Research Article

Iterative Development of a Home Review Program to Promote Preschoolers' Vocabulary Skills: Social Validity and Learning Outcomes

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Purpose: This article describes the iterative development of a home review program designed to augment vocabulary instruction for young children (ages 4 and 5 years) occurring at school through the use of a home review component.
Method: A pilot study followed by two experiments used adapted alternating treatment designs to compare the learning of academic words taught at school to words taught at school and reviewed at home. At school, children in small groups were taught academic words embedded in prerecorded storybooks for 6 weeks. Children were given materials such as stickers with review prompts (e.g., "Tell me what *brave* means") to take home for half the words. Across iterations of the home intervention, the home review component was enhanced by promoting parent engagement and buy-in through in-person training, video modeling, and daily text message reminders. Visual analyses of single-subject graphs, multilevel modeling, and social validity

measures were used to evaluate the additive effects and feasibility of the home review component.
Results: Social validity results informed each iteration of the home program. The effects of the home program across sites were mixed, with only one site showing consistently strong effects. Superior learning was evident in the school + home review condition for families that reviewed words frequently at home. Although the home review program was effective in improving the vocabulary skills of many children, some families had considerable difficulty practicing vocabulary words.
Conclusion: These studies highlight the importance of using social validity measures to inform iterative development of home interventions that promote feasible strategies for enhancing the home language environment. Further research is needed to identify strategies that stimulate facilitators and overcome barriers to implementation, especially in high-stress homes, to enrich the home language environments of more families.

Preschoolers' vocabulary is a strong predictor of their future academic success and reading abilities, especially comprehension (Dickinson & Porche, 2011; Stahl & Nagy, 2007; Tunmer & Chapman, 2012; Walker et al., 1994). Yet, systematic and explicit instruction of sophisticated, academically relevant vocabulary is largely missing from preschool classrooms and from commercially available preschool curricula. Beck et al. (2013)

recommend teaching Tier 2 vocabulary. We choose to call these words "academic vocabulary" as they typically are not used during conversational speech with children, but they have high educational utility and are likely to be encountered in books (Beck & McKeown, 2007; Coyne et al., 2007). Although challenging, these words have the capacity to broaden the lexicon of young children, thereby improving the odds that they will be able to decode, recognize, and understand more words as they become readers (Vadasy et al., 2013).

Young children enter kindergarten with vast differences in their vocabulary knowledge (Hart & Risley, 1995; Hoff, 2003; Weisleder & Fernald, 2013). These differences place some children at greater risk for academic difficulties

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(Cartmill et al., 2013; Dickinson & Porche, 2011; Hoff, 2003; Suskind & Suskind, 2015). Differences in vocabulary exposure at home and at school are strong contributors to this persistent gap in word knowledge across groups of children (Walker et al., 1994). Providing timely, effective vocabulary intervention that supports word learning at school and at home can potentially promote the academic success of at-risk children.

Bridging Vocabulary Instruction Between the School and Home

Most of the existing vocabulary interventions for preschoolers are delivered either at home (Fielding-Barnsley & Purdie, 2003; Mol & Neuman, 2014; Price et al., 2009; Roberts, 2008; Whitehurst et al., 1994) or at school (Gonzalez et al., 2010; Neuman et al., 2011; Pollard-Durodola et al., 2011; Wasik & Hindman, 2011). Few studies have investigated the potential benefit of providing at-risk preschoolers with vocabulary intervention that connects instruction between school and home settings (Lonigan & Whitehurst, 1998; Whitehurst & Lonigan, 1998). Young children benefit from vocabulary exposure through adult interactions in the settings in which they spend most of their time (Dickinson & Tabors, 2001), namely, homes (Mol & Neuman, 2014; Price et al., 2009; Reese et al., 2010) and classrooms (Landry et al., 2009; Loftus-Rattan et al., 2016; Pollard-Durodola et al., 2011; Wasik & Hindman, 2011).

The collective effort of teachers and caregivers using academic vocabulary during adult–child conversations could provide at-risk children with more word-learning opportunities (Neuman & Wright, 2014). Whitehurst and Lonigan (1998) found that vocabulary interventions combining instruction across the school and home settings for preschoolers yielded greater vocabulary gains than vocabulary instruction occurring only in classrooms. Aligning vocabulary instruction between school and home also has the potential of creating more consistent learning environments for young children (Dickinson & Tabors, 2001; Hindman et al., 2016; Lonigan & Whitehurst, 1998).

The most obvious barrier to successful home vocabulary intervention is lack of implementation (Mendez, 2010). This barrier is likely to be more acute in low-income homes that experience limited financial resources, scarcity of time, and stress associated with daily routines in their home environments (Mendez, 2010; Shonkoff & Fisher, 2013). These challenges could hinder caregivers' participation in home vocabulary interventions (K. E. Smith et al., 2005; Teti et al., 2017). Indeed, these challenges often take priority in attempts to mitigate the effects of these risk factors (Halgunseth, 2009; Shonkoff & Fisher, 2013). Thus, it is important to consider how to minimize demands and maximize potential effects of parent involvement.

Promoting parent engagement, setting realistic expectations, and increasing implementation at home requires collaboration between caregivers and professionals. For example, teachers and caregivers might employ strategies for maximizing two-way communication and involving

caregivers in decision making to build a partnership (Halgunseth, 2009; Halpern, 2000; Teti et al., 2017). Family engagement is likely to be maximized when tangible benefits (e.g., transportation and child care services, home education resources) and intangible benefits (e.g., environments that welcome families) outweigh the costs of participation (e.g., time and effort; Halgunseth, 2009). It also might be beneficial to provide parent education regarding their important role in promoting children's vocabulary skills (Hart & Risley, 1995).

To better understand what intervention components are perceived as feasible, valuable, and sustainable in authentic environments, we need to gather feedback from caregivers (Aldridge et al., 2016; Fixsen et al., 2013). One way of gathering, evaluating, and incorporating caregiver feedback is to measure social validity. Schwartz and Baer (1991) define social validity as "the use of evaluative feedback from consumers to guide program planning and evaluation…." (p. 189). Although social validity is a vital component of external validity, it is often overlooked (Goldstein, 2016). Incorporating social validity measures can potentially improve the implementation of empirically supported practices in real-world settings (Eccles & Mittman, 2006; Goldstein, 2016). Measuring social validity at all stages of development (i.e., before, during, and after) has the potential to enhance the feasibility, generality, and sustainability of interventions. Although social validity is important in developing evidence-base interventions, it is seldom reported in intervention studies (Goldstein et al., 2014; Soto et al., 2019).

Story Friends

Story Friends is a supplemental vocabulary curriculum for preschoolers at risk for language and academic difficulties (Goldstein et al., 2016; Kelley et al., 2015; Spencer et al., 2012). This curriculum targets academic vocabulary (e.g., *brave, gorgeous, tumble*) through lessons embedded in storybooks. Academic, Tier 2 vocabulary is taught using the instructional procedures consistent with robust vocabulary instruction described by Beck et al. (2013).

Story Friends teaches vocabulary skills through prerecorded storybooks that contain embedded lessons. *Story Friends* is composed of two book series: *Jungle Friends* and *Forest Friends*. Each book series contains 13 books: one introductory book, nine instructional books, and three review books. Each book teaches two (Kelley et al., 2015) or four (Peters-Sanders et al., 2020) academic words. Embedded lessons provide multiple response opportunities, child-friendly definitions, examples and nonexamples, and text-to-life connections (Beck & McKeown, 2007). Each story takes about 10 min to complete. *Story Friends* books are delivered in small groups of three to four children who listen to the prerecorded stories under headphones. An adult facilitator ensures that children are on the right page and they are responding to the prompts in the book. Children hear the same book three times in a week before progressing to the next story.

The efficacy of *Story Friends* has been evaluated through a series of single-subject experimental design studies (Greenwood et al., 2016; Kelley & Goldstein, 2014; Kelley et al., 2015; Peters-Sanders et al., 2020; Seven et al., 2020; Spencer et al., 2012) and cluster-randomized group design studies (Goldstein et al., 2016; Kelley et al., 2020, 2015). Across studies, children identified with low vocabulary knowledge who received *Story Friends* instruction learned 30%–50% of the challenging words taught (Goldstein et al., 2016; Kelley et al., 2015; Spencer et al., 2012). This rate of learning tends to be higher than other studies seeking to explicitly teach academic words (see Kelley et al., 2015).

