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Responsiveness of Students With Language Difficulties to Early Intervention in Reading

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For children with language challenges, little is known about effective early reading interventions, because most studies have used language scores as exclusionary criteria. We randomly assigned 78 kindergartners with poor language skills to small group reading interventions that included phonemic awareness, alphabetic understanding, and oral language. The groups began in September or mid-February. Nearly half the students were English learners. MANOVA between these groups found that earlier intervention led to significantly better outcomes than the same interventions begun later in kindergarten. We found similar rates of growth between students who were English only or English learners. Twice as many students in the immediate as in the delayed treatment scored in the average range at the end of the year. Pretests did not predict who would be a good or poor responder to the treatments; however, January scores in letter knowledge and phonemic awareness were reliably different for good and poor responders.

Keywords: *response to intervention; mild retardation; English learners; reading intervention*

Young children with language difficulties often struggle learning to read once they enter school. Given the reciprocal nature of vocabulary development and reading ability (Catts, Adlof, & Weismer, 2005; Scarborough, 1990), this challenge is not surprising. Two of the most prevalent etiologies for language difficulties are cognitive disabilities or native languages other than English, each of which affect reading development in English differently.

English-speaking-only children (EO) with low language ability (operationally defined as those with receptive or expressive language scores between 50-84) subsume a large segment of the children meeting criteria for borderline and mild cognitive disability specified in the Individuals with Disabilities Education Improvement Act (2004). This group of children constitutes approximately 15% of a given school population based on a normal curve, translating into approximately 4 children out of a typical 30-student classroom. During the past two decades, we have seen a persistent decline in the willingness of public schools to classify these children with cognitive disability, instead labeling them as learning disabled (LD; despite not meeting IQ-achievement discrepancy criteria) or speech/language impaired, or keeping them in general education and unserved by special education (Donovan & Cross, 2002; MacMillan, Gresham, Bocian, & Lambros, 1998). Many of these children avoid detection and are not referred by teachers despite their concerns about the child's academic performance (MacMillan & Siperstein, 2002). Ample evidence suggests that children in this range are perceived by teachers to constitute one of the most difficult to teach groups of children (MacMillan & Siperstein, 2002). Although prevalent in public schools, these students often have been excluded from studies of early reading interventions because their low level of language is associated more with cognitive disability than with learning disability, and early reading intervention research has been focused typically on reducing the

incidence of LD. As examples, the research of Ball and Blachman (1991) and Blachman, Ball, Black, and Tangel (1994) excluded students with PPVT scores more than 1.5 standard deviations below the mean; Torgesen, Morgan, and Davis (1992) excluded students who attended special classes, and Vellutino et al. (1996) excluded students with verbal IQ below 90 and also English Language Learners.

Children who are English learners (ELs) as they enter school may score similarly to students with cognitive disability on measures of receptive or expressive language in English, however, their learning trajectory in reading is likely to be quite different. These students can present teachers with a different set of challenges than those students meeting the cognitive delay criteria. Research on early reading intervention in English with ELs is still in its infancy (Klingner, Artiles, & Barletta, 2006), although evidence is growing that ELs may perform similarly to native speakers on early literacy skills (Lesaux, Rupp, & Siegel, 2007). Interventions developed for EL poor readers have shown promise in kindergarten and first grade (Linan-Thompson, Vaughn, Prater, & Cirino, 2006), however, results are rarely compared to native speakers in the same study.

It should be noted that very little is known about how children with language challenges will respond to evidence-based reading instruction that has been validated on populations of children with average or near-average cognitive and language abilities (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Elbaum, Vaughn, Hughes, & Moody, 2000; Torgesen, 2000; Vellutino & Scanlon, 2002). When students with receptive language scores above 85 are selected as study participants, receptive language contributes little unique variance to reading scores in kindergarten or first grade (e.g., about 2% in O'Connor & Jenkins, 1999), although language skills account for increasing amounts of variance in later grades. Because most of the prediction studies of the last decade have excluded students with low language scores, we simply do not know the extent to which language ability supports or inhibits responsiveness to reading interventions during the early grades.

