using headphones and respond to embedded lessons within prerecorded stories with adult supervision. Two challenging vocabulary words are embedded in each book with rich, explicit instruction that provides child-friendly definitions, provides multiple contexts for words, allows for active responding, and provides multiple opportunities for practice and learning. See Table 1 for a sample vocabulary lesson. Results from Story Friends efficacy studies (Goldstein et al., 2016; Kelley et al., 2015; Spencer et al., 2012) found that children learned, on average, 30%–50% of target words instructed. These promising results suggest the potential to capitalize further on the learning gains demonstrated in prior efficacy studies by increasing the number of words taught per book.

The purpose of this study was to assess the efficacy and feasibility of teaching four challenging vocabulary words in a book each week. We were also interested in examining the effects this program had on children with a range of language abilities. It was hypothesized that children would learn more words with the increase in target words taught each week, but this learning may differ among children with varying language abilities. Specifically, we hypothesized that those with higher initial language abilities would have greater word learning gains than their peers with lower abilities. This research addressed the following questions:

1. To what extent do preschool children demonstrate vocabulary learning when explicit instruction of four target words is embedded within prerecorded storybook activities presented to small groups of children?
2. Are differential effects observed for children with differing initial language abilities?

## Method

### *Participants*

Twenty-one 4- and 5-year-olds enrolled in a voluntary prekindergarten school readiness program were recruited from two child care facilities in the Tampa area. These facilities primarily serve children from low-income families. One child was excluded from the study because limited English language skills prevented him from completing language assessments. Three participants left the schools during the study, so results for the 17 participants who completed the full duration of the study are reported.

Children completed two norm-referenced measures to describe the language abilities of participants: a measure of single-word receptive vocabulary (Peabody Picture Vocabulary Test–Fourth Edition [PPVT-4]; Dunn & Dunn, 2007) and an omnibus language measure (Clinical Evaluation of Language Fundamentals Preschool–Second Edition [CELF Preschool-2]; Wiig, Secord, & Semel, 2004). Both measures provide standard scores with a mean of 100 and an *SD* of 15. Participants' performance on these measures is presented in Table 2.

In previous studies, this intervention was only implemented with children who had limited language relative to normative means on the PPVT-4 (standard scores within 0.5–1.5 *SD*s, 92–78; Goldstein et al., 2016; Greenwood et al., 2016; Kelley et al., 2015; Spencer et al., 2012). In

**Table 1.** Sample vocabulary lesson: *Ellie's First Day*.

| | |
|---|---|
| Vocabulary word | *enormous* |
| Embedded, explicit instruction | *Ellie is enormous! She is really big! Enormous. Say enormous. Enormous means really big. What word means really big? Enormous! Great job! Let's see. Can you tell me some things that are enormous? I'm thinking of… a school bus! A mountain! Or a building! Those are things that are really big. Now, pretend you are going to give Ellie a hug. Remember, she is enormous, so make your arms really big! Whew! Tell me, what does enormous mean? Really big! That's right!* |
| End of story review | *Look at the picture of the dump truck. It is really big! The dump truck is enormous. Say enormous. Tell me, what does enormous mean? Really big! Great job!* |

**Table 2.** Characteristics of participants.

| School | Child | Age | Gender | PPVT-4 | CELF Preschool-2 |
|---|---|---|---|---|---|
| F | F1 | 4;7 | Female | 83 | 88 |
| | F2 | 4;5 | Male | 90 | 83 |
| | F3 | 4;6 | Male | 93 | 90 |
| | F4 | 4;6 | Male | 93 | 96 |
| | F5 | 4;3 | Male | 100 | 96 |
| | F6 | 4;5 | Female | 110 | 114 |
| | F7 | 4;10 | Male | 120 | 100 |
| | F8 | 4;9 | Female | 123 | 121 |
| | F9 | 4;5 | Male | 127 | 114 |
| J | J1 | 4;2 | Female | 70 | 63 |
| | J2 | 4;4 | Male | 72 | 83 |
| | J3 | 4;2 | Male | 77 | 59 |
| | J4 | 4;1 | Male | 81 | 69 |
| | J5 | 4;9 | Male | 93 | 90 |
| | J6 | 5;0 | Male | 108 | 92 |
| | J7 | 5;2 | Male | 109 | 92 |
| | J8 | 4;5 | Female | 118 | 119 |
| *M* (*SD*) | | 4;6 | | 98.1 (18.2) | 92.3 (18.2) |