These promising findings prompted further development of *Story Friends* to increase children's vocabulary learning. One way of strengthening the instruction provided in *Story Friends* is to provide additional opportunities for review and practice (Neuman & Wright, 2014). A home review component of *Story Friends* was developed because parents are often an underused resource for facilitating preschoolers' vocabulary knowledge (Reese et al., 2010) and because there is a robust body of literature indicating that caregivers play a crucial role in young children's vocabulary acquisition (Hart & Risley, 1995; Hoff, 2003, 2006; Pan et al., 2005; Weisleder & Fernald, 2013; Weizman & Snow, 2001). It was hypothesized that providing children with additional response opportunities at home would result in increased word learning.

Piloting of a Home Review Component of Story Friends

One way to encourage additional opportunities for practicing targeted vocabulary words is to have children recruit reinforcement through practice activities (Alber & Heward, 2000). Recruitment of reinforcement (Alber & Heward, 2000; Craft et al., 1998; Fowler et al., 2007; Wolford et al., 2001) is a strategy in which children are encouraged to elicit positive adult attention. An example of recruitment of reinforcement is when a child is encouraged to call the positive attention of an adult when demonstrating positive behavior by saying, "Look, I finished cleaning the toys!" (Craft et al., 1998). This seems to be a powerful and cost-effective way of facilitating children's active involvement in their own learning while eliciting adult praise (Alber & Heward, 2000).

This recruitment of reinforcement strategy served as the basis for a small-scale pilot study conducted to evaluate the feasibility of a home review component of *Story Friends.* After obtaining permission from the institutional review board (IRB), parents and children consented to participate in an initial pilot study. Six preschoolers (ages 4–5 years) listened to six *Story Friends* books containing embedded vocabulary instruction in small groups for 6 weeks at school. At the end of each week, the interventionists provided the children with stickers to take home containing prompts to recruit reinforcement, such as "Ask me what *brave* means." Words on stickers were counterbalanced among the children.

The interventionists sent home a note at the beginning of the pilot study explaining the home practice program to the parents, as well as weekly forms for the parents to indicate how often they practiced the target words at home. At the end of the review week, children were asked to define the targets words using a researcher-developed measure, but results did not reveal discernable effects of the home program on children's word learning.

Follow-up social validity interviews of parents helped explain the results. Although parents reported that they enjoyed receiving the stickers, they admitted rarely practicing the words at home. Some parents reported that they did not check their children's backpack regularly as they received an abundance of miscellaneous papers each day. Parents offered a number of suggestions about better ways to remind them to practice the words. Although the research team postulated that sending home simple prompting materials such as stickers was a good idea, it was clear that supplying stickers was not enough.

Addressing Barriers to Improve the Home Review Program

There are several factors potentially contributing to the null findings of this initial pilot study. First, parents were not taught to practice asking children to define words in person. Huebner and Meltzoff (2005) assert that parents benefit from in-person training. Perhaps not meeting the parents in person limited the researchers' ability to establish relationships with the parents, therefore reducing the level of parent buy-in and participation. However, when working with families, it is important to consider possible barriers (such as transportation difficulties, child care needs, food security, etc.) that may preclude parents from participating in a training program (Mendez, 2010). Second, the researchers sought to communicate with the parents using written correspondence (e.g., letters, parent diary forms), which was largely ineffective. Parents recommended communicating using technology they already use in their daily routines (e.g., text messages, social media).

The social validity results of the initial pilot study played an important role in informing subsequent iterations of the home review program of *Story Friends*. Although reviewing *Story Friends* words initially seemed like it would be easy for parents to implement, the results of this study indicated that future iterations of this intervention needed to consider how parents were trained, to improve methods for maintaining school–home communication, and to consider barriers that might affect the extent of parent buy-in.

Purpose

We sought to identify successful approaches to bridging instruction between the school and home informed through social validity interviews. Simultaneously, we aimed to evaluate whether a home review program enhanced vocabulary learning. This article describes two

experiments illustrating the iterative development of a home review component of *Story Friends* that incorporated strategies to improve preschoolers' vocabulary learning by addressing potential barriers to implementation. Thus, a home review component of *Story Friends* was developed iteratively over two single-subject experimental design studies (see Table 1).

The following research questions were addressed:

1. To what extent do parent reports and social validity results attest to the feasibility of the home component of *Story Friends*?

2. To what extent does the addition of a home review component to the *Story Friends* program improve preschoolers' vocabulary learning?

Experiment 1 (Site 1)

In Experiment 1, we sought to increase parent engagement and participation. In addition to the stickers used in the initial pilot study, we added three additional strategies. First, we added text messaging. There has been growing evidence supporting the use of text messaging to enhance two-way communication between school and home settings (Bigelow et al., 2008; Carta et al., 2013; Kharbanda et al., 2009). In the current study, we anticipated that text messaging would increase parents' responsiveness and implementation of the home vocabulary program.

Second, we provided training sessions to teach parents how to review the vocabulary words at home. The in-person training included the use of video modeling to demonstrate vocabulary-enhancing strategies caregivers could apply at home. Researchers have found that in-person trainings that incorporate video modeling are effective in enhancing caregiver participation (Bigelow & Lutzker, 1998; Briesch et al., 2008; Huebner & Meltzoff, 2005; Jabaley et al., 2011; Leffel & Suskind, 2013; Mandel et al., 1998; Reamer et al.,

1998; Reese et al., 2010). Jabaley et al. (2011) found that using video modeling technology through cell phones is an effective dissemination method. We hypothesized that video modeling would serve to instruct parents on how they could embed vocabulary instruction and prompt them to practice words in their daily routines.

Third, we provided parents with options to overcome rigid work schedules, limited childcare, and lack of transportation (Castro et al., 2004; Mendez, 2010; S. Smith et al., 2013). Castro et al. (2004) note that parents' employment is the strongest predictor of their level of involvement in their children's early childhood education. Thus, we provided flexible times for trainings in their community. We hypothesized that providing parents with options that would mitigate potential participation barriers would bolster their implementation of the home review program.

Participants

Following IRB-approved procedures, parents and children were recruited from a School Readiness Prekindergarten classroom in a low-income urban neighborhood. The classroom was part of a private childcare center offering financial subsidies to families through Florida's Voluntary Prekindergarten program. In this early stage of research, the aim was to examine the effects of and engagement with the revised home review program under somewhat ideal conditions. Thus, we did not limit participation to only children with low oral language skills. Instead, children were selected to participate because their parents demonstrated an interest. Because the program was only available in English, children whose parents did not speak English fluently or children with language skills that fell more than two deviations below the mean on the standardized assessments administered were excluded.

Table 2 presents a summary of participants' demographic characteristics. Six preschool children (two girls

Table 1. Summary of iterative development of the home review program.

Iteration	Measures	No. of words taught per book	Prompting materials	Parent training	Home–school communication
Pilot study	VMM Parent diary form Social validity interview	2	Stickers	Sent home a letter describing the intervention	Weekly written correspondence sent via children's backpacks
1_Site 1	Same as pilot study plus: CELF Preschool-2 & PPVT-4	2	Stickers and necklaces	In-person trainings containing video modeling. Addressed potential barriers to participation, including transportation, food, and child care	Daily text reminders using free messaging application, *WhatsApp*
2_Sites 2 & 3	Same as prior iteration plus family demographic questionnaire	4	Stickers and badges	Same as Iteration 1	Automated daily text reminders using free messaging application, *Remind*

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

Table 2. Participant demographic information across sites.

