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Evaluation of a Phonological Awareness Intervention for Kindergarten and First Grade Students

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ABSTRACT OF THE THESIS

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by

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Master of Arts, Graduate Program in Education
University of California, Riverside, June 2013
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This study examined the effects of a phonological awareness intervention for at-risk kindergarten and first grade students. The intervention consisted of five phonological awareness activities and one vocabulary activity and occurred three times per week for 30 minutes. The researcher evaluated the kindergarten students' phonemic awareness screening data and first grade students' phonics screening data using an ANCOVA design, using fall phonemic awareness scores as the covariate. For kindergarten students, there was not a significant effect on phonemic awareness or alphabetic principle skills. For first grade students, there was not a significant effect on phonics skills, but there was a significant effect on oral reading fluency skills. The average rates of improvement between the kindergarten intervention and control groups were not significantly different for a measure of phonemic awareness. However, the average rates of improvement between the first grade intervention and control groups were significantly different for phonics. These results suggest that this intervention can be effective in increasing the reading fluency skills of first graders.

Table of Contents

List of Tables

List of Figures

Evaluation of a Phonological Awareness Intervention for Kindergarten and First Grade Students

Early intervention for students who struggle with basic literacy skills is crucial to preventing more serious reading difficulties (Torgesen, 2002). The U.S. Department of Education (2011) reported that 32 percent of fourth grade students in public schools performed at or above the Proficient level in reading in 2011. This indicates the need for educators to address reading problems before fourth grade so that more students can raise their reading performance into the Proficient range by this grade. A review of the effects of early literacy interventions for students with reading difficulties and disabilities demonstrated higher effects for those provided before second grade (Wanzek and Vaughn, 2007). This means that appropriate intervention can benefit students in the primary grades, and the goal of this study was to evaluate the effects of an early intervention on reading skill improvements.

Early intervention is important in the early grades because there is a high probability that poor readers at the end of first grade will remain poor readers at the end of fourth grade (Juel, 1988). This further emphasizes the need to address reading problems early before fourth grade. In addition, over time, students who are good readers tend to improve in reading, while poor readers tend to experience a continual decline in reading skills, which increases the gap between strong and weak readers (Stanovich, 1986). Also, while children with strong reading and vocabulary skills tend to read and enhance their reading skills with more exposure to text and practice, students with more limited vocabularies tend to read less and develop reading skills more slowly (Stanovich,

1986). Over time, many students who struggle with a learning disability drop out of school before high school graduation (deBettencourt & Zigmond, 1990). This suggests that it is particularly important to consider providing intervention support at the kindergarten and first grade levels to identify and prevent reading difficulties before they lead to serious consequences later in life.

To avoid the development and continuation of reading difficulties, educators must consider ways in which to identify students who are at-risk for later problems as soon as possible. Some researchers, such as Simmons and colleagues (2008), have recommended identifying students at risk for reading difficulties in early kindergarten and providing instruction in the appropriate skill areas. Teachers can, for example, use curriculum-based measures of PA to both identify kindergarten students in need of intensive instruction in PA and evaluate their progress (Allor, Gansle, & Denny, 2006), which is important because children who struggle with reading in the early years of their education experience difficulty improving toward the rate of their more advanced peers (Good et al., 1998). In addition, even if intervention is provided, it may be too late to improve students' reading skills sufficiently (Puma, Jones, Rock, & Fernandez, 1993). These findings highlight the benefit of addressing students' reading problems early. Although the research on struggling readers can be discouraging, many children at risk for early and long-term reading problems can receive intervention as early as kindergarten and no longer require additional remedial support by the beginning of first grade (Vellutino et al., 2006).

Findings such as these have contributed to the concept of an inoculation effect,

which is the idea that early intervention is sufficient to resolve the phonological and alphabetic deficits of a significant number of children who were initially identified as at-risk for a reading disability (Coyne, Kame'enui, Simmons, & Harn, 2001). This means that, when given carefully designed and implemented intervention support, students who receive intervention would no longer require additional supplemental support in the future. In one study, the majority of kindergarten students who achieved appropriate grade-level reading skills by the beginning of first grade were able to continue to progress adequately through at least the middle of first grade (Coyne et al., 2001). Rather than waiting until students' reading challenges are severe in the middle and upper grades, it is critical that educators identify the struggles early and better prepare children for future reading instruction. It is also crucial to provide supplemental intervention support that focuses on the appropriate early literacy skills.

Phonemic Awareness

Intervention support with phonological awareness (PA) has resulted in important gains for several different groups of students. Because many studies, including the meta-analysis conducted by the National Reading Panel (2000), have focused on phonemic awareness, a type of phonological awareness involving the manipulation of sounds, this paper will include both terms. However, phonological awareness refers to the general understanding of the sound structure of a spoken language. This intervention incorporates phonological awareness activities that help students understand in general that words consist of sounds. The National Reading Panel (2000) concluded that reading programs that incorporate phonemic awareness instruction are very likely to lead to improvements

in reading and writing skills. This panel also found that phonemic awareness instruction can be beneficial to normally developing readers, children at risk for future reading problems, disabled readers, preschoolers, kindergartners, first graders, children in second through sixth grades, children across various socioeconomic levels, and children learning to read in English as well as in other languages.