This study was designed to address a gap in the early intervention literature between students with average language skills but low reading skills (i.e., virtually all of the early reading intervention studies of the last 15 years) and students with low language skills and low reading skills. In Browder et al.'s (2006) review of research on reading instruction for students with significant cognitive disabilities, few studies were found that focused on areas of reading other than sight word identification, and her team concluded that the least is known about response to instruction in phonemic awareness, despite extensive research on this skill for students with average levels of language. A similar dearth of studies addresses the large population of students with mild cognitive disabilities, who continue to experience chronic and persistent academic difficulties. These students may not have received the most appropriate instructional strategies to remediate their academic problems because they have not been included as participants in the studies that form the evidence-based practices for reading interventions.

Reading Acquisition for Children With Low Levels of Language

Reading acquisition has been a major area of difficulty for children with poor language skills in English, regardless of the cause of the poor language skills. Given that language is a defining feature of both cognitive disability and EL status and that receptive language correlates significantly with academic achievement over time, reading difficulties come as no great surprise.

Mild cognitive disability. In a major review of the literature by Semmel, Gottlieb, and Robinson (1979), the following conclusion documents the limited success achieved in teaching reading to students with cognitive disability:

> We note that in the investigations cited, mean reading scores of EMR pupils never reached a grade level of 4.0. These data suggest that the crucial need at present is to develop more appropriate instructional delivery systems for mentally retarded children. Instructional alternatives that have been offered to date have proven relatively ineffectual regardless of the environment in which these children are taught. (p. 237)

This conclusion was reached after reviewing research including children with verbal language scores as high as 85. Subsequently, the upper IQ for cognitive disability eligibility was reduced to 70 (Grossman, 1973), rendering those in the IQ range of roughly 71 to 85 ineligible for services as "borderline mentally retarded" but often unable to qualify for services as LD because of the difficulty in documenting a discrepancy psychometrically. In the years since

Semmel et al. (1979) published their analysis, a considerable body of empirical evidence has accumulated addressing reading disabilities (Foorman et al., 2003; Torgesen, Wagner, & Rashotte, 1997). This research has demonstrated the importance of phonemic awareness as a necessary but insufficient skill in reading acquisition. However, the empirical evidence above excluded children with vocabulary scores below 78, leaving a gap in the reading literature about this same disenfranchised population. This exclusion leads to the rationale for the current study.

Historically, cognitive disability has been the only disability category that required modifications in both how children were taught and what children were taught. Other disability categories required modifications in how to teach children to accommodate their disability. In cases of cognitive disability, however, conventional wisdom in the late 20th-century suggested that the intellectual limitations defining cognitive disability restricted learning ability and therefore suggested a more functional curriculum designed to relate directly to everyday living, vocational skills, and independence. The question raised by the more recent developments in reading instruction and early intervention is whether methods with empirical support for students at risk for LD will benefit children with intellectual or language-processing limitations. Second, do the same methods require more intensity or duration to be effective? To date, these important questions have not been examined systematically.

English learners. The number of students who speak a language other than English has risen rapidly in the past decades and continues to grow. At the turn of the century, approximately 17% of school-aged children spoke a language other than English at home as compared to 9% two decades earlier. Of this population, the majority (77%) speak Spanish as their first language (Zehler, Fleischman, Hopstock, Stephenson, Pendzick, & Sapru, 2003). The Hispanic student population as a whole, including English-proficient children, score significantly lower in reading than their peers (Slavin & Cheung, 2005; Snow, Burns, & Griffin, 1998).

As EL populations continue to increase throughout the United States, we need empirically supported methods with which to accurately assess and intervene for these students. Although there has been a dramatic rise in the number of studies investigating reading interventions for English-only students, there is limited research evaluating these effects with ELs. For example, measures of phonemic awareness and phonics such as phoneme segmentation fluency (PSF) and rapid automatized naming of letter sounds are widely used with English-only students in kindergarten, and studies have found good predictive validity for these measures. Some evidence suggests they may serve the same function for ELs (Lesaux et al., 2007; Swanson, Saez, & Gerber, 2006).

Schools often overlook or delay addressing the possibility that ELs are having difficulties with word decoding that is typical of reading disability (Lesaux & Siegel, 2003), because it is difficult to determine whether reading difficulties are the result of poor English language proficiency or an indication of a learning disability or mild cognitive disability. Teachers understandably hesitate to refer ELs to prereferral teams because they are unable to determine whether ELs are having difficulties learning to read because of second language acquisition issues or a disability (Klingner et al., 2006). While teachers wait to refer, students fall further behind. This delay in providing early intervention could result in more ELs qualifying for special education services with a disability later in school (Rueda & Windmueller, 2006), especially at the secondary level (Artiles, Fueda, Salazar, & Higareda, 2005), when in fact, the discrepancy is because of earlier instructional issues.