Iteration	Child	Age (years;months)	Gender	Race	PPVT-4	CELF Preschool-2	Primary caretakers' education	Primary caretakers' marital status	No. of times per week stories are read	Hours a week child watches TV	No. of times a week child uses computer
1_Site 1	Adriana	4;2	F	African American	82	75	High school	Single			
	AJ	4;10	M	African American	90	97	High school	Single			
	Vanessa	5;5	F	African American	95	104	High school	Single			
	Jaiden	5;2	M	Caucasian	88	104	Not reported	Single			
	Joshua	5;5	M	African American	109	119	High school	Single			
	Marcus	4;10	M	Multiracial	93	100	High school	Married			
	Average	4;8			92.83	99.83					
2_Site 2	Odell	3;6	M	Caucasian	119	79	Graduate	Married	3	3–6	0
	Cynthia	4;3	F	Caucasian	97	98	Bachelor	Married	3	1–2	Daily
	Andrew	4;5	M	Caucasian	99	84	Bachelor	Widowed	3	1–2	0
	Lola	4;1	F	Caucasian	117	108	Graduate	Married	3	1–2	0
	Houston	4;5	M	Caucasian	113	100	Bachelor	Single	3	1–2	1–2×/week
	Tommy	4;7	M	African American	97	100	Graduate	Married	3	0	3×/week
	Alex	4;7	M	Caucasian	117	106	Bachelor	Married	Daily	1–2	3×/week
	Annie	3;5	F	Latina	109	88	Bachelor	Married	Daily	1–2	3×/week
	Average	4;2			108.5	95.34					
3_Site 3	Aliyah	4;2	F	African American	90	88	High school	Single	Not reported	Not reported	Not reported
	Martin	4;2	M	African American	88	71	Some college	Single	Daily	3–6	3×/week
	Collin	3;0	M	African American	99	71	Some college	Single	Daily	3–6	3×/week
	Anthony	4;8	M	African American	101	92	High school	Single	3	3–6	1–2×/week
	Layla	4;3	F	African American	91	84	High school	Single	Not reported	Not reported	Not reported
	Average	4;1			93.8	81.2					

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

and four boys; M_{age} = 4;8 [years;months]) and their parents participated. All of the parents had a high school education. Three of the primary caretakers were single mothers, one was a single father, one was a single grandmother who adopted the child, and one was a married couple. Their ages ranged from 24 to 60 years. Four of the children were African American, one child was multiracial, and one child was Caucasian.

Children's language skills were assessed using norm-referenced, standardized language measures to describe the participants. The Core Language Index from the Clinical Evaluation of Language Fundamentals Preschool–Second Edition (CELF Preschool-2; Semel et al., 2004) was used to evaluate children's expressive and receptive language skills. The Core Index is composed of the Sentence Structure, Word Structure, and Expressive Vocabulary subtests. The Peabody Picture Vocabulary Test–Fourth Edition (PPVT-4; Dunn & Dunn, 2014) was administered to evaluate children's receptive vocabulary skills. The children had an average score of 92.8 (range: 82–109) on the CELF Preschool-2 and an average score of 99.8 (range: 75–119) on the PPVT-4, indicating that five of six children's expressive and receptive language skills were within normal limits on the CELF Preschool-2 and the PPVT-4.

Dependent Variables

Parents' Implementation of the Home Program

Parent diary forms were used to measure how many times each word was practiced at home and to gauge the implementation fidelity of the home component. The parent diary forms were 4 × 6 in. rectangular cards containing 12 preperforated squares and were designed to hang on refrigerators, doorknobs, or rearview mirrors of cars. There was a parent diary form for each target word. Parents were asked to keep track of how often they practiced each word by punching one of the boxes each time they reviewed a word at home. Parents were instructed to take a picture of the parent diary forms at the end of the week and to post it using a text messaging application.

Social Validity

A social validity interview was used to evaluate parents' perceptions of the home review program. The social validity interview contained questions related to how often parents practiced the words at home, parents' feedback on the prompting materials used, whether their children used the target words spontaneously at home, parents' perceptions of the feasibility of the home review program, whether they would continue practicing vocabulary words at home, and what suggestions they had for improving the program. The social validity interview took approximately 10–15 min to administer. The first two authors administered the social validity interviews over the phone.

Children's Vocabulary Learning

A research-developed vocabulary assessment, the Vocabulary Mastery Monitor (Kelley et al., 2015), served as the primary outcome measure of children's vocabulary learning. This measure was used to evaluate the effects of the home review program. The Vocabulary Mastery Monitor asked children to define each target word (e.g., "What does *brave* mean?"). Children earned a score of 2 if they defined the word accurately, a score of 1 if they demonstrated partial knowledge of the target word, and a score of 0 for incorrect or nonresponses. The Vocabulary Mastery Monitor was administered before each child heard the book (pretest) and 1 week after the review materials were sent home (posttest). Similar to previous studies, only two participants demonstrated full knowledge of one of the 24 target words (4.2%) at baseline; therefore, only the posttest scores were graphed to compare learning of words taught at school only versus words taught at school and at home.

Procedure

In-Person Parent Training

Research assistants with experience in early childhood and/or speech-language pathology conducted the initial in-person meeting with the parents to inform them about the home program. The meeting was delivered in the community center located within walking distance of the preschool during a day and time that parents selected as most convenient. Childcare and food were provided. Four of the six parents attended the meeting. The two parents who were not able to attend the meeting were provided the option to receive the training in their homes. These at-home meetings were conducted 1 week after the initial group meeting.

During the in-person training, parents who decided to participate in the program completed a consent form and a program preferences survey. The survey solicited feedback on preferences on the type of review materials (i.e., stickers or necklaces) they wanted and when to receive daily text reminders to practice the words via *WhatsApp*, a free text messaging application.

A PowerPoint presentation contained a video demonstrating home vocabulary practice. In the video, a parent asked a child to define a word, modeled how to use the word in a sentence, and asked the child questions related to the word (e.g., "How do you feel when you go to the dentist? Are you *brave*? What does *brave* mean?"). The presentation also included an explanation of why vocabulary is important to children's development, an overview of the *Story Friends* program, and steps for reviewing the target words at home. Parents also were encouraged to tabulate how often they practiced words at home by using the parent diary form. Parents were asked to send pictures of their parent diary forms at the end of each week. Data gathered from these pictures were collected to estimate the frequency of word practice at home. The training took approximately 20 min to complete.

Initial Assessments

Once parents provided informed consent, children's expressive and receptive language skills were evaluated using the PPVT-4 and the CELF Preschool-2. These

assessments were conducted in quiet rooms adjacent to classrooms to avoid distractions. Once all the children's language skills were assessed, six children were assigned to one of two small groups.

Small Group Listening Centers

At school, children received vocabulary instruction through the *Story Friends* curriculum in small groups. Children heard the prerecorded stories using headphones. Listening sessions took approximately 10 min to complete and were repeated three times per week for a total of 6 weeks. Each book taught two academic vocabulary words. Vocabulary instruction included the use of child-friendly definitions, the use of real-world examples, multiple exposures, and multiple response opportunities. As children listened to the storybooks, an adult facilitator managed the group by ensuring children were on the right page and engaged during the intervention.

Prompts for Home Vocabulary Practice

At the end of each week, children were given stickers or necklaces with review prompts designed to recruit additional practice opportunities for one of the two words targeted at school (e.g., "Ask me what gorgeous means?"). Children were encouraged to keep their stickers or necklaces on all day. Per teacher recommendations, some children's stickers were placed on their backs to ensure they did not lose their stickers before getting home.

After stickers were sent home, the interventionists sent daily text reminders saying, "Don't forget to practice your child's words today." The text messages were sent using *WhatsApp*. These text messages were sent in the evening, as per parents' preferences.

Parent Assessments

Parents were interviewed using the social validity interview at the end of the study to gather information about their perceptions of the home review program.

Experimental Design and Analysis

The effects of the home review component was evaluated using an adapted alternating treatment design, a single-case experimental design useful for comparing experimental conditions applied to nonreversible behaviors (Ledford & Gast, 2018). For each book, one word received school-only instruction in listening centers and one word received school instruction plus home review (with review prompting materials sent home). Thus, learning of the school-only words versus the school + home words provided an indication of the effects of the home review strategies. Counterbalancing of words across children minimized the potential confound related to systematic differences in the difficulty in words.

To evaluate the social validity of the home review component, parents' responses from the parent diary forms were summarized to calculate how often they reported that words were practiced at home each week. The average rate of parents' use of the parent diary forms and the mean number of times each word was practiced were recorded. For the social validity interviews, parents' responses were first transcribed. Their responses were then summarized to determine their general perceptions of various aspects of the home program (i.e., in-person training, video modeling, prompting materials).