A number of studies have produced results consistent with those of the NRP report. Phonological awareness interventions have improved the early literacy skills of students without reading problems and those at risk for reading failure (Kjeldsen, Niemi, & Olofsson, 2003). Both monolingual English-speaking students and English language learner (ELL) students have also achieved positive outcomes following PA intervention (Linan-Thompson & Hickman-Davis, 2002; Chiappe, Siegel, & Wade-Wooley, 2002). Some ELLs who receive PA instruction even perform as well as or even better than English-only speakers by second grade (Lesaux & Siegel, 2003). Research demonstrating the beneficial effects of phonological awareness instruction have included both kindergarten (Chiappe, Siegel, & Wade-Wooley, 2002; Lesaux & Siegel, 2003) and first grade students (Healy, Vanderwood, & Edelston, 2005). There is also evidence that either kindergarten intervention alone or kindergarten intervention combined with first grade intervention can help prevent early and long-term reading problems in most at-risk children (Vellutino, Scanlon, Small, & Fanuele, 2006). These studies provide a strong indication that PA instruction can help improve reading outcomes for a diverse group of students from different types of backgrounds.

For these various groups of students, PA instruction can help improve several

reading-related outcomes. The National Reading Panel (2000) reported that PA has a significant effect on reading and spelling outcomes. Additionally, systematic, well-planned early instruction in phonological awareness strongly facilitates reading acquisition (Lundberg, Frost, Petersen, 1988). Specifically, PA instruction had positive effects on word reading, pseudoword reading, and reading comprehension. This means that PA can improve not only students' ability to read familiar words but also to decode unfamiliar words and better understand connected text. PA instruction has also been found to predict word identification and spelling skills 11 years following the intervention (MacDonald & Cornwall, 1995). Current research has offered consistent evidence that interventions that target phonological awareness can produce significant short-term and long-term improvements on reading skills for kindergarten and first grade students.

Kindergarten and First Grade Interventions

The National Reading Panel (2000) reported that the effects for interventions focusing on phonological awareness were significantly larger for students in kindergarten than for students in first grade or higher grades. One study that supported this finding demonstrated that a phonemic awareness intervention that began in kindergarten produced positive effects one to two years after intervention (Cartledge et al., 2011). This suggests that a one-time intervention in kindergarten can be sufficient to produce reading improvements that persist for one to two years. Elbro and Petersen (2004) also reported even later long-term effects as the result of a phoneme awareness intervention implemented with 35 children of dyslexic parents. In this study, students were evaluated

in second, third, and seventh grades, and the students that received training outperformed untrained control students in the reading of both word and nonsense words at each time period. They also found that the children who were not responsive to the intervention tended to have relatively poor phonological representations of known words.

Consistent with these findings are the results of a synthesis of 27 intervention studies (Cavanaugh, Kim, Wanzek, & Vaughn, 2004). These researchers found that the intervention components that produced the largest effect sizes included phonemic awareness instruction, along with an intensity of 15-30 minutes and small group sizes. While interventions that included phonemic awareness and print instruction produced moderate to high effect sizes for most of the studies reviewed, interventions that provided phonemic awareness instruction alone produced large mean effect sizes. These findings emphasize that early intervention can have a significant impact on preventing reading problems for kindergarten students and that phonemic awareness is one important intervention target that produces long-term reading effects beyond kindergarten.

Studies conducted at the first grade level have also supported the need for interventions focused on phonemic awareness. One study provided during first grade focused on phonologically-based decoding skills and found that these students continued to benefit from this intervention each year through the end of third grade (Vadasy, Sanders, & Abbott, 2008). A phonological awareness intervention conducted with 15 first grade English language learner students tracked the students' phonemic awareness and phonics skills and eventually exited 80% of the students from the intervention based on adequate score improvements on both reading skills (Healy, Vanderwood, & Edelston,

2005). These studies demonstrate that intervention focused on phonemic awareness can help improve the reading skills of low-performing first grade students.

Vocabulary

Vocabulary is relevant to phonemic awareness and general reading outcomes. As vocabulary grows, children gain a more detailed understanding of the phonemes in words they know (Metsala & Walley, 1998). Vocabulary skills are also related to reading comprehension. McKeown, Beck, Omanson, and Perfetti (1983) found that vocabulary instruction in fourth grade provided an advantage over students who did not receive vocabulary instruction on accuracy of word knowledge, speed of lexical access, and story comprehension. This is consistent with the statement that word knowledge is an important contributor to reading comprehension (Davis, 1944). Additionally, in a meta-analysis, Stahl and Fairbanks (1986) found that vocabulary instruction had a mean effect size of .97 for passage comprehension and a significant mean effect size of .30 for global measures of reading comprehension. Similar findings have been presented for English language learners (e.g., Gersten & Baker, 2000; Jimenez, 1994). The activities in the present intervention of interest incorporate both phonological awareness and vocabulary components.

Intervention Methods

There are several types of reading intervention approaches. Strategy instruction involves teaching students techniques they can use independently during instruction. For example, students could use a graphic organizer such as a Story Map, which helps the student organize information about a story's structure and events (e.g., Stringfield,

Luscre, & Gast, 2011). Students use the strategies as tools during reading activities. During embedded instruction, in contrast, students learn skills during the ongoing routines of the performance setting, and instruction occurs during natural learning opportunities (e.g., Johnson, McDonnell, Holzwarth, & Hunter, 2004). Although people have advocated the use of instruction with minimal guidance for many years, Kirschner, Sweller, and Clark's (2006) review concluded there is no research that supports this technique and that most studies support direct instructional guidance when teaching beginning to intermediate learners.