Although many school districts opt to wait until students' language proficiency has developed to determine if a learning disability is present, researchers are demonstrating that early intervention may reduce later academic difficulties (Mathes & Torgesen, 1998; Quiroga, Lemos-Britton, Mostafapour, Abbott, & Berninger, 2002). Exploratory research suggests that ELs who are seriously delayed in reading when they enter kindergarten can make substantial gains in a short period of time if identified early and given an empirically supported reading intervention (Healy, Edelston, & Vanderwood, 2005; Justice & Pullen, 2003; Linan-Thompson et al., 2006; Quiroga et al., 2002). Several studies recently have included EL students in their early intervention groups, but few studies compare the response of EL students to the response of English-only students who have similar levels of language in English. Although these groups of students differ along many dimensions, they share similar difficulties with receptive language in English. This comparison is a focus of the current study.

Evidence-Based Reading Instruction

An extensive research base exists on the effectiveness of phonemic awareness and letter sound instruction

for children in kindergarten (Blachman et al., 1994; O'Connor, 2000; Torgesen et al., 1997; Vellutino et al., 1996). It is important to note, however, that this empirical work has typically required that participants exhibit normal intelligence, usually operationalized as verbal IQ or receptive language scores greater than 80 or 85. Moreover, although that compendium of research findings shows improvement for the large majority of cases, they typically report a 4% to 6% rate of inadequate responders to the intervention. That is, 4% to 6% of children with reading difficulties with language scores above 80 fail to respond to these empirically based instructional programs. We do not know the percentage of children with language scores less than 80 who would make inadequate response to early intervention best practices in reading instruction.

Purpose of the Study

The conceptual rationale for the present investigation is that we do not know the degree to which children with low levels of language respond or fail to respond to early intervention in reading that is delivered in schools. This gap in the early intervention knowledge base can be interpreted, in part, as a problem of external validity, given that there is little evidence to suggest that the same results produced with the average-language samples in early intervention studies might be obtained with students with lower language abilities. The overall question that drove this study is the following: What are the short-term effects of early intervention in reading in kindergarten for students with low levels of language? Specifically, are there differences in response rates between students who begin interventions in September or in February of kindergarten? Are there differences in response between children whose low language is due to receptive language difficulties in their native language or the difficulty of learning English? What proportion of students with low levels of language respond poorly to interventions? Do individual student characteristics predict response?

Method

Participants

Students and schools. We selected schools to represent urban and rural locations. Our target population included all kindergartners in four schools in Southern California and four schools in rural Montana (561 children). Across schools in California, 23% to 82% of students were eligible for free or reduced lunch. Ethnicities included African American (8%-21%), Asian (1%-12%), White (24%-33%), Hispanic (44%-50%), and Other (1%-6%). English was a secondary language for 19% to 25% of the students in the selected California schools. Across the Montana schools, 42% to 77% of students were eligible for free or reduced lunch, and ethnicities included African American (2%-3%), Asian (0%-2%), White (85%-95%), and Hispanic (1%-2%). None of the Montana students were ELs.

We used a gated selection procedure that began with universal screening in the second month of kindergarten using individually administered measures of letter-naming fluency and initial sound identification, which predict reading difficulties at this age (Good, Simmons, & Kame'enui, 2001; O'Connor & Jenkins, 1999). For the 143 children who named fewer than nine letters and identified fewer than seven initial sounds, we asked for parent permission to continue testing and received permission for 80%. A comparison of initial sound and letter-naming fluency scores between those students with and without parent permission was not significant. Because we were interested particularly in students with low levels of language, we administered a test of receptive language (*Peabody Picture Vocabulary Test–III*, PPVT-III; Dunn, Dunn, & Dunn, 1997) to students with parent permission, and selected 78 students across schools (62 from California and 16 from Montana) who scored below 85 (standardized score) on the PPVT-III, which was 55% of the low-skilled sample who returned parent permission (14% of the overall sample of kindergartners). Forty-two percent of the participants were female; one was receiving services through special education, and nearly half (n = 35) were ELs—all from California. Of the ELs, 26 were considered beginners based on the *California English Language Development Test* (CELDT) and 9 were in the intermediate to advanced range.