To evaluate learning outcomes across conditions, children's posttests scores on the Vocabulary Mastery Monitor were graphed. The graphs were visually inspected to determine whether gains in vocabulary knowledge were consistently greater for the school + home words compared to the school-only words. The extent of replications of this effect within and across participants allowed us to determine the extent to which experimental effects were demonstrated.

Statistical analyses were conducted to corroborate the findings of the visual analyses. A two-level random coefficients model was used to evaluate children's average vocabulary knowledge. Multilevel modeling (MLM) was applied to estimate the extent to which the home review component influenced the variation in vocabulary knowledge of the children in three preschool sites. This analysis enabled an estimate of the differences in the average vocabulary knowledge of children for each condition: school-only versus home + school. The parameter estimates for vocabulary knowledge range from 0 to 2 for each word. The model was applied separately for each site by using SPSS MIXED models with restricted maximum likelihood estimation. A Satterthwaite estimated degrees of freedom was calculated to ensure there were accurate inferences from the single-subject data (Ferron et al., 2009, 2010). To disentangle the vocabulary knowledge variation of children in the school-only versus school + home conditions, the following two-level random coefficients model was specified:

$$WK_{ij} = \pi_{0j} + \pi_{1j}\,\text{Treatment} + r_i\,(\text{Level}\,1)$$
$$\pi_{0j} = \beta_{00} + u_{0j}\,(\text{Level}\,2) \qquad\qquad . \quad (1)$$
$$\pi_{1j} = \beta_{10}\,(\text{Level}\,2)$$

The WK_j represented ith vocabulary knowledge for the jth child; treatment was coded 1 for the school + home condition and 0 for the school-only condition. Thus, β_{00} represented the average vocabulary knowledge per word among children in the classroom for the school-only condition, and β_{10} indicated the average vocabulary knowledge per word between the school + home and school-only conditions. The error terms (e.g., r_i, u_{0j}) were assumed to be normally distributed.

Fidelity and Reliability

Implementation fidelity was evaluated using a procedural observation checklist on 20% of the small group sessions. Researchers scored fidelity on each other using the observation checklist. The checklist included procedures

that were vital for lesson delivery, including children had the materials necessary to complete the listening center, not interrupting the audio, maintaining children's engagement in the storybooks, and distributing home materials. The percentage of implementation fidelity was calculated by dividing the total number of observed procedural points by the total number of possible procedural points. Implementation fidelity averaged 99% (range: 94%–100%).

The research staff were taught to administer the research-developed and standardized language measures with high implementation fidelity. The administration of the Vocabulary Mastery Monitor was audio-recorded to evaluate fidelity of administration and scoring reliability. A second research staff listened to 20% of all testing sessions to judge whether the assessment protocol was delivered with high fidelity and whether responses were accurately recorded. The fidelity of assessment administration was 100%.

After the first two authors scored all measures, a second trained research member blind to which words were in each condition independently scored 20% of the Vocabulary Mastery Monitors to assess reliability. Item-by-item response agreement was calculated by dividing the agreements by the total number of disagreements and agreements. The interrater reliability score was 100%.

Results

Parent Implementation and Social Validity of the Home Component

Parents' Implementation

Researchers suggested that parents practice the words at least 12 times a week. The parent diary forms were collected to estimate how often parents reported practicing the words at home as a measure of implementation fidelity. On average, the parents returned 69% of the parent diary forms (range: 0%–100%). The number of times the words were practiced at home ranged from five to 13 times a week.

Social Validity

Five of the six parents answered the social validity questions over the phone; one parent did not respond despite multiple attempts. All of the parents interviewed expressed that they saw the value of the home review program but that their busy schedules sometimes interfered with their implementation of the home program.

Parents reported that the in-person parent training was helpful and that they appreciated the flexibility in scheduling. Parents stated that they benefitted from video modeling and seeing how to provide additional practice opportunities for word learning at home.

When parents were asked how often they practiced the words at home, they reported they practiced the words at home and in the car every day; however, they did not always have the time to send the parent diary forms over

the phone. One parent said, "I am busy because I got a new job, and I have not been good about the chart [parent diary form]. But I keep an estimate in my mind of how often we practiced. For example, for ridiculous, I have practiced six times." Overall, parents reported that they enjoyed receiving daily text reminders to practice the words through *WhatsApp*. However, one parent noted concern regarding the use of a phone application because other people outside the study could view her profile. In general, data gathered from the interviews indicated that, although they enjoyed various aspects of the home program, there was variability in their implementation of the home program.

Differential Effects on Children's Word Learning

Vocabulary learning results are displayed in Figure 1. Graphs are arranged by the estimated order of home implementation (from highest to lowest starting from the top left and progressing to the bottom right). The level of home implementation was estimated based on how often parents reported practicing the words at home through the parent diary forms. Pretest scores on the Vocabulary Mastery Monitor indicated negligible knowledge of words prior to the intervention, with the exception of Joshua who knew three of 12 words at pretest. The *x*-axis represents each book, and the *y*-axis presents children's performance on the posttest Vocabulary Mastery Monitor probes (a week after school instruction). The solid black lines with the black circles show children's posttest scores on the school-only words, and the dashed black lines with the open squares show posttest scores on words in the school + home condition. We hypothesized that the dashed line would be higher than the solid line, indicating that the home review component resulted in better vocabulary learning.

Although all six children demonstrated learning of academic vocabulary words, visual inspection revealed no clear advantage for the school + home words. Ceiling effects were demonstrated by AJ and Joshua, who learned almost all the words regardless of condition. Marcus showed an advantage for three of five school + home words, but an advantage for one of the school-only words. The other three children (Vanessa, Adriana, and Jaiden) showed mixed effects. The scores averaged 66.7% and 58.3% for Adriana, 83.3% and 66.6% for Vanessa, 80% and 50% for Marcus, 100% and 91.7% for Joshua, 83.3% and 91.7% for AJ, and 50% and 50% for Jaiden, for the home + school versus school-only conditions, respectively.

The MLM results (summarized in Table 3) supported the visual analysis of the graphs. Evaluating model assumptions for each of the residuals from Site 1, we confirmed the linearity, homoscedasticity, and normality assumptions by using a boxplot, a scatter plot, and a Q-Q plot. The results of the MLM analysis revealed that children learned an estimated average of 1.23 word points for the school-only condition and 1.53 word points for the school + home condition. The difference of 0.29 word points was not a

Figure 1. Experiment 1 results (Site 1). Children's posttest scores on the Vocabulary Mastery Monitor for each book. Open squares denote the home + school condition, and closed circles denote the school-only condition. Graphs are arranged by the level of home implementation as indicated by parent diary forms (highest to lowest, starting from the top left graph and progressing to the right).
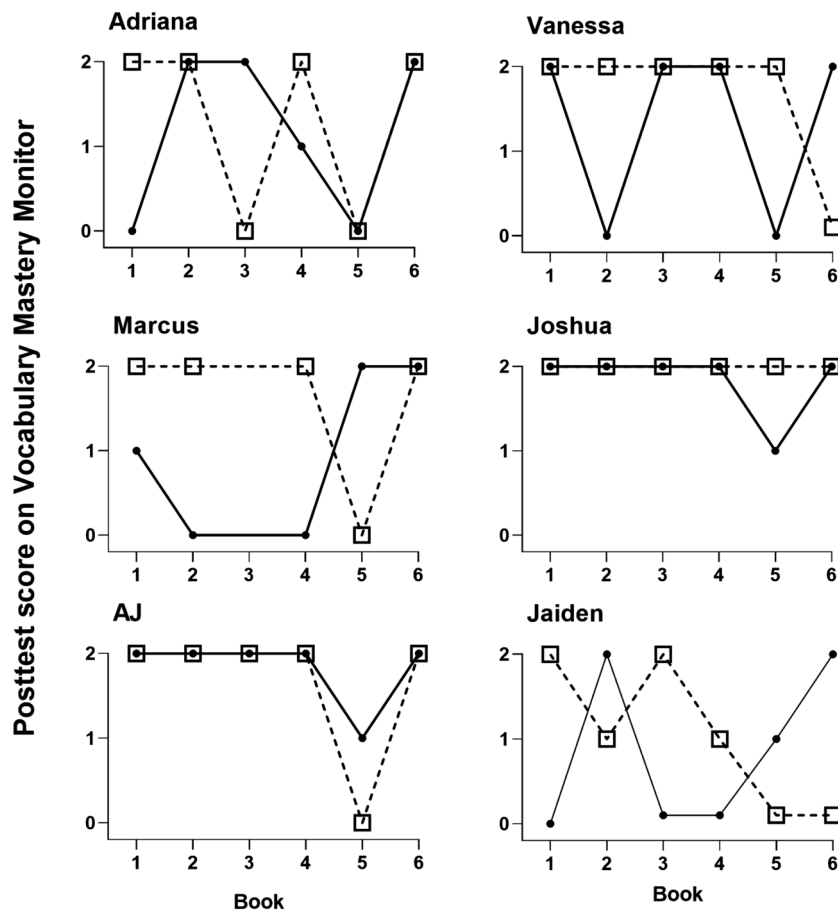
statistically significant difference, $t(61.3) = 1.40$, $p = .166$. As can be seen in Table 3, we also observed significant within-child variation for the six words per condition among Site 1 children ($\sigma^2 = 0.75$).