*Note.* School F received Forest Friends, and School J received Jungle Friends. Age at the beginning of the study is reported in years; months. PPVT-4 = Peabody Picture Vocabulary Test–Fourth Edition (Dunn & Dunn, 2007); CELF Preschool-2 = Clinical Evaluation of Language Fundamentals Preschool–Second Edition (Wiig et al., 2004).

this study, we were interested in examining the differential effects this program had on children with a broader range of initial language abilities, so we included children with standard scores ±2.0 *SD*s (70–130) on either the PPVT-4 or the CELF Preschool-2. The average PPVT-4 score was 98.1 (*SD* = 18.2, range: 70–127), and the average CELF Preschool-2 score was 92.3 (*SD* = 18.2, range: 59–121).

## *Procedure*

### Story Friends Word Selection Process

In previous versions of the program, each book included lessons for two target vocabulary words. For the current study, an additional two words were selected, and lessons for the new words were created. Because the books were relatively simple, short stories, it was feasible to add two additional words without making the listening sessions much longer. Longer sessions might have a negative impact on children's attentional capabilities and were likely to exceed the 10–15 min allotted in typical classrooms for rotations through a series of small-group activities.

To select the additional target vocabulary, we used the same process for word selection that Kelley et al. (2015) used during past iterations of Story Friends development. Three main criteria were considered: (a) the words had to fit within the existing stories, (b) words could be defined in an easily understandable way, and (c) there were multiple child-friendly contexts for the word. Four members of the research team, including the developers of the previous two-word versions, worked together to select words. The research team members were familiar with Beck et al.'s (2013) tiered framework, and they reviewed the criteria and process used in selecting words for previous versions. Each researcher went through the stories to create a list of possible words that fit the stories' context and met our criteria. These words were often more sophisticated synonyms of words already in the story (e.g., *burst* instead of *pop*). We avoided words with similar semantic and phonological features as target words in the same book to minimize word confusion. For example, previous studies indicated that children confused "enormous" and "ignore," perhaps because the words sounded similar. Decisions about word selection and placement in the stories were made by group discussion and consensus. In a few cases, we had to reword the story to make the new target word fit; however, this did not alter the overall story structure, so minimal edits were made.

### Story Friends Embedded, Explicit Instruction

In the current study, each Story Friends book provided preschoolers with embedded, explicit instruction for four challenging vocabulary words. Sample vocabulary targets are provided in Table 3. We created embedded lessons for the new target words that matched the existing lessons using systematic instructional language. Each lesson includes a simple definition and child-friendly contexts relating the word to young children's everyday experiences. Throughout the lesson, the narrator provides multiple opportunities for children to respond (e.g., say the word or definition) and repeated exposures to the word. Children hear the word eight to 11 times in one lesson. The target words are reviewed again at the end of the story using an additional child-friendly context, and children are given the opportunity to say the word and the definition.

### Story Friends Implementation

Intervention took place in an adjacent classroom free from distractions. Intervention sessions were conducted in small groups (three to four children), with an adult facilitator who was a member of the research team (trained undergraduate and graduate research assistants). Children listened to the same prerecorded storybook 3 days a week under headphones in a small group while the adult facilitator supervised. The facilitator monitored children's behaviors during the lesson (i.e., children turned to the correct page, responded to instruction, kept headphones on). Two series of Story Friends were used, *Jungle Friends* and *Forest*

**Table 3.** Vocabulary targets in revised books.

| Book | Original version | Revised version |
|---|---|---|
| *Ellie's First Day* | enormous<br>different | bolt<br>enormous<br>destroy<br>different |
| *Pablo's Prickly Problem* | terrified<br>protect | prepare<br>terrified<br>protect<br>burst |

*Friends,* one in each classroom. After the third listen, children's vocabulary learning was assessed using a curriculum-based vocabulary measure.