The participating schools in California operate on a year-round track system, with students assigned to one of four tracks to equalize attendance year round. Students had breaks of 3 to 4 weeks by track occurring several times during the year. Administrators attempted to balance the composition of the students in each track within schools, and so we randomly assigned tracks within school to an immediate intervention

Table 1
Descriptive Statistics (Means and Standard Deviations) for Students in Immediate and Delayed Treatment Groups

Subtests	Immediate Treatment (n = 38)	Delayed Treatment (n = 31)	Effect Size
Pretests			
Rapid Letter Naming	1.68 (2.11)	2.57 (2.47)	
Initial Sound Fluency	3.12 (1.87)	3.11 (2.25)	
PPVT-III	73.15 (13.51)	74.29 (13.62)	
WPSSI, IQ estimate	82.34 (8.26)	81.20 (8.01)	
WPSSI Picture Naming	5.73 (2.17)	5.81 (1.77)	
CELDT	2.44 (0.90)	2.38 (0.88)	
Midtests			
Rapid Letter Naming	23.83 (16.76)	20.93 (15.80)	0.18
Phoneme Segmentation Fluency	17.68 (14.71)	13.46 (14.19)	0.30
Posttests			
Rapid Letter Naming	33.98 (16.75)	29.93 (16.44)	0.25
Phoneme Segmentation Fluency	38.59 (17.77)	27.43 (17.02)	0.66
Nonword Fluency	30.15 (14.49)	16.70 (16.26)	0.83
Treatment Minutes	628.78 (278.84)	314.25 (156.50)	1.44

Note: PPVT-III = *Peabody Picture Vocabulary Test, 3rd Edition*, standard scores with a mean of 100, *SD* = 15; WPSSI = *Wechsler Primary Scale of Intelligence*; IQ estimate = standard scores with a mean of 100, *SD* = 15; WPPSI Picture Naming = scaled score with mean of 10 and *SD* of 3; CELDT = *California English Language Development Test*.

group (beginning treatment in September) or to a delayed treatment control group that began intervention in mid-February.

In Montana, students were assigned to immediate intervention or delayed control by school of attendance. All schools were on a traditional schedule of instruction (September through mid-June) and were located in different rural districts. Thus, two schools were randomly selected for the immediate intervention group and began instruction in early October. The remaining two schools served as the delayed control and began intervention in mid-February. By the end of the year, 9 students left the study due to family moves outside the area, leaving 69 students in the analyses (57 in California and 12 in Montana). Means and standard deviations for the selection and descriptive measures by condition can be found in Table 1.

Teaching assistants and teachers. Instruction was delivered by 11 teaching assistants (TAs) who were already working part time in the schools. Five TAs were bilingual and all but one were female. Most worked as tutors in this study for the entire school year and for students in the immediate and delayed treatments; however, five TAs were hired midyear, because the caseload for tutoring grew when the delayed treatment began. The TAs' time on this study was paid by the research grant. Instruction in Montana was delivered at one of the immediate intervention schools by the reading specialist, and in the three remaining schools (one immediate and two delayed treatment) by graduate students in the school psychology program, because none of these schools had paraprofessionals with time available for training or implementation. Doctoral students modeled activities and management techniques and also filled in as substitutes. For purpose of simplicity, however, all persons delivering instruction in this study will be referred to as *teaching assistants*.

We also enlisted one kindergarten or first grade teacher at each school to act as lead teacher and conduct additional observations of tutors. These teachers were recommended by their principals on the basis of perceived teaching expertise and willingness to attend the training sessions with the TAs and to submit weekly reports on the TAs in their school. They received a small stipend from the research grant for the additional work and training.

Following an initial half day of training, the California TAs and lead teachers attended monthly 2-hour training sessions at the university, in which data on student progress were reviewed and new activities were introduced, modeled by the trainer, and practiced by the TAs and lead teachers. All training sessions were video recorded. Toward the end of each training session, the researchers met with the team from each

school to generate specific plans for the tutoring groups in which activities were matched to students' current skill levels. To replicate the California training in the Montana schools, the videotaped training sessions from California were presented to instructors and lead teachers at each school. The same procedures were used to match activities to students' current skill levels. In both the California and Montana sites, instructional groups were reorganized frequently after the first 2 months of intervention to accommodate differences in learning rates among students.