Discussion

The parent diary forms provided some evidence that most of the parents reviewed the target words at home. The social validity results indicated that parents enjoyed and valued the program. Although children did not demonstrate consistent enhancements in word learning associated with the home review component, data gathered from social validity and parent diary forms revealed that the level of parent engagement was greatly improved over the pilot study. Many parents in this experiment shared the parent diary forms weekly by sending pictures electronically. This approach seemed more effective than asking parents to return paper-based materials to school. The findings from this study support the utility of applying technology to promote parent engagement. Engaging with parents

using cell phones and social media (e.g., *WhatsApp*, Facebook, Instagram) is a promising way of improving parent responsiveness.

The social validity data provided further information on the acceptability of several aspects of the home review program. First, providing in-person training seemed to facilitate the establishment of a trusting collaboration between the parents and the researchers. This was evident as parents were willing to share their feedback on the home program. Involving parents in the development of home programs seemed beneficial, as it emphasized the message that parents are important stakeholders in their children's learning and that their opinions matter (Teti et al., 2017). These findings are in line with research indicating that one of the keys to a successful home intervention is establishing trusting, reciprocal relationships between the school and home (Halgunseth, 2009). Other investigators have noted that in-person parent trainings alone are rarely sufficient to increase parent engagement (Huebner & Meltzoff, 2005). However, text messaging helped to sustain relationship development.

Table 3. Output of mixed-effects models for estimating children's vocabulary knowledge for each site.

Parameter	Parameter estimate	SE	95% CI	Significance
Site 1 fixed effects				
Intercept	1.233	0.177	[0.85, 1.62]	< .001
Condition	0.294	0.210	[−0.13, 0.71]	.166
Site 1 variance estimates				
Within-child	0.750	0.135	[0.53, 1.07]	< .001
Between-child	0.537	0.748	[0.004, 1.07]	.473
Site 2 fixed effects				
Intercept	0.662	0.142	[0.37, 0.95]	< .001
Condition	0.777	0.126	[0.53, 1.03]	< .001
Site 2 variance estimates				
Within-child	0.750	0.080	[0.61, 0.92]	< .001
Between-children	0.763	0.577	[0.02, 0.34]	.186
Site 3 fixed effects				
Intercept	0.567	0.195	[0.08, 1.05]	.028
Condition	0.086	0.159	[−0.23, 0.40]	.543
Site 3 variance estimates				
Within-child	0.730	0.098	[0.56, 0.95]	< .001
Between-children	0.127	0.111	[0.02, 0.71]	.254

Note. CI = confidence interval.

We found that text messaging played unanticipated roles beyond simply prompting parents to practice words at home. Two parents spontaneously shared pictures and videos of their children practicing the target vocabulary words at home. Researchers in turn reinforced parents' engagement, making parents and researchers equal players in children's word learning. Finally, text messaging allowed for networking among parents. Parents communicated with each other, exchanging ideas and encouraging one another's participation in the home program. These findings provide preliminary evidence of ancillary benefits of establishing school–home communication using text messaging.

Text messaging seems advantageous for several reasons. First, cell phones and text messaging have become commonplace in American society. Thus, sending daily text reminders fits well within parents' existing routines. Identifying ways of embedding home practice opportunities that fit within parents' daily routine may increase their level of engagement. Second, unlike notes sent home, text messaging allows for two-way communication between the school and home. Third, the unexpected communication among parents seemed to serve as a natural reinforcer for continued engagement in the home and community.

In addition, parents responded positively to the use of video modeling, suggesting this strategy helped increase parents' participation in the home program. These findings are congruent with Jabaley et al. (2011), who found video modeling an effective tool for changing parents' behavior. These findings are illuminating, as they contribute to the body of literature supporting the use of video modeling as a way to provide instruction not only for children but also for adults.

Although the social validity results were positive, the alternating treatments design did not reveal clear experimental effects associated with the home review component. This was in part due to the fact that the listening center intervention alone is rather successful in teaching vocabulary words, and with only two words per book, there was limited opportunity to see differential effects. In addition, researchers observed a possible confound, as the teacher did not limit instruction to listening centers; she was observed reviewing the target words in the classroom. This may have augmented learning and contributed to ceiling effects.

Experiment 2 (Sites 2 and 3)

Despite the lack of clear home review effects in Experiment 1, parent feedback indicated that we were able to overcome many of the barriers to extending practice opportunities into the home. In Experiment 2, we sought to improve our ability to examine the effects of home review program in two ways. First, we used revised books that taught four words per book. The addition of two additional words to each book was evaluated empirically before it was incorporated into this study (Peters-Sanders et al., 2020). Notably, these additional words allowed for a more sensitive measure of differential effects. Second, we sought to enroll more participants from two new child-care settings. Because the social validity results from the previous iteration were positive, the other components of the home intervention remained the same, with the exception of using a different, more secure application for school–home communication (i.e., *Remind*). A family demographic questionnaire was added to gather additional participant descriptive information (see Table 1).

Participants

Thirteen children and their parents were recruited from two different preschool sites, following IRB-approved

procedures. Demographic information is presented in Table 2. Despite both being in low-income urban areas, these centers differed considerably. All the parents in Site 2 had college degrees, and the parents in Site 3 either had a high school diploma or had attended some college. Parents' age ranged from 25 to 40 years. Six of eight mothers in Site 2 were married, one was single, and one was widowed. All five mothers in Site 3 were single; they were 20–25 years old.

Site 2 included eight children, and Site 3 included five children. In Site 2, six of the children were Caucasian, one child was African American, and one child was Latina. In Site 3, all five of the children were African American. The average age of children in Site 2 was 4;2 (range: 3;5–4;7 years old), and the average age in Site 3 was 4;1 (range: 3;0–4;8 years old). The children in Site 2 had an average score of 95.4 (range: 79–108) on the CELF Preschool-2 and an average score of 108.5 (range: 97–119) on the PPVT-4; two of six children scored more than 1 *SD* below the norm on the CELF Preschool-2. The children in Site 3 had an average score of 81.2 (range: 71–92) on the CELF Preschool-2 and an average score of 93.8 (range: 88–101) on the PPVT-4; three of five children scored more than 1 *SD* below the norm on the CELF Preschool-2.

Families' home literacy practices are summarized in Table 2. Across the two sites, most reported they read to their children three times a week. Most children used computers at home for approximately 1–3 hr a week. The majority of the parents in Site 2 stated that their children watched TV for about 1–2 hr a week, whereas the parents in Site 3 stated that their children watched TV for 3–6 hr a week.

Measures

Experiment 2 used the same language assessments, parent diary forms, and social validity interviews as Experiment 1. The Vocabulary Mastery Monitor was adapted to reflect the addition of two extra words. Instead of receiving a potential score of 4, this version had a maximum score of 8 per book (corresponding to each word receiving a potential of 2 points each).

A family demographic questionnaire was incorporated to gather additional descriptive information about home characteristics. The family questionnaire contained questions regarding the child's ethnicity, language(s) spoken at home, how often stories were read at home, how often letters were reviewed at home, how often the computer was used at home, how frequently the children watched TV, whether the family or teacher had specific concerns, and the highest level of parental education.