## Measures

### Norm-Referenced Language Measures

Two standardized, norm-referenced language measures were administered to all consented children prior to the intervention. The PPVT-4 (Dunn & Dunn, 2007), a measure of receptive vocabulary, was used to characterize children's receptive vocabulary and to identify participants. The average split-half reliability for the PPVT-4 is reported as .94, and test–retest reliability is .93 across age and grade levels. The Core Language score (CLS) of the CELF Preschool-2 (Wiig et al., 2004) was used to characterize participants' general language ability and overall language performance. The CLS includes three subtests: Sentence Structure, Word Structure, and Expressive Vocabulary. Reported split-half reliability for the CLS ranges from .92 to .94 for children between 4 and 5 years of age, and test–retest reliability for the CLS is reported to be .89.

### Curriculum-Based Measure

The Story Friends mastery monitoring probe was the primary outcome measure for vocabulary learning. The mastery monitoring probes are a researcher-created, curriculum-based measure developed for use with Story Friends. The mastery monitoring probes have been the measure of vocabulary learning in previous Story Friends studies (Goldstein et al., 2016; Greenwood et al., 2016; Kelley et al., 2015; Spencer et al., 2012). For each target word, children are asked to provide a definition in response to an open-ended question, that is, "Tell me, what does (target word) mean?" Responses are scored on a 0- to 2-point scale: 0 points for an incorrect response, 1 point for a partial or related response, and 2 points for a correct response. In the current study, the mastery monitoring probes were administered before and after each week of intervention. All assessments were administered individually by trained research staff members. The internal consistency of the mastery monitoring probes was high for this sample (Cronbach's $\alpha = .95$).

## Fidelity and Reliability

Trained observers assessed implementation fidelity for 20% of the vocabulary lessons using an observation checklist. The checklist included key components of the small-group listening center and facilitator behavior (i.e., each child has a book and is wearing headphones, facilitator is wearing headphones, correct and complete audio is played, behavior expectations are reviewed, nonspecific positive feedback is given, facilitator does not provide additional instruction). The average implementation fidelity was 94%, ranging from 70% to 100%. There were two sessions with low fidelity due to behavior incidents that impacted the implementation of the listening center.

The fidelity checklist was also used to record child behaviors during the lessons to monitor active responding that included repeating the word, responding to instruction by verbally answering a question or acting out a response (e.g., *Now, pretend you are going to give Ellie a hug. Remember, she is enormous, so make your arms really big!*), and repeating the definition. On average, children responded to instruction 61% of the time, ranging from 50% to 82%.

Twenty percent of the weekly mastery monitoring probes were randomly selected and assessed for administration fidelity and scoring reliability. A trained research staff member blind to assessment period (pre- or posttest) listened to the audio-recorded testing sessions and completed procedural checklists specific to the probe protocol. The administration fidelity for this study averaged 99.6%, ranging from 88% to 100%. Scoring was completed using a detailed scoring guide created for the mastery monitoring probes that includes a scoring rubric and sample responses. Item-by-item interrater agreement calculated for scoring reliability averaged 98.8%, ranging from 75% to 100%.

To ensure children received the intended dosage of the intervention (listens to the story three times), attendance logs were kept noting the number of times children were present and participated in the intervention and any behavior incidents that impeded or prohibited participation. On average, children listened to each book 2.9 times. Of 54 intervention sessions, there were two behavior incidents that impeded a child's participation in the listening center. Overall, attendance and behavior did not seem to interfere with children's participation in the intervention or the results of our study.

## Experimental Design

A repeated acquisition experimental design was used to examine the effects of instruction on word learning. The repeated acquisition design is an alternative to multiple baseline designs when examining multiple sets of nonreversible target behaviors (Gast & Ledford, 2014; Kennedy, 2005). Unlike a multiple baseline design, a repeated acquisition design allows for repeated measurement of the same behavior (e.g., vocabulary knowledge) when the response sets are different (e.g., different target words each week) during brief baseline and treatment phases. The vocabulary targets for the Story Friends program are challenging words, rarely known and/or used by preschoolers. For this study, repeated demonstration of word learning was evaluated by comparing pre- and postintervention responses to determine the extent to which instruction facilitated vocabulary learning. In repeated acquisition design, experimental control is demonstrated by the replication of learning effects within and across participants. Each book provides an opportunity to learn four words replicated nine times within participants, as well as replicated across subjects ($n = 17$); thus, $9 \times 17 = 153$ possible replications of experimental effects. Improvements are judged by posttest scores exceeding pretest scores for each book.