Phonological Awareness and Vocabulary Intensive Intervention

The intervention studied in this paper, Phonological Awareness and Vocabulary Intensive Intervention (PAVII), incorporates phonological awareness skills with vocabulary that follows a direct instruction format. Direct instruction (DI) utilizes explicit, structured instructional routines within a small group format that incorporates modeling and guiding until mastery is achieved (Carnine, Silbert, Kame'enui, & Tarver, 2009). DI lessons are tightly organized, fast-paced, highly engaging, and provide multiple opportunities to respond with corrective feedback. Studies have demonstrated that DI can be effective for at-risk students as well as students with disabilities (Carnine et al., 2004). In addition, a meta-analysis listed DI within the top three models of the 29 it reviewed for its effectiveness in urban and low-performing schools (Borman, Hewes, Overman, & Brown, 2003). This paper focuses on an intervention that uses this direct instruction format.

The purpose of this study is to evaluate PAVII as an intervention for both

kindergarten and first grade students. One study that utilized the original 12-session version of PAVII demonstrated positive effects in with low socioeconomic status ELL first grade students (Healy, Vanderwood, & Edelston, 2005). This study found that 80% of students met phonemic awareness and phonics goals by the end of 25 sessions. No study has evaluated PAVII with kindergarten students. PAVII consists of research-based components, including a combination of segmenting and blending (Slocum, O'Connor, & Jenkins, 1993; NRP, 2000) and a direct instruction format (Carnine, Silbert, Kame'enui, & Tarver, 2009). To evaluate this intervention, this paper will address the following research questions.

Research Questions

Given the strong support for providing early literacy intervention, it is important to evaluate the effectiveness of these interventions by examining student reading outcomes. It is critical that educators provide evidence-based intervention support to students as early as the kindergarten and first grades. The purpose of this study was to examine the outcomes and implications of a research-based phonological awareness intervention provided to kindergarten and first grade students at-risk for reading difficulties in a school district that serves a low socioeconomic status population of students. Three research questions will be addressed: (1) To what extent does PAVII reduce the risk of reading failure for kindergarten and first grade students based on phonemic awareness and phonics skills, respectively?; (2) To what extent do the students' phonemic awareness and phonics skills improve more than a control group in the same school district?; (3) Are the average rates of improvement (ROIs) significantly

different between the intervention and control groups?

Hypotheses. Based on past findings related to the beneficial effects of phonemic awareness instruction in both kindergarten and first grade, the following results are expected in this study: (1a) PAVII will reduce the risk of reading problems based on phonemic awareness for at least 80% of kindergarten students; (1b) PAVII will reduce the risk of future reading problems based on the phonemic awareness performance of at least 80% of the first grade students; (2a) Kindergarten students will have mean post-intervention phonemic awareness and phonics scores that are significantly higher than those of the control group; (2b) First grade students will have mean post-intervention phonics and oral reading fluency scores that are significantly higher than those of the control group. (3a) Kindergarten students will demonstrate a significantly higher average ROI on phonemic awareness scores than that of the control group; (3b) First grade students will have a significantly higher average ROI on phonics scores than that of the control group.

Method

Participants

Participants were selected from a convenience sample from four Southern California elementary schools in a school district that serves a low socioeconomic population. In this district, 9.9% of the students were English language learners and 43.8% received free/reduced price meals. The student ethnic distribution includes 58.4% Caucasian, 1.8% Black or African American, and 1.5% Asian students. The gender makeup of the kindergarten intervention group was 42% female students and 58% male

students. In the first grade intervention group, 40% of the students were female and 60% of the students were male. More descriptive demographic information is summarized in Table 1. In the kindergarten comparison group, 48% of the students were female and 52% of the students were male. The comparison group that did not receive PAVII received the regular core instruction from a fourth elementary school in the same district as the intervention groups. Both intervention and control group participants in this study received instruction in their general education classrooms using either kindergarten or first grade Houghton Mifflin curriculum.

All participants were recruited from four schools based on their Fall 2011 phonemic awareness screening scores. The aim was to identify students at risk for reading failure and provide early intervention to these students. Participants were selected for participation in this study based on their DIBELS Next (Dynamic Indicators of Basic Early Literacy Skills Next; Good & Kaminski, 2011) scores from the fall screening period. During the pre-intervention fall screening in September, kindergarten students were tested with First Sound Fluency (FSF), a measure of basic phonemic awareness. These students were included in the study if their FSF scores fell in the Well Below Benchmark or in the Below Benchmark range for the fall screening period. All 24 kindergarten students who did not score in the At or Above Benchmark range scored in the Well Below Benchmark range and received intervention. First grade students were tested with PSF and were eligible to receive intervention if their Phoneme Segmentation Fluency (PSF) scores fell in the Well Below Benchmark or Below Benchmark range for the fall screening period. Priority was given to students who received the lowest scores of

all of the students. Of the 45 first grade students who received intervention, 71% of the students scored in the Well Below Benchmark range and 29% scored in the Below Benchmark range. There were 45 first grade students across the five the first grade groups. See Figure 1 for a summary of pre-intervention and post-intervention FSF scores.