Procedure

Consistent with the procedures of Study 1, parents were trained in person using the same format. All parents in Site 2 attended the in-person training held in a local library and were trained at the same time. In Site 3, two of the five parents were trained at the same time, and the others

were trained individually in a quiet room at the preschool due to scheduling constraints. The same parent diary forms were sent home to track how often words were practiced at home. However, instead of home–school communication being maintained through *WhatsApp,* another freely available application was used, *Remind. Remind* facilitated the scheduling of automated daily text reminders while also providing a platform to disseminate information and engage parents.

The most significant modification made was increasing the number of words taught in each book from two to four words. Instead of sending one word home to review each week, children were given prompting materials for two of the four words taught at school each week. The words taught in each book are listed in Table 3. Because the words reviewed at home were increased to two words, the prompting materials were modified. The prompting materials for the third iteration included 2 × 3 in. badges with a lanyard worn around children's necks that included pictures representing the two target words in the front with the phrase "Ask me what these words mean?" and with the definitions of the words on the back.

Fidelity and Reliability

The implementation fidelity of 20% of the sessions of Experiment 2 was evaluated using the same procedural checklist previously described. The implementation fidelity averaged 99% (range: 94%–100%).

The fidelity of administration for the Vocabulary Mastery Monitor was calculated for 20% of the total testing sessions. The fidelity of assessment administration was 100%. The item-by-item response agreement on 20% of the Vocabulary Mastery Monitor averaged 99% (range: 88%–100%).

Results

Parent Implementation and Social Validity of the Home Component

Parent Implementation

The data from parent diary forms indicated that there were site differences in parents' implementation of the home program. In Site 2, all the parents returned 100% of the parent diary forms for all six books. Parents reported practicing the words at home approximately 10–24 times a week. The parents in Site 2 were responsive in their communication through *Remind.* One parent shared pictures of her daughter practicing the words at home. Many parents left comments on the texting application and asked questions about how they could improve their children's learning. For example, one parent commented, "I believe the word smart is too hard for my child. She doesn't understand that abstract word. What do I do?" In contrast, none of the parents in Site 3 submitted the parent diary forms throughout the study. They did not respond to the researchers' attempts for communication through *Remind.*

Social Validity

The social validity results corroborated the results in the graphs and the parent diary forms. All parents in the Site 2 completed the social validity interview, providing detailed responses and feedback. Overall, all the parents in Site 2 shared their excitement about the program, stating that the intervention provided an effective means of having meaningful conversations with their children. Parents in Site 2 reported that they practiced the words at home every day, incorporating the use of these words into their daily routines. One parent reported, "We modeled the meaning of the words to help increase the understanding of the words. For example, we pretended to **comfort** the baby doll." Parents suggested the program be improved by reducing the number of badges sent home each week and by sending home texts with ideas on how to use the words in conversation. Other parents stated they would have liked receiving additional suggestions for deepening children's understanding of the words.

Only three of five parents in Site 3 completed the social validity interview. Although the researchers attempted reaching the other parents at least three times via phone and by talking to the teacher, they did not respond. The teacher stated that she also had difficulty communicating with these parents because they were transitioning between jobs and because their phone service was terminated. Like the parents from Site 2, the parents in Site 3 noted they enjoyed the program. However, they reported they did not complete the parent diary forms because they were busy. One parent reported that it was difficult for her to implement the home program because her child stayed with his grandmother, who did not speak English, while she worked two jobs. When asked how the home program could be improved, one parent recommended that the researchers meet with the parents in person more often, such as once a week or once a month.

Differential Effects on Children's Vocabulary Learning

The results of Experiment 2 are shown in Figures 2 and 3. Graphs are arranged by the estimated order of home implementation as indicated by how many times a week parents reported practicing the words at home through the parent diary forms (from highest to lowest, starting on the top left and progressing to the bottom right). The x-axis represents each book, and the y-axis presents children's performance on the posttest Vocabulary Mastery Monitor probes. Because children had low scores at pretest ($M = 0.06$ word points, $SD = 0.14$), only the posttest measures were graphed. The solid black lines with the black circles show children's scores on the school-only words, and the dashed black lines with the open squares show children's scores on words in the school + home condition.

As can be seen in Figure 2, the dashed lines and squares tended to be equal or higher than the solid lines and circles. Among the eight children in Site 2, seven showed greater vocabulary learning in school + home condition.

Only Houston showed mixed effects, but with slightly higher learning in the school + home condition ($M = 83.3\%$ vs. 75%). Learning was consistently equal or greater for the school + home condition for Odell, Cynthia, Lola, Tommy, and Alex. Andrew and Annie had greater learning in the school + home condition for four of six books, but greater learning in the school-only condition for one book each.

In contrast to Site 2, children in Site 3 (see Figure 3) made smaller gains in vocabulary learning, and only Martin showed a clear advantage of the school + home condition, for four of five books. One child (Collin) only learned one word in six books. One child (Anthony) learned more words in the school-only condition for three of the six books. The two remaining children (Layla and Aliya) showed mixed effects.

In summary, vocabulary learning was greater in the school + home condition for nine of the 13 children (69%), and only one of the 13 showed an advantage in the school-only condition. In Site 2, out of 51 total books, a school + home advantage was replicated for 32 books (63%) and a school only advantage was replicated for three books (6%). In Site 3, out of a total of 29 books, a school + home advantage was replicated for 10 books (34%) and a school-only advantage was replicated for five books (17%).

MLM analyses were conducted using the approach described in Experiment 1. The results of the random coefficient models for Sites 2 and 3 were consistent with the results of the visual analysis (see Table 3). Linearity, homoscedasticity, and normality assumptions were evaluated for each residual in the model. The results confirmed a homoscedastic residual distribution with multivariate normality and linear effects for Sites 2 and 3. The results indicated that children from Site 2 learned an average of 0.66 word points per word in the school-only condition and an average of 1.44 word points per word in the school + home condition. Thus, the school + home condition significantly expanded children's word knowledge by an estimated 0.78 word points, $t(179) = 6.15$, $p < .001$.

Children from Site 3 learned an estimated average of 0.57 word points in the school-only condition and an average of 0.65 word points in the school + home condition. The school + home condition helped these children to expand their word knowledge by an estimated 0.09 word points, which was not a statistically significant difference, $t(110) = 0.54$, $p = .588$.

The results indicated that children in Site 2 experienced greater word learning in the school + home condition, indicating that the home review component enhanced learning effects. However, this effect was not observed in children in Site 3. As in Experiment 1, the model also revealed significant variance components for within-child variations of children from Sites 2 ($\sigma^2 = 0.75$) and 3 ($\sigma^2 = 0.73$).

Discussion

Consistent with the findings from Experiment 1, parents in Experiment 2 (Sites 2 and 3) responded positively to