Measures

The three screening measures were the Letter Naming Fluency (LNF) subtest of Aimsweb, the Initial Sound Fluency (ISF) subtest of DIBELS (Good, Kaminski, Smith, Laimon, & Dill, 2002), and the PPVT-III, each described below. The *Wechsler Preschool and Primary Scale of Intelligence*™, 3rd edition (WPPSI™-III; Wechsler, 2003) was administered after the treatments began.

Descriptive measures. The PPVT-III is an individually administered, norm-referenced measure of receptive vocabulary. The items follow a format in which the child selects from among four pictures the one that best represents a word read by the examiner. We report standardized quotient scores here (raw scores standardized by age), with a mean of 100 and standard deviation of 15. The split-half reliability coefficient for 6-year-olds was .84 (Dunn et al., 1997). Although we were concerned with the possibility of cultural bias with PPVT-III items, we included it here as a descriptive measure to enable comparisons of our sample with children in other studies that have used this measure.

Wechsler Preschool and Primary Scale of Intelligence™*, 3rd edition*. The WPPSI™-III (Psychological Corporation, 2002) is a measure of general intelligence in young children with separate age bands for children aged 2:6 to 3:11 and 4:0 to 7:3 years. The WPPSI-III is a nationally normed instrument with strong psychometric properties and has been reviewed to eliminate ethnic, gender, regional, and socioeconomic biased items. Validity studies have been conducted on clinical groups, including mild-to-moderate cognitive disability, developmental delay, attention deficit and hyperactivity disorder, expressive and mixed receptive and expressive language disorder, and at risk for developmental delay.

The WPPSI-III 4:0 to 7:3 age band contains seven core subtests and five supplemental subtests that yield standard scores for full scale IQ, verbal IQ, performance IQ, and a processing speed quotient. A two-subtest screener composed of the information subtest in the verbal area and the picture completion subtest in the nonverbal performance area was administered to yield an overall estimate of full scale IQ. The Receptive Vocabulary and Picture Naming subtests were also administered to yield a general language composite score.

Screening and progress measures. To measure reading skill acquisition and responsiveness to intervention, 1-minute probes of LNF were administered every 2 weeks to participants in the immediate and delayed intervention groups and to all kindergartners in these schools in January and June. The ISF probes were administered to participants every 2 weeks until January; thereafter, PSF was used every 2 weeks for participants through the end of kindergarten, and in late January and June for all kindergartners. Each measure includes many alternate forms.

To administer LNF (Aimsweb), examiners show students a card with randomly ordered upper and lower case alphabet letters, arranged in large print, 10 per row. Students name as many letters as they can in 1 minute. Interrater reliability in an earlier study (O'Connor & Jenkins, 1999) was .96. We report the number of correctly named letters per minute. Interrater reliability was calculated for LNF for the California sample of kindergartners from four schools, and in the winter data collection, was 99.15 with a range of 95.45 to 100, and in the spring data collection, was 99.58 with a range of 96.97 to 100.

To administer ISF (Good et al., 2002), examiners showed students four pictures and named them. Then they asked children which picture began with one of the four sounds represented. Every fourth question was a production task in which students were asked the following: What sound does ———— (the fourth picture) begin with? Alternate form reliability for this task is .72 in January of kindergarten (Good et al., 2001).

In January, we substituted PSF for ISF, because research has shown that PSF is a better predictor of early literacy growth after December of kindergarten (O'Connor & Jenkins, 1999). Examiners asked students to segment monosyllabic words into their speech sounds ("Tell me the sounds in *sat*"). Each word comprised two to four phonemes. We report the number of correctly identified phonemes in 1 minute.

The 2-week alternate form reliability for this task is .88 (Kaminski & Good, 1996). Interrater reliability was calculated for PSF for the California sample of kindergartners from four schools, and in the winter data collection was 97.33 with a range of 85.71 to 100, and in the spring data collection was 95.44, with a range of 86.54 to 100.

We began administering Nonword Fluency (NWF) after students scored more than 40 letters correct on LNF. For NWF, students were shown a list of consonant-vowel-consonant trios that were not real words. Students could read the words by sounding them out letter-by-letter, or by pronouncing them as pseudowords. Each correct letter sound was given 1 point, or correctly pronounced pseudowords were given 3 points. We recorded the total number of correct sounds per minute. Because we used gating into this measure based on identification of letter names, not all students were monitored with NWF during the intervention phase, however, we used NWF for all students as a posttest of decoding skill. The alternate form reliability is .83 (Good et al., 2002). Interrater reliability was calculated for NWF for the California sample, and in the spring data collection, was 97.75 with a range of 90.48 to 100.