## Results

The effects of explicit, embedded vocabulary instruction of four target words per book were analyzed by graphing the scores of the mastery monitoring probes for each child. Figure 1 includes panels for each participant that are ordered from low to high PPVT-4 standard scores, which are shown under each participant ID. As shown in Figure 1, a pretest score (open circle) and posttest score (closed circle) for each book were plotted for each child.

Consistent with repeated acquisition designs, evidence of treatment effects is repeatedly examined by comparing pretest and posttest scores for each book within and across participants. A treatment effect for each book was defined as an increase of at least 2 points from pretest to posttest, representing an improvement consistent with at least a complete definition for one word or partial definitions for two words. For example, in Figure 1, Child J1 had a score of 0 at pretest and a score of 2 at posttest for Book 2. For each participant, nine replications of treatment effects were possible (one per book). For example, Child F1 had seven replications of treatment effects (Books 2, 3, 4, 6, 7, 8, 9). Treatment effects were replicated across all children for many of the books, 111 of 149 possible replications (75%). We had missing data for four books because of attendance. Treatment effects were observed for a mean of 6.7 books per child (range: 3–9). On rare occasions, children had higher pretest scores than posttest scores. For example, Child F7 had a score of 2 at pretest and a score of 0 at posttest for Book 9. Across all participants and books, this only occurred five times (3%).

Word-level results were examined by calculating gain scores for each child and each word. Vocabulary scores were low at pretest ($M = 0.22$ points per book), indicating children had limited knowledge of target words prior to intervention. On average, children learned 17 words, that is, approximately two words per book.

Next, we examined how pre-intervention vocabulary and language skills related to vocabulary learning. Intercorrelations among children's language scores and word learning revealed strong positive relations between PPVT-4 scores and word learning ($r = .57$, $p < .05$) and CELF Preschool-2 scores and word learning ($r = .70$, $p < .01$). Our results suggest a relation exists between the number of vocabulary words children learned and their pre-intervention oral language skills. Children with higher PPVT-4 scores knew more words at pretest and learned more words during intervention than children with lower PPVT-4 scores. For example, in Figure 1, Child J1, whose PPVT-4 score was 70, had a pretest score of 0 for each book. Child F9, whose PPVT-4 score was 127, had an average pretest score of 2.9 points per book (range: 0–6), indicating that she could provide the full definition for 1.5 words or had partial knowledge of three words per book. Second, there are observed differences in children's word learning. For example, Child F5, whose PPVT-4 score was 100, demonstrated effects for all nine books, with an average gain of 6.2 points per book (range: 4–8 points). Child J3, whose PPVT-4 score was 77, demonstrated effects for only four books with an average gain of 1 point per book (range: 0–3).

## Discussion

The purpose of this study was to examine the extent to which preschool children demonstrate vocabulary learning when explicit instruction of four target words per book was embedded within prerecorded storybook activities. Additionally, we were interested in examining the differential effects this program had on children with a range of language abilities.

Previous studies examining the effects of Story Friends taught two words per book. We continued to use Beck et al.'s (2013) framework for word selection to incorporate two additional instructional targets into preexisting stories. Results indicate children were still able to learn sophisticated words when we increased the number of instructional targets. On average, children learned approximately 47% of the vocabulary words taught (17 of 36). Providing decontextualized definitions is a challenging task for preschoolers and subject to measurement error. For example, a higher pretest score than posttest score could reflect a child being able to provide partial definitions for a few words at pretest, but not at posttest. Alternatively, children sometimes confuse definitions among new words at posttest.

Table 4 summarizes the average word learning outcomes from previous Story Friends studies. Word learning was assessed using the same procedure in all of these studies; children were asked to define the vocabulary targets using the same prompt (*"Tell me, what does (word) mean?*) and scored using the same criteria (2 points for a correct definition, 1 point for a partial or related response, and 0 points for an incorrect response). Children in the current study learned more words and the second highest percentage of words compared to children who received the two-word version. Children learned less than one word a week in the studies of Goldstein et al. (2016) and Greenwood et al. (2016) and approximately one word a week in the study of Spencer et al. (2012). Overall, children in the current study learned approximately two words a week, twice as many words than the previous studies. Even though the average percentage of word learning is lower than the results of Kelley et al. (2015; 47% compared to their 56%), the number of words learned is greater as a result of the four-word version of Story Friends, with children learning 17 words compared to their 10. When we increase the number of instructional targets, children learned more words because more words were taught.