The kindergarten comparison group, which consisted of all kindergarten students at this school, originally included 101 students, but five were excluded from the analysis because they were missing their Fall FSF data and 54 other students were also excluded from the data analysis because they scored in the At or Above Benchmark risk category. At the first screening, all kindergarten students scored in the Well Below Benchmark range and were included in the comparison group. The first grade students were in the comparison group and originally included 137 students, but 9 were excluded from data analysis because their PSF scores were missing, and 76 additional students were excluded because their scores fell in the At or Above Benchmark risk category.

During the post-intervention winter screening, the kindergarten students were tested with PSF, Nonsense Word Fluency (NWF), and DIBELS Oral Reading Fluency (DORF), and the first grade students were tested with NWF and DORF.

Materials and Procedure

The curriculum used in this study, Phonological Awareness and Vocabulary Intensive Intervention (PAVII; Vanderwood, n.d.), is a manualized scripted intervention. It was intended to be used with a small group of kindergarten or first grade students struggling in phonological awareness skills, including ELL students. The original 12-session version demonstrated positive effects in a study with low socioeconomic status

ELL first grade students (Healy, Vanderwood, & Edelston, 2005). After 25 sessions, 12 of the 15 intervention students (80%) met their PSF and NWF goals. These results demonstrated that PAVII has been effective for most of the kindergarten and first grade students who received the intervention.

This study utilized a 20-session version of PAVII consisting of 30-minute sessions and following a direct instruction, model-lead-test format. Each session contains a vocabulary activity and five phonological awareness activities requiring individual and unison student responses. The vocabulary activity introduces the words that are used in each phonological awareness activity and includes explicit definitions with example sentences and questions that test the students' understanding of word definitions. The phonological awareness activities include Phoneme Production/Replication, Phoneme Segmentation and Counting, Phoneme Blending, Phoneme Isolation, and Rhyming. For Phoneme Production/Replication, the interventionist produces phonemes and the students repeat the phonemes in unison. For Phoneme Segmentation and Counting, students are asked to segment two-, three-, or four-syllable words with corresponding arm movements. When saying each phoneme, the interventionist and students touch one part of their arms. Students are also asked for the number of sounds in each word. With Phoneme Blending, the interventionist says words and students blend the sounds by saying the words. Phoneme Isolation requires students to name the first, middle, or last sound in a list of words. For the last activity in each session, Rhyming, the interventionist defines what a rhyme is, offers example words for a particular ending sound, and then elicits words that either end with the ending sound or rhymes with a sample word.

There were three kindergarten intervention groups and five first grade intervention groups in this study. The intervention creators designed the intervention sessions to occur three to four times per week for 30 minutes each time. Three of the five first grade intervention groups were only able to receive 20 minutes of intervention during each session. The kindergarten and first grade groups received 10 to 11 weeks of intervention instruction. Seven of the eight groups included six to seven students, and one of the eight groups included 12 students.

Each interventionist received individualized training for 30 to 40 minutes from the author of this paper. At each training, the researcher discussed the rationale and components in the PAVII manual, modeled each activity, and answered questions. The school psychologists, teachers, and graduate students who collected the screening data received training on the administration of DIBELS Next assessment tools. Inter-rater reliability calculations ranged from 87% to 100%. Students were exited from the intervention when they met their PSF goals, which were the scores that fall in the At or Above Benchmark range for the appropriate grade level.

Measures

First Sound Fluency (FSF). FSF was used as a screening tool to identify students who were eligible to receive intervention. This measure was designed to assess early PA for students by asking them to say the beginning sounds in words. Children were asked to say the first sound in a series of words read aloud to them for one minute. For kindergarten students, the median one-month alternate-form reliability is .82 (Cummings, Kaminski, Good, & O'Neill, 2010).

Phoneme Segmentation Fluency (PSF). PSF was used to monitor the students' progress during the intervention. PSF is a one-minute, individually administered test of phonemic awareness. The overall score is the number of correctly identified segmented sounds in one minute. The alternate-form reliability for this measure was .44, and the inter-rater reliability was found to be .95 (Good et al., 2011).

Nonsense Word Fluency (NWF). NWF is also an individually administered, one-minute test of alphabetic principle and basic phonics skills. For this task, participants are provided with printed nonsense words in a consonant-vowel-consonant sequence and are asked to read the words aloud. The overall score is the number of correctly produced letter sounds in one minute. This measure was used because it has been found that PA instruction can produce positive effects on both word reading and pseudoword reading (NRP, 2000). This test's alternate-form reliability for first graders is .85, test-retest reliability is .76, inter-rater reliability was found to be .99, and the predictive criterion-related validity with the DIBELS Composite Score for the end of the year was .71 (Good et al., 2011).

DIBELS Oral Reading Fluency (DORF). DORF is an individually administered test of oral reading fluency, advanced phonics and word attack, and reading comprehension. Participants read three passages aloud for one minute each. They receive a score for each passage based on the number of words read correctly. The score is calculated as the median of the three scores.

Fidelity of Intervention Implementation

Interventionists were observed during 8% of the intervention sessions on one or

two days and provided feedback. The fidelity checklist (See the Appendix) consisted of observed intervention components for each activity on a likert scale ranging from 0 to 2 (0=Never observed, 1=Sometimes observed, 3=Always observed). The total fidelity score was calculated as the total score of observed components over the total possible score of components. This number was then divided by 100 to produce a percentage. Overall, fidelity scores were moderate to high with a range of 67%-96% (M=86%) across the three intervention schools.