California English Language Development Test. The CELDT was administered to all California participants who spoke a language other than English in the home to determine the level of English language proficiency of those students in the areas of listening, reading, speaking, and writing in English. The test was developed using a three-parameter item response theory model including piloting, item calibration, and standard setting activities (California Department of Education, 2002). Internal consistency estimates of test reliability for the reading and writing subtests range from .85 to .91. The CELDT scores range from 1 to 5, with 5 representing advanced English proficiency. All ELs were assessed with the CELDT by school personnel at the beginning of kindergarten.

Measures for exit criteria. We used two criteria to determine when to stop early intervention with specific students. These criteria were based on expected performance of average readers at the end of kindergarten and consisted of scores above 40 letters per minute on LNF and above 35 on PSF. Because typical kindergartners read few words at the end of kindergarten, we did not use standardized tests of reading achievement with words and stories. Moreover, researchers have found that most standardized measures of reading (e.g., the *Woodcock Reading Mastery Test* and the *Woodcock-Johnson Tests of Achievement*) overestimate kindergarten reading ability because they include guessable picture tasks and few reading items for beginners (O'Connor & Jenkins, 1999; O'Connor, Notari-Syverson, & Vadasy, 1996).

Intervention

Students in the treatments received pull-out instruction in 15-min sessions three times per week in small groups of two or three students. Instruction focused on the three areas—alphabet knowledge, phonemic awareness, and oral language—that were the focus of the professional development that occurred uniformly across the California and Montana schools. Activities across these areas were selected from *Ladders to Literacy: A Kindergarten Activity Book* (O'Connor, Notari-Syverson, & Vadasy, 2005). In September and October, alphabet letters and their most common sounds were introduced at a rate of one or two letters per week, following the order recommended by Carnine, Silbert, and Kame'enui (1997), which separates confusable letters such as *b* and *d* and *e* and *i*. Phonemic awareness activities began with syllable clapping and saying words slowly so that students could hear the individual speech sounds within one-syllable words. Most words were represented with pictures and objects to make them more concrete and to teach the names for objects. Students generated a one-sentence message that was written by the TAs and used for finger-point reading and for identifying letters and sounds that had been taught.

In November and December, students continued to learn letters and sounds using a cumulative introduction approach in which taught letters and sounds were reviewed during every lesson. These letters were integrated with first sound activities so that students could begin to apprehend the alphabetic principle. Oral language activities focused more often on descriptive language during this period.

In January and February, a wider range of letters was used in onset-rhyme blending and segmenting, and students began to manipulate letters on cards to represent where the letters would occur in a word. Students also began writing a letter to represent a sound.

During the last few months of school, some students in the immediate treatment group began segmenting words into three phonemes and representing all phonemes in words with letter tiles in an activity called segment-to-spell. We increased the difficulty of activities based on observations of students in

groups and their scores on the progress-monitoring measures. Students whose progress exceeded recommended benchmarks for end of kindergarten were dropped, or exited, from the treatment groups, but were monitored on the same schedule as other participants to ensure that they maintained the levels they achieved during the treatment.

Students who grew at slow rates were observed more frequently, and we made instructional adjustments that included decreasing the size of their instructional group to two or one, providing more practice on smaller sets of activities, and making use of the walk to and from class for additional practice.

Background Reading Instruction

Kindergarten teachers across the four California schools all used the Houghton Mifflin reading series for kindergarten. The texts and accompanying materials cover key California standards in language arts: word analysis, fluency and vocabulary development, reading comprehension, writing, written and oral English language conventions, listening and speaking strategies, and speaking applications. Pacing guides for coverage of the text and standards are provided and teachers attend 40 hr of state-mandated professional development in the implementation of the series. During a pilot phase of this project, selected teachers created a matrix that aligned the *Ladders to Literacy* (O'Connor, Notari-Syverson, et al., 2005) activities with the Houghton Mifflin activities and California standards. This matrix demonstrated considerable overlap in the standards addressed and particular phonemic awareness activities (e.g., picking off beginning sounds in words).