Intercorrelations revealed preliminary evidence that differences in language abilities contributed to differences in word learning. We consider these results preliminary in light of a relatively small sample size. However, this relation was not evident in prior Story Friends investigations, which found that initial PPVT-4 and CELF Preschool-2 scores did not influence vocabulary learning (Goldstein et al., 2016; Kelley et al., 2015). The limited range of

**Figure 1.** Vocabulary mastery monitoring probe scores at pretest (○) and posttest (●). Graphs are organized by Peabody Picture Vocabulary Test–Fourth Edition (PPVT-4) score and student number.

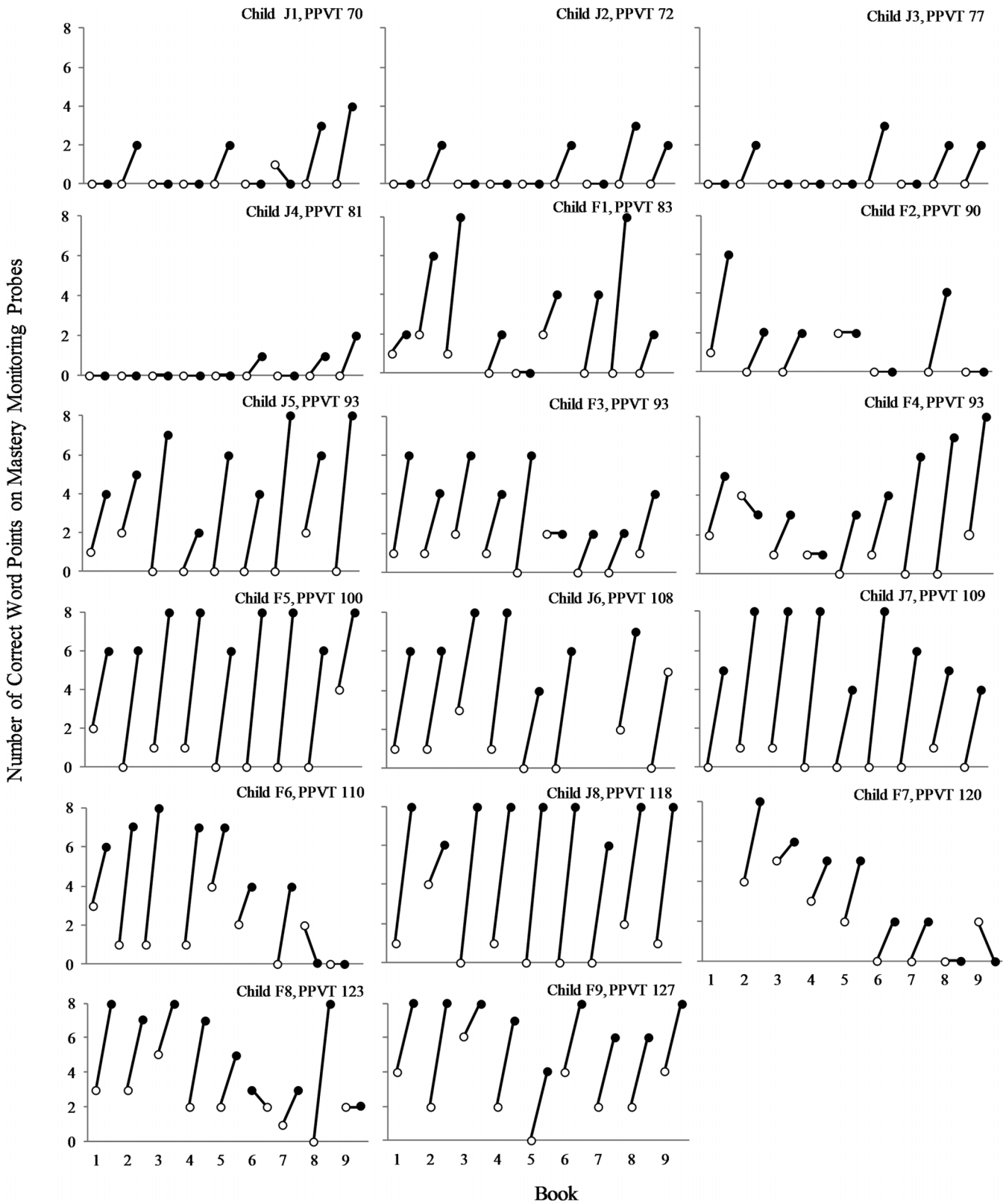

**Table 4.** Summary of Story Friends studies.

| Study | *n* | Version | PPVT-4 | | CELF Preschool-2 | | Average word learning |
|---|---|---|---|---|---|---|---|
| | | | *M* (*SD*) | Range | *M* (*SD*) | Range | |
| Spencer et al. (2012) | 9 | 2-word | 84.3 (5.45) | 78–96 | 86.44 (7.18) | 73–94 | 8/18 (45%) |
| Kelley et al. (2015) | 9 | 2-word | 83.44 (4.22) | 77–90 | 89.11 (8.43) | 79–98 | 10/18 (56%) |
| Goldstein et al. (2016) | 85 | 2-word | 83.9 (5.32) | 71–96 | 83.10 (11.07) | Not reported | 5/18 (28%) |
| Greenwood et al. (2016) | 9 | 2-word | 86.9 (11.4) | 73–107 | 72.60 (14.20) | 50–102 | 5/18 (28%) |
| This study | 17 | 4-word | 98.1 (18.15) | 70–127 | 92.30 (18.16) | 59–121 | 17/36 (47%) |

*Note.* PPVT-4 = Peabody Picture Vocabulary Test–Fourth Edition; CELF Preschool-2 = Clinical Evaluation of Language Fundamentals Preschool–Second Edition.

children's PPVT-4 and CELF Preschool-2 standard scores could explain why Goldstein et al. (2016) and Kelley et al. (2015) did not observe the similar relations, as it is more difficult to detect relations when conducting analyses with a restricted range of test scores.

Research has demonstrated conflicting evidence on the effects initial language ability has on vocabulary learning. In many studies, children with higher vocabulary scores at pretest learn more words in intervention than children with lower vocabulary scores (e.g., Coyne et al., 2004; Penno et al., 2002). However, Justice et al. (2005) reported the opposite: Children with lower vocabulary scores made the largest gains. Results of our study corroborate results of those who found that children with limited oral language skills may struggle to learn sophisticated target words (Coyne et