Figure 2. Experiment 2 results (Site 2). Children's posttest scores on the Vocabulary Mastery Monitor for each book. Open squares denote the home + school condition, and closed circles denote the school-only condition. Graphs are arranged by the level of home implementation as indicated by parent diary forms (highest to lowest, starting from the top left graph and progressing to the right).
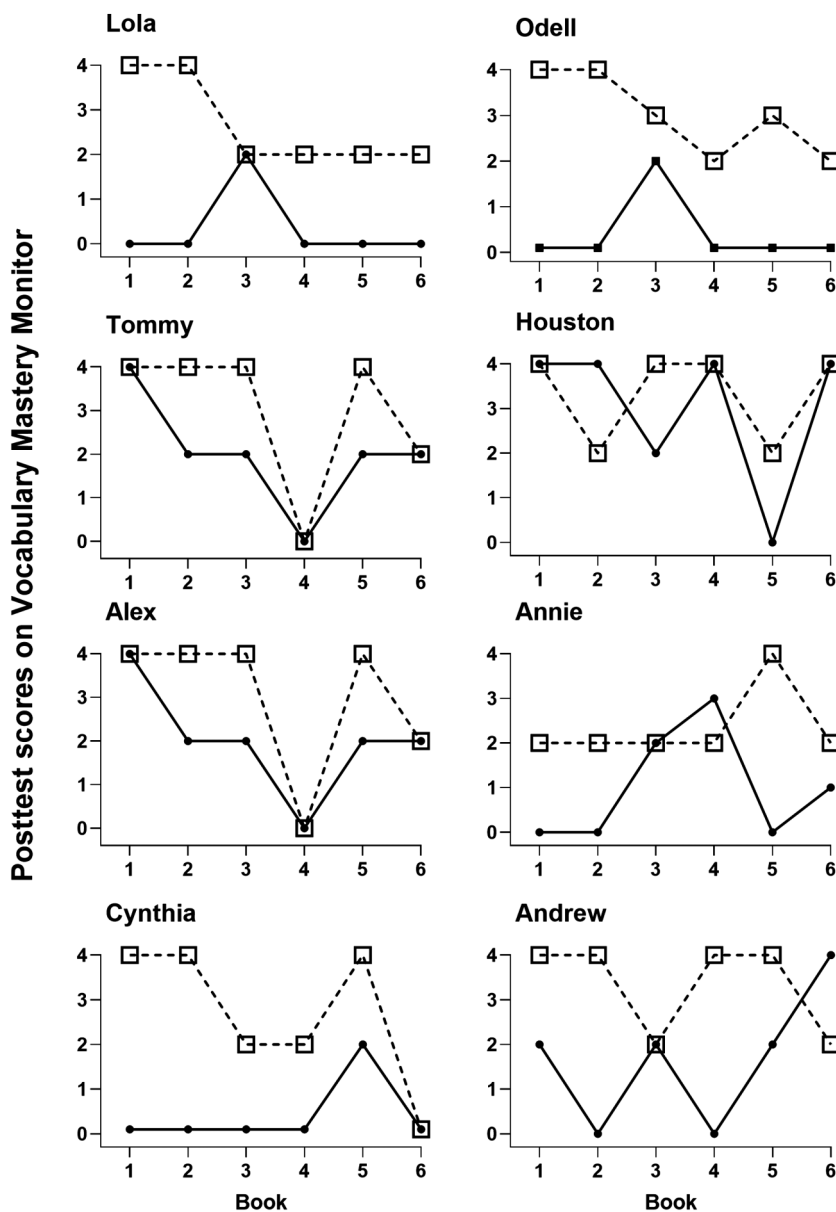
various aspects of the home review program, including the in-person parent trainings, use of text messaging, and prompting materials. However, the effects of the home program differed between Sites 2 and 3. Only the children in Site 2 demonstrated robust gains in their vocabulary skills following the home review of *Story Friends* words.

One possible reason for these site differences is that the children in Site 2 started out with higher language skills than the children in Site 3. Although they did not differ in their baseline scores for the words taught (averaging 2.9% and 2.5% of the words, respectively), children in Site 3 had

lower expressive and receptive language test scores than children in Sites 1 and 2. Previous research on *Story Friends* and other vocabulary interventions have found that children with initially higher language skills are likely to learn more vocabulary words than children with lower vocabulary skills after receiving instruction (Coyne et al., 2004; Goldstein et al., 2016; Penno et al., 2002; Peters-Sanders et al., 2020).

However, these differences in language skill do not fully explain the results. Children in Sites 1 and 3 had similar average scores on measures of their receptive vocabulary

Figure 3. Experiment 2 results (Site 3). Children's posttest scores on the Vocabulary Mastery Monitor for each book. Open squares denote the home + school condition, and closed circles denote the school-only condition. Graphs are arranged by the level of home implementation as indicated by parent diary forms (highest to lowest, starting from the top left graph and progressing to the right).
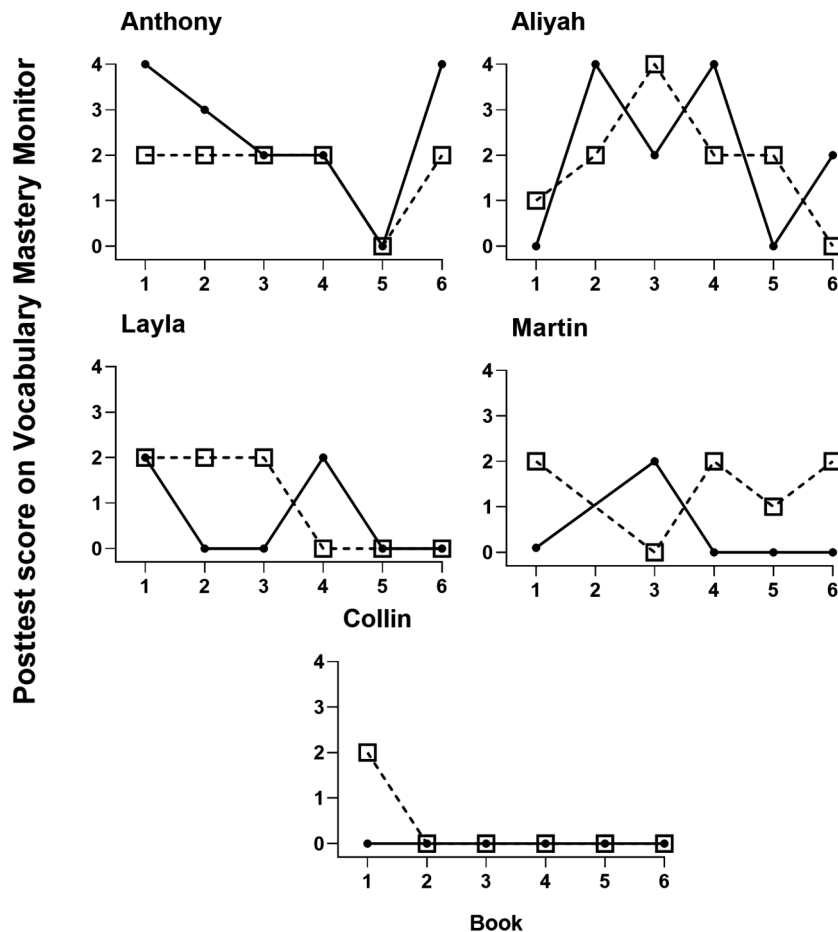
but differed in their learning gains. Thus, learning differences are more likely to be attributable to the level of parent engagement in these two sites. These differences beg the question "What made Site 3 unique?" There were demographic characteristics that set Sites 2 and 3 apart. Most of the parents in Site 2 were older and had college degrees, and there were two adults in the home. Conversely, all of the caretakers in Site 3 were single, generally younger, and had a high school education. Although there is evidence that parents' education is a strong predictor of children's vocabulary skills (Hart & Risley, 1995), attributing levels of parent engagement solely to parents' education and marital status is insufficient. Parents in Site 3 were similar to parents in Site 1. Both sets of parents were the sole caretakers and had received a high school education. However, while the parents in Site 1 were highly engaged, the parents in Site 3 did not respond to the researchers' communication attempts, reporting that their busy schedules conflicted with their participation.

Another notable difference between Sites 2 and 3 that could have influenced the level of parent engagement

was TV watching at home. In Site 2, parents reported their children are watching TV with an average of 1–2 hr per week, whereas in Site 3, parents reported their children are watching TV with an average of 3–6 hr per week. Research suggests that the amount of background TV noise reduces the quantity and quality of parent–child interaction (Christakis et al., 2009; Kirkorian et al., 2009; Mendelsohn et al., 2008). Kirkorian et al. (2009) warn that background noise containing speech can reduce parents' responsiveness to children's communicative attempts. There also is evidence suggesting this limited parent–child social interactions can delay children's language development (Mendelsohn et al., 2008). Findings from this experiment provide only a preliminary indication suggesting that the number of hours children spend watching TV might predict parents' engagement and responsiveness to the home program. Future studies should investigate the potential role of moderating factors (such as maternal education, hours of TV watching, and the number of environmental stressors) on parents' participation in home programs.

Findings from Experiment 2 indicate that, when parents implement the home review of *Story Friends* words, their children learn more of the academic words. Despite these promising results, these findings also provide preliminary evidence that there are differences in the engagement of families in the home review program, likely associated with a number of risk factors.