Results

Analyses of covariance (ANCOVA) were conducted to examine differences in the equality of means between intervention and comparison groups for each grade level at posttest. All participants assigned to receive intervention completed the intervention and were included in the data analysis. To provide additional information on individual and group response to intervention, descriptive analyses are also provided.

Baseline Data

The baseline DIBELS scores for the kindergarten treatment and comparison groups are presented in Figure 1 for FSF scores. All kindergarten students began intervention with scores in the Well Below Benchmark risk category. The baseline NWF scores for the first grade students are presented in Figure 2. About 30% of first grade students scored in the Well Below Benchmark risk category before intervention support began. Regarding first grade students' phonemic awareness skills, 71% of students entered intervention with scores in the Well Below Benchmark risk category, and 0% scored in the At or Above Benchmark risk category.

Analysis of Intervention Effects

An ANCOVA was conducted to compare the treatment and comparison groups on each dependent measure for each grade level. The covariates used were the pre-test scores for each dependent variable to control for initial skill level. For kindergarten, the covariate was a fall FSF screening score for the two dependent variables, PSF and NWF. For first grade, the covariate was a fall screening PSF score in the analyses for the dependent variables, NWF and ORF.

Kindergarten. The homogeneity of variance assumption was met for both outcome variables. Contrary to one of the hypotheses in this study, when differences in pretest FSF scores were accounted for, there was no significant difference in mean post-test PSF scores, F=.43 p=.51. Additionally, when differences in pretest PSF scores are accounted for, there was no significant difference in mean outcome NWF scores, (F=.55, p =.460). Contrary to the hypothesis related to ROIs for kindergarten, there was not a significant difference in ROI on FSF between kindergarten intervention and control groups, t=1.126, p=.268.

First Grade. The homogeneity of variances assumption was not fully met for either outcome variable. There was no statistically significant main effect on measures of NWF, F=2.10, p=.151. However, there was a statistically significant main effect on post-test DORF performance (F=7.90; p= .006).

To address the third research question regarding whether the average rates of improvement were significantly different between the intervention and control groups, average ROIs were calculated and an independent samples t-test was conducted to

determine whether the differences in ROIs were significantly different. As expected, there was a significant difference in ROI on NWF between first grade intervention and control groups, t=5.434, p<.001. There was not a significant difference in ROI on PSF between kindergarten intervention and control groups, t=1.13, p<.27.

Student Response to Intervention

Descriptive analyses were conducted to examine student response to intervention more closely. In the kindergarten group, 0 of 24 students scored in the At or Above Benchmark range for the FSF measure at the beginning of the year during Fall screening. After receiving intervention support, 6 of 24 (25%) scored in the At or Above Benchmark Range. This means that fewer than half of the students reached the benchmark goal, which is inconsistent with the hypothesis that at least 80% of students would reach this phonemic awareness goal. See Figure 1 for a summary of the movements of students' FSF scores from fall to winter. The fall scores were based on the DIBELS Next Fall benchmark risk categories, and the Winter scores were categorized based on the winter benchmark goals.

In the first grade group, initially 71% of students scored in the Well Below Benchmark risk category for PSF and 0% scored in the At or Above Benchmark category. By the end of the intervention, 5 of 47 students (11%) continued to score in the Well Below Benchmark category, although most of the students (37 of 47 students, or 82%) had scored in the At or Above Benchmark category. Although the At or Above Benchmark range was intended for the beginning of the school year, these students had struggled to score close to this range just prior to the intervention. These results are

consistent with the hypothesis that at least 80% of first grade intervention students would reach the PSF goal for At or Above Benchmark.

Discussion

Past research examined the effectiveness of PAVII with first grade students (Healy, Vanderwood, & Edelston, 2005). This study extended those findings by implementing PAVII with kindergarten students at-risk for reading failure in addition to struggling first grade students. The intervention used in the study was developed based on current research on teaching phonemic awareness. Instruction was explicit, with the interventionist modeling correct responses, providing multiple opportunities to respond, and providing immediate corrective feedback.

The results of this study provide additional, albeit limited, evidence that this intervention, which focused on phonological awareness and vocabulary, can increase first grade students' oral reading fluency skills as well as the rate of improvement in phonics-related skills. The data demonstrate that following intervention, several kindergarten students scored in lower risk DIBELS Next ranges for phonemic awareness and several first grade students scored in lower risk ranges for phonics. The intervention was effective in improving oral reading fluency for first grade students, although it did not significantly improve phonemic awareness or phonics for kindergarten or phonics for first grade. These results are inconsistent with current research on the development of reading skills. The National Research Council Committee identified phonemic awareness, phonics, vocabulary, comprehension, and fluency as the important processes by which children learn to read (National Reading Panel, 2000). Based on this report, it

would be expected that students would typically develop phonemic awareness before phonics and that an intervention that provides PA instruction would lead to an increase in students' phonics skills and eventually to reading fluency. Surprisingly, the first grade students demonstrated improved reading fluency skills following this PA intervention but not as much of an improvement on phonemic awareness or phonics skills. However, it is important to note that this study did not include a randomized control group, and it would be inaccurate to conclude that these improvements were due to this intervention because there was no true control group with which to compare the improvements.