al., 2004; Goldstein et al., 2017; Penno et al., 2002; Robbins & Ehri, 1994). Language ability alone may not truly represent a child's risk status. It could be that the combination of several unique factors contributes to a child's ability to acquire new vocabulary words. Marulis and Neuman (2010) found significant differential effects on word learning outcomes when socioeconomic status was combined with other risk factors (e.g., special education status). Future studies should be done to determine factors associated with word learning (e.g., home literacy practices, maternal education level). An understanding of these factors will help us design a vocabulary program that will meet the diverse learning needs of all students.

We found great variability in learning of vocabulary targets, with some words that many children learned and some that very few learned. The differences in vocabulary learning could be attributed to the words chosen for instruction. Children may be more likely to learn words that are more concrete regardless of language ability compared to words that are more abstract. McDonough, Song, Hirsh-Pasek, Golinkoff, and Lannon (2011) found a relation between imageability and age of acquisition when examining word learning in young children. They found that words that were more concrete or highly imageable were easier to acquire and acquired earlier than words that were more abstract. Findings from our study support this. As an example, children struggled to learn the word *wise* (defined as *smart*), a more abstract concept. Only 37.4% of children (three of eight) were able to correctly define the word. We then discovered that children could not easily define the word *smart*; even the definition was still too abstract, which made the word *wise* more difficult to learn. Interestingly, all eight children were able to define the word *sprint,* a seemingly more concrete word. We assume that many children already had a strong representation for the concept *running,* which may have facilitated their learning of *sprint*. The sophisticated words we choose for instruction should be "a more refined label for concepts with which young learners are already familiar" (Beck & McKeown, 2007, p. 253). There is a delicate balance between identifying the words that children will acquire and incorporate into their lexicon and words that may not be learned because they are too difficult.