General Discussion

Despite mounting evidence that children benefit from living in homes with rich conversations more likely to include academic vocabulary, few studies directly evaluate the effects of bridging vocabulary instruction between the school and home. The purpose of this article was to describe the initial steps in developing and evaluating a home component for a supplemental oral language curriculum for preschoolers. The effects of the home review program were evaluated by gathering social validity data and measuring children's vocabulary gains.

The Value of Social Validity

The iterative nature of the development of this home review program highlights the utility of taking full advantage of social validity assessments when creating and refining home-based interventions. First, social validity data provide a clearer picture of the studies' results. Evaluating the effects of the home review program solely through children's vocabulary learning provided an incomplete picture of factors contributing to implementation in the home. The social validity measures revealed implementation differences and potential barriers to participation. Identifying these barriers to participation resulted in active problem solving that sought to address parents' needs. Second, the social validity results provided important insights that helped explain why the home vocabulary program's effects varied across sites. Third, incorporating social validity measures during the development process reinforced the notion that parents were an integral part of children's word learning. In both experiments, the researchers asked the parents to provide them with feedback regarding the intervention materials at the beginning of the study. This feedback was important in creating reciprocity between the parents and the researchers, seemingly enhancing the level of parent buy-in and engagement.

Goldstein (2016) argues that social validity should not be an afterthought. Instead, social validity should be incorporated at all stages of intervention development. Despite the value of social validity, most interventions focus exclusively on establishing internal validity (Goldstein et al., 2014; Soto et al., 2019). For example, Soto et al. (2019) conducted a systematic review of 17 studies evaluating the effects of early literacy interventions for young Latino children who were dual language learners. The results of this review indicated that, although most studies demonstrated strong internal validity, only two studies incorporated social validity measures. Incorporating social

validity measures bolster generalizing power (external validity) by ensuring that evidenced-based interventions are sustainable in real-world settings (Goldstein, 2016; Krathwohl, 2009). Social validity assessments hold potential to more nimbly adapt interventions to varying cultures, community circumstances, and needs of individual families.

Promoting Parent Engagement

During the inception of the home component of *Story Friends,* we hypothesized that developing a seemingly simple intervention incorporating the use of stickers with prompts (e.g., *Ask me what **brave** means*?) would result in high parent participation. However, the disappointing results from the first iteration of the home program revealed that sending materials home without first establishing a positive, reciprocal relationship with parents or without explicitly explaining to parents how to use the materials was insufficient.

The second and third iterations incorporated parent engagement strategies that produced more promising findings. These strategies included providing in-person trainings, using video modeling, sending daily text reminders, maintaining two-way communication, and addressing potential participation barriers. Improved vocabulary learning when these strategies were applied demonstrates the importance of developing home programs that adapt to families' needs. The findings from these iterations illustrate the importance of evaluating and addressing the barriers parents might experience that preclude them from participating in home programs.

Variability in Parent Engagement and Home Implementation

Although not surprising, the variability in parents' level of participation and engagement was striking. Predictably, effects of vocabulary instruction and home review activities were weakest in homes reporting low home implementation. The parents with the lowest reported implementation of the home program noted that, although they saw the value of the program, their hectic schedules precluded their full participation. These findings are elucidating as they reveal that, even if parents believe an educational program to be beneficial and attempts are made to reduce their participation barriers, some parents may not complete interventions at home.

Despite our efforts to encourage parents' feedback, we most likely overlooked their actual needs, such as food security, rent payments, or behavior health counseling. It is likely that some parents were experiencing extenuating barriers (e.g., financial, social–emotional) precluding their successful implementation of the home program. Therefore, they might have benefitted from being referred to other professionals (e.g., social workers) before participating in the home review program. If our goal is to reach the families with the most compounding stress, it is vital for future studies to identify and address potential moderating factors (financial, socioemotional, home organization, TV

watching, etc.) on parents' implementation of home-based interventions.

Limitations and Future Directions

These iterative studies have limitations warranting consideration in future studies. These experiments were conducted with a small sample of classrooms and families. These promising results may warrant additional systematic replications and larger-scale group design experiments.

Another limitation is the limited data on children's language skills and parents' demographic information, particularly for the pilot study and Experiment 1. This information was not gathered in the first two iterations because the initial focus was to evaluate the feasibility of the home review activities; however, collecting these data would have strengthened these studies. Moreover, in the first experiment, the teacher's involvement in the classroom might have confounded the results of the study. It is likely that her review of words outside the home extension program conflated the school-only condition effects.

Alternating treatments designs are not sensitive to small differences in learning, especially when treatment conditions overlap. Multiple treatment interference is a common threat to the interpretation of results using this design. Relying on counterbalancing of so few words (two in Experiment 1 and four in Experiment 2) also limits the opportunity to detect learning differences. Although the design offers multiple opportunities to evaluate learning within and among participants, an inability to gather objective, in situ data on home practice limits our ability to directly relate learning to our independent variable of interest.

It is difficult to capture how often parents actually practice words at home. Although data gathered from the parent diary forms provided an indication of the level of parent participation in the home program, not all parents returned the diary forms on a weekly basis. When interviewed, parents also indicated that, even when they returned the parent diary forms, they were a rough estimate of targeted vocabulary use in the home. Moreover, a failure to return diaries did not necessarily mean that those parents did not review words at home. Future studies should consider better ways of capturing parents' use of targeted, academic vocabulary words at home. Including the use of the Language Environment Analysis system (LENA Foundation) might help gather insightful information regarding home vocabulary practices.

Because the home program was an extension of an existing vocabulary curriculum, *Story Friends*, only words preselected by the research team were reviewed at home. One benefit of this approach was that we sent home child-friendly definitions and academic vocabulary words that parents may not readily use in their daily routines. Our hope is that it encourages parents to target additional academic words. Future studies should determine whether the vocabulary words reviewed at home are frequently used by parents in their daily routines.

In this study, the only vocabulary measures used to determine treatment effects were the research-developed curriculum-based Vocabulary Mastery Monitors. The use of curriculum-based measures provides a robust assessment of the taught words and is often a better measure of learning than norm-referenced assessments that only measure generalized language abilities (National Institute of Child Health and Human Development, 2000). Often, generalized language assessments do not assess children's knowledge of sophisticated vocabulary words such as the ones from *Story Friends*, and because of this, we typically do not see significant growth on these measures as a result of our intervention. However, improved outcomes on the Vocabulary Mastery Monitors indicate that children are adding new vocabulary terms to their lexicon. Learning these new words may help strengthen their semantic networks, enhance their word finding abilities, and improve recall of words and their meanings. Future studies should include generalization measures of vocabulary to determine the extent to which learning a finite number of challenging words influences overall vocabulary knowledge.

Large-scale studies have the potential to elucidate the influence of moderating factors (number of hours TV watched, number of adults in the home, number of children, level of parents' education, etc.) on parent implementation of home-based interventions and child learning effects. For many families, it might be beneficial to provide resources and supports to help create homes conducive to child growth and development generally, in tandem with introducing families to specific home language interventions.

Researchers were the ones communicating with parents and facilitating home implementation. Future studies should study the effects when teachers or clinicians are teaching and encouraging parents to practice new vocabulary words. Furthermore, it is important to consider barriers to parents' participation, such as access to smart phones or funds for sending text messages and images. Conducting in-person trainings also presents challenges as one strives to accommodate parents' disparate work schedules. Future studies should investigate the potential benefit of using videoconferencing to overcome these challenges, while being mindful of the need to ensure that all parents have equitable access to all aspects of home programming.

Conclusion

This article highlights the role of home review activities on enhancing language development of at-risk preschoolers within early childhood education settings. Despite the strong evidence that young children benefit from home environments that provide rich contexts for vocabulary learning, there is limited empirical research on effective strategies for promoting parent engagement to increase the vocabulary instruction occurring at school. These studies provide preliminary evidence of effective ways of augmenting children's learning of vocabulary skills through

parent-focused home interventions. The findings showcase the utility of establishing two-way communication between school and home, addressing potential barriers to participation, and nurturing positive relationships with parents. Nevertheless, there continues to be a tremendous need for future work to evaluate alternative means of strengthening the home language environment if we are to close the 30 million word gap too often experienced by children living in families with compounding risk factors (Suskind & Suskind, 2015).

Acknowledgments

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