These findings also contradict past research that found that phonemic awareness instruction tends to be significantly more effective for students in kindergarten than for students in first grade or higher grades (National Reading Panel, 2000). One possible explanation for these results is that the kindergarten core curriculum focused largely on developing phonemic awareness skills. It is possible that the first grade students significantly improved on oral reading fluency following this intervention because their core curriculum did not emphasize phonemic awareness and therefore provided extra support for struggling first graders who did not acquire PA in kindergarten. This supports the notion that nonreaders in first grade require much more PA instruction than those who are already reading (National Reading Panel, 2000). The kindergarten students, in contrast, might not have improved significantly on PA skills because the core instruction already provided sufficient PA support. It is possible that because PA was a primary focus for all students in kindergarten, the intervention effects were small and insignificant. However, another possibility is that PAVII was not implemented with high

integrity. We cannot make conclusions about the results with confidence because the results could have resulted from a lack of adherence to the intervention script and procedures.

A second possible explanation is that kindergarten students may require instruction involving a combination of phonemic awareness and letter-sound correspondence. The National Reading Panel (2000) found that programs that included phoneme manipulation in addition to using letters produced larger effects than those that excluded the use of letters. Fuchs and colleagues (2001) have also concluded that greater reading improvements can result from combining PA instruction with decoding instruction rather than only focusing on PA instruction. It could be that phonemic awareness is necessary but not sufficient for reading development in kindergarten, although this intervention was intended to be supplemental to core instruction.

The differences in rates of improvement for the kindergarten and first grade groups with their respective comparison groups reveal important information regarding these two age groups and their expected growth rates. While there was not a significant difference in rate of improvement on phonemic awareness for kindergarten, there was a significant difference in rate of improvement on phonics for first grade. Compared to the expected rate of improvement on nonsense word fluency for first grade between fall and winter screening periods, the PAVII group's rate of 2.49 corresponds to the 85th percentile for students in the national norm sample who initially scored in the "high" range (Pearson, 2012). This suggests that, following PAVII, the first grade intervention group was able to increase in phonics skills at a rate comparable to those students in the

national norm sample who scored at a rate equal to or higher than 85% of students who initially scored in the 76th-90th percentile range. For kindergarten, the PAVII students achieved a rate of improvement on phonemic awareness similar to that of students who, between the winter and spring screening periods, scored in the 95th percentile range for students who initially scored in the "very high" range (Pearson, 2012). This means that the PAVII students improved on phonemic awareness at a rate similar to that of students in the national norm group who scored in the 91st-99th percentile range during initially. Overall, the students who received intervention support through PAVII reached high ROIs based on the national norm growth rates.

Future Research

Future studies should attempt to replicate this study with a different design that includes a control group. They should also include a larger sample size and provide intervention with smaller, more consistent group sizes. It would also be informative to determine whether phonemic awareness combined with decoding support is more effective for kindergarten students than intervention in phonemic awareness alone. Although PAVII was designed as an intervention supplemental to core instruction, it is possible that, as some researchers have suggested, this would be more effective with the inclusion of decoding instruction for kindergarten students (e.g., Fuchs et al., 2001). It is also possible that under controlled experimental design conditions PAVII would have resulted in significant improvements in reading skills when compared to a control group.

Limitations

It is important to note the limitations of this study. First, and most important, this

study does not meet the requirements of an experimental design. Schools and participants were selected from a convenience sample based on the interventions previously used at each school rather than based on random assignment. This limits the internal validity of this study, which means that it is difficult to attribute the results in literacy skill improvement to the intervention. This also limits the external validity in that it limits the ability to generalize the results to other students. Second, the comparison group students attended kindergarten or first grade at a different school. The students in the control group were selected from a separate school because all students who were identified as at-risk for future reading problems received intervention support through PAVII. This limits the ability to compare the experimental and control groups because other factors could have contributed to differences in outcomes for these groups. Third, the groups did not have consistent numbers, and one group included 12 students. This was a limitation because it could have hindered improvement in the students' phonological awareness growth. This study could have yielded stronger effects if the groups had been smaller because PAVII was designed to improve reading skill outcomes for small groups of students. Fourth, not all intervention sessions were consistently 30 minutes in length. For example, the first grade groups at one school were limited to sessions that were 20 minutes in duration. Although this was a limitation, the first grade students demonstrated significant improvements compared to the control group. Fifth, only 1-3 fidelity checks were conducted at each school, which particularly limits the ability to conclude with confidence that the intervention sessions were conducted as intended. It is also difficult to conclude that PAVII is not effective for kindergarten students or is effective for first

grade students because we do not know if the interventionists implemented PAVII with fidelity. Sixth, because multiple interventionists led the groups, it is difficult to compare the quality of instruction across groups because each interventionist could have differed in instructional and behavior management techniques. Finally, no inter-rater data were collected for control group screening scores. Only two inter-rater reliability calculations were completed between two researchers who conducted the screening at one intervention school. These limitations emphasize the need to interpret and generalize the results with caution.

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Table 1

Participant Demographic Information

	Kindergarten		First Grade	
	Intervention	Non-Intervention	Intervention	Non-Intervention
Gender				
Male	58%	52%	60%	50%
Female	42%	48%	40%	50%
ELL Status				
ELL	20%	14%	31%	12%
Non-ELL	80%	86%	69%	88%
Ethnicity				
White	58%	55%	31%	54%
Hispanic	38%	43%	69%	40%
Vietnamese	4%	0%	0%	0%
Korean	0%	0%	0%	2%
African American	0%	2%	0%	4%

Table 2

ANCOVA Results by Grade Level

Measure	F	P Value	η^2	Power
Kindergarten				
PSF	.431	.514	.007	.099
NWF	.552	.460	.009	.113
First Grade				
NWF	2.09	.151	.021	.300
DORF	7.899*	.006	.076	.795

* $p < .01$.