Although word frequency norms, phonotactic probabilities, and other lexical characteristics have been shown to relate to word learning, concreteness or imageability seems to have especially strong effects (Gillette, Gleitman, Gleitman, & Lederer, 1999; McDonough et al., 2011). Results from our study indicate that more abstract words may be harder to teach; a closer examination of concreteness levels and word learning is warranted in future research. Findings from additional investigations could help guide the word selection process when designing a vocabulary program for young children.

### *Limitations and Future Directions*

There are limitations worth noting. In the current study, members of the research team implemented the small-group lessons in this study with strict adherence to lesson dosage. Dosage was a priority, and make-up sessions were easily delivered by research staff when children returned after an absence. Because of this, implementation fidelity was very high. Although the automated nature of Story Friends eliminates most barriers that educators face in achieving implementation fidelity, it may be more difficult for educators to find time to ensure children receive three lessons per week, particularly when children are absent frequently. Thus, dosage may be affected and implementation may be reduced when educators act as interventionists. Future studies will examine the feasibility and fidelity of implementation when educators implement the four-word version of Story Friends in authentic preschool settings.

Story Friends is designed to be implemented three times a week, but it could be, for children with higher language abilities, three listens are not necessary. Further investigation is warranted to determine the optimal dosage for groups of children with differing pre-intervention language abilities. This program is intended to be used as a supplemental program in preschool classrooms. Used alone, teaching four words a week is insufficient to impact their overall language development. Vocabulary instruction should occur throughout the day. When this happens, children are learning more than just four vocabulary words a week. Teachers should enhance whole-group read alouds by teaching novel vocabulary words from storybooks and explain words that relate new themes for the week, including science, social studies, art, or music. In doing so, teachers will provide children with rich language experiences that will enhance their vocabulary growth.

Meaningful measurement of vocabulary learning in preschool children presents a challenge. In the current study, we chose to focus on the ability of children to define the target vocabulary words and to limit the amount of testing to what a teacher might reasonably be able to accomplish. Although the mastery monitoring probe provided a rigorous test of the decontextualized, definitional vocabulary knowledge of young children, it did not capture information about receptive knowledge or about children's ability to use the vocabulary words in everyday conversations. Future studies might address this limitation by including multiple measures of vocabulary knowledge or by probing vocabulary use in multiple contexts.

It is important to note that participants in the current study had higher pre-intervention vocabulary and language scores than in previous studies, which may explain some of the vocabulary learning. Table 4 also summarizes the differences in participants across the Story Friends line of research. Participants in the current study had a wide range of initial language abilities as measured by the PPVT-4 and the CELF Preschool-2. The average PPVT-4 and CELF Preschool-2 standard scores were higher compared to the standard scores of participants from previous studies. Including children with higher initial language abilities may have influenced the word learning outcomes for this study. We found that they learned more words as a result of the explicit, embedded instruction compared to their peers with lower initial language abilities. Given that Story Friends was designed to be used with children who have limited oral language skills, future studies will examine the effects this revised version has on the word learning of children who may require supplemental instruction to acquire sophisticated vocabulary.

Regardless of pre-intervention language abilities, all children in the current study benefitted from instruction. However, it can be difficult for educators to implement the small-group Story Friends lessons with their whole class. Developing instructional strategies that educators can use outside the small-group listening center (e.g., whole group, transition times, centers) may be easier for educators to implement with all students throughout their day. Examining the extent to which these short activities enhance word learning is key to developing a comprehensive vocabulary program that is flexible enough to meet the instructional needs of all children.

## Conclusion

When books and lessons were revised to include more vocabulary words and lessons, children in the current study learned more words than children in previous studies when fewer words were taught. This finding suggests that increasing the number of words taught to four words per book within the Story Friends program is feasible and will result in larger increases in vocabulary knowledge. These findings add to our understanding of best practices for vocabulary intervention in preschool and provide further evidence that children can learn sophisticated vocabulary when instruction is explicit, is repeated often, and provides child-friendly contexts.

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