Table 3

ROI Results

	N	*M*	*SD*	*t*	P value
Kindergarten FSF	--	--	--	1.13	.27
PAVII	24	1.90	1.66		
Control	42	1.48	1.00		
First Grade NWF	--	--	--	5.43*	<.001
PAVII	47	2.49	1.52		
Control	52	1.06	1.09		

Figure 1

Kindergarten Changes in First Sound Fluency Risk Categories

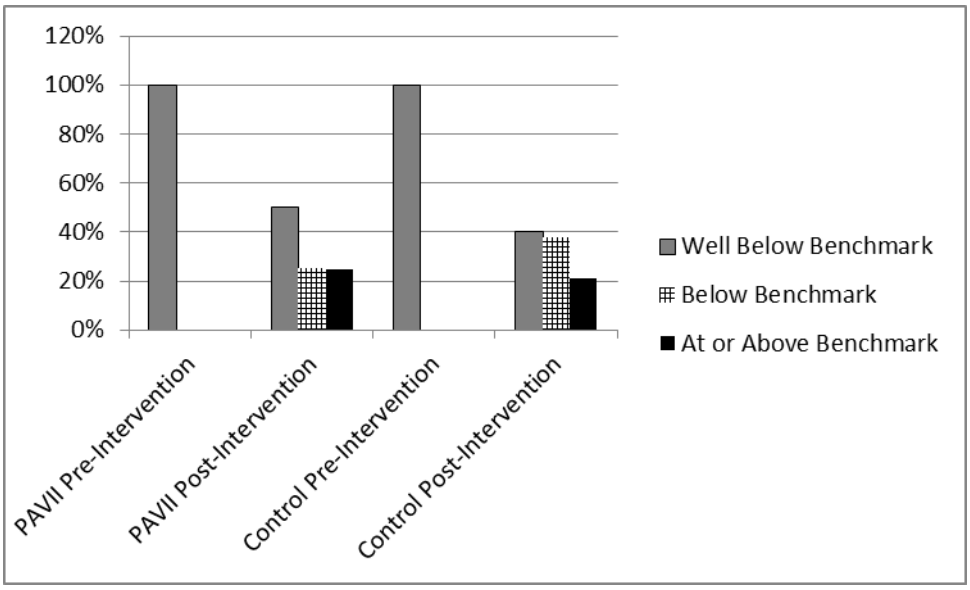
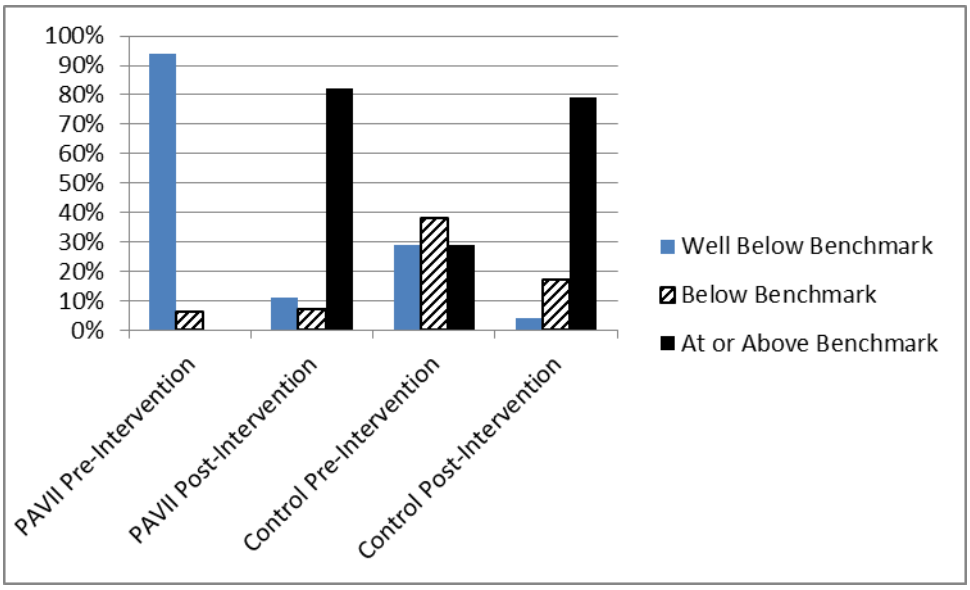


Figure 2

First Grade Changes in Nonsense Word Fluency Risk Categories



Appendix

Fidelity Checklist

Intervention Leader: _____ Date: _____

Observer's Name: _____

School: _____

# of Students Present: _____ Time: _____-_____ Calculated Fidelity Score: _____ %

Vocabulary	**Score** (Circle)	
1. Interventionist reads to students all definitions listed in lesson plan	1	0
2. Interventionist reads all sentences	1	0
3. Interventionist asks students for definitions	1	0
4. Interventionist uses hand signal appropriately	1	0
5. Interventionist leads the response with all of the students when indicated in the directions (i.e., for the first word example)	1	0
6. Interventionist points to and asks students individually for definitions	1	0
7. Interventionist responds to all correct answers with verbal praise and/or a "high-five"	1	0
8. Interventionist completed the Vocabulary section.	1	0

9. Interventionist corrects student errors by modeling the correct answer and then asks the student or students for the correct response.	1	0
10. Interventionist clearly acknowledges correct responses, often using the “high-five” as a reinforcer.	1	0
Phoneme Production		
11. Interventionist accurately models all phonemes.	1	0
12. Interventionist uses the hand signal appropriately to elicit student responses.	1	0
13. Interventionist has students respond in unison for all phonemes.	1	0
14.	1	0
15. Interventionist corrects student errors by modeling the correct answer and then asks the student or students for the correct response.	1	0
16. Interventionist clearly acknowledges correct responses, often using the “high-five” as a reinforcer.	1	0
17. Interventionist completed Phoneme Production section.	1	0
Interventionist responds to all correct answers with verbal praise and/or a “high-five”		
Phoneme Segmentation and Counting		

18. Interventionist reads word listed in lesson plan.	1	0
19. Interventionist uses the hand signal for students to repeat the word.	1	0
20. Interventionist tells students the number of sounds in the example word.	1	0
21. Interventionist verbally models segmentation of the example word.	1	0
22. Interventionist asks students how many sounds are in the word.	1	0
23. Interventionist uses parts of his/her arm to segment the sounds.	1	0
24. Interventionist asks students to segment the word.	1	0
25. Interventionist elicits only unison responses for all but the parts asking for the number of sounds.	1	0
26. When asking for the number of sounds, interventionist elicits both unison and individual responses.	1	0
27. Interventionist points to students individually when eliciting individual responses.	1	0
28.	1	0
29. Interventionist clearly acknowledges correct responses, often using the “high-five” as a reinforcer.	1	0
30. Interventionist completed the Phoneme Segmentation and Counting section.	1	0

Interventionist responds to all correct answers with verbal praise and/or a “high-five”		
Phoneme Blending		
31. Interventionist reads definition of blending.	1	0
32. Interventionist models blending of words by utilizing parts of his/her arm to segment the words by sound.	1	0
33. Interventionist models blending of words using appropriate hand signal.	1	0
34. Interventionist asks the students to blend the sounds together to form the word.	1	0
35. Interventionist explains directions for blending the words while modeling hand signal.	1	0
36. Interventionist asks students to blend word in unison.	1	0
37. Interventionist points to and asks an individual student to blend the word.	1	0
38.	1	0
39. Interventionist clearly acknowledges correct responses, often using the “high-five” as a reinforcer.	1	0
40. Interventionist corrects student errors by modeling the correct answer and then asks the student or students for the correct response.	1	0
41. Interventionist completed the Phoneme Blending section.	1	0

Interventionist responds to all correct answers with verbal praise and/or a “high-five”		
Phoneme Isolation		
42. Interventionist reads word from lesson plan.	1	0
43. Interventionist asks students to repeat word using hand signal.	1	0
44. Interventionist models isolation of sounds by utilizing whole arm while saying whole words	1	0
45. Interventionist models isolation of sounds by utilizing parts of arm for parts of words.		
45. Interventionist asks students to repeat isolation of sounds.	1	0
46. Interventionist asks students to isolate sounds in unison.	1	0
47. Interventionist points to and asks students individually to isolate sounds.	1	0
	1	0
49. Interventionist corrects student errors by modeling the correct answer and then asks the student or students for the correct response.	1	0
51. Interventionist completed the Phoneme Isolation section.	1	0
Interventionist responds to all correct answers with verbal praise and/or a “high-five”		
Rhyming		

52. Interventionist gives definition of rhyme.	1	0
53. Interventionist reads the word to the students.	1	0
54. Interventionist reads the sentences that follow the word.	1	0
55. Interventionist models the rhyme while stressing the ending and using hand signal appropriately.	1	0
56. Interventionist states the ending.	1	0
57. Interventionist asks the students for the ending.	1	0
58. Interventionist asks all students for examples of words that rhyme with the target word (students should respond in unison).	1	0
59. Interventionist points to and asks students individually for words that rhyme with target word.	1	0
Interventionist responds to all correct answers with verbal praise and/or a “high-five”	1	0
61. Interventionist corrects student errors by modeling the correct answer and then asks the student or students for the correct response.	1	0
63. Interventionist completed the Rhyming section.	1	0
Corrective Procedure (if applicable)		
64. Interventionist responds appropriately to students who do not pay attention by saying, “Let’s try it again.”	1	0

65. Interventionist responds appropriately to students who do not respond by saying, “I have to hear everybody.”	1	0
66. Interventionist responds appropriately to students who respond before or after the signal by saying, “I need everybody to respond at the signal.”	1	0
67. Interventionist responds appropriately to students who respond using an inappropriate voice by modeling the “nice way” to respond.	1	0
68. Interventionist acknowledges alternative responses but models the response expected in the curriculum.	1	0

Total points received: _____

SCORING:
Circle “1” if component is present.
Circle “0” if component is not present.
All components, excluding those from the “Corrective Procedure” section, must be present and should receive a score of either “1” or “0.”
If a component from the “Corrective Procedure” section was not observed, subtract one from the denominator (the total number of points possible) for each component. For example, if students do not offer alternative responses as described in #68, divide the total number of “1” scores by 54 (68 – 1 = 67).

Percentage of Components Present: _____ (_____/58 = _____%)