The four schools in Montana varied widely in the background reading curriculum and instructional time spent in reading. One of the immediate treatment groups had full-day kindergarten that included 60 min of uninterrupted classroom reading instruction at the beginning of the day. This particular school used *Zoo Phonics* (Bradshaw & Wrighton, 1985) in conjunction with the district reading instruction plan. The remaining three schools had half-day kindergarten classes so that kindergarten teachers taught two different classes of children, one in the morning (K-AM) and one in the afternoon (K-PM). Reading instruction time varied between and within schools as did reading curriculum. The second immediate intervention school had only one teacher (with K-AM and K-PM classes) who did not use a specific reading curriculum. One of the delayed treatment schools had two kindergarten teachers who were each piloting a different curriculum (Houghton Mifflin, 2006; SRA/McGraw-Hill, 1998). The second delayed treatment school had two kindergarten teachers who both used the McGraw Hill Reading Series with a *Zoo Phonics* supplement. Although the background reading instruction varied across schools and states, the intervention that formed the focus of this study was consistent.

Midyear Screening and the Delayed Treatment

We were concerned about whether our screening measures would be appropriate for identifying kindergarten children with language delays. We were unsure if our selection criteria would find all of the children who were at risk at the beginning of kindergarten because of low levels of language. We screened all kindergartners who were not receiving the intervention a second time in late January. We used the January developmental benchmarks from Good et al. (2001) and O'Connor, Fulmer, Harty, and Bell (2005) that specified scores below 15 on LNF and below 10 on PSF as determinants of risk in this second testing wave. Across all eight schools, only one student was found who met the midyear screening criteria (LNF and PSF below the cut-off scores above) who had not met the initial criteria in September.

Of the 29 students who met our initial risk criteria but who were not included in the study for lack of parent permission, 10 (one third of the group) met midyear grade-level criteria solely from the benefit of kindergarten instruction. Of the remaining 19 students, 7 had left the schools, 7 were at risk for one but not both of the midyear LNF or PSF criteria, and 5 continued to fall behind and met our risk status for LNF and PSF at the midyear point. As we are unaware of the receptive language ability of these students as measured by the PPVT, we cannot compare these students to either our immediate or our delayed treatment group.

A second group of students who met the initial risk and the midyear risk criteria in LNF and PSF had not been included in treatments earlier because of high PPVT scores ($n = 34$). These students, who were not a focus in this study, may be closer to the traditional learning disabled category as it is now defined in the literature. Several new enrollees to the schools also met the midyear risk criteria, but these students were not included in the data reported here because we had no pretest scores or opportunity for random assignment to intervention group.

Delayed treatment. Students in the delayed treatment began interventions in February, which permitted a length of treatment (i.e., 18 weeks) similar to that used in many of the intervention studies to reduce risk for LD (e.g., see Blachman et al., 1994; Fuchs et al., 2001; O'Connor, Jenkins, & Slocum, 1995; O'Connor et al., 1996). We selected their activities based on their end of January progress measures, and so many students did not receive the September through October activities because they were ready for more difficult ones. Examples of activities we omitted from the delayed treatment groups include Clap the Syllables and the TA writing a message dictated by the students.

Treatment fidelity. The TAs were observed for their first several instructional sessions, and then weekly by the lead teacher in their school and monthly by project staff. During the 1st month, researchers primarily modeled instructional delivery and corrections for student errors during the observations. The observation protocol included notations for level of support offered by the instructor (high, medium, or low), a place to record the letters and decodable words used in the instruction, and a place to record interpretive comments regarding students' response to the instruction. These qualitative notes were used to both refine the training offered to the instructional aides and to refine the instruction provided to the students. Observers also assisted some TAs to make more specific entries into their lesson logs so that activities and student responses could be preserved in permanent records. The TAs faxed these logs to the research team weekly.

We found considerable variance in fidelity to treatment across TAs and schools and frequently provided booster sessions to some TAs. We used the problems we observed as topics for the next group-training session, such as avoiding overcuing students by mouthing the sounds for letters or persisting with easy activities after students had mastered the tasks. The clarity of the instruction was the emphasis of both our training and corrections to the TAs, and we frequently modeled for aides faster pacing within a lesson (to increase attention span of students) and the correct pronunciation of phonemes in blending and segmenting exercises. Difficulty with hearing phonemes correctly is not limited to very young children, and we had to dismiss one TA because of inconsistencies in modeling of phonemes.

When considering the quality of instruction offered to the students, our objective measures included records of minutes of instruction and records of instructional activity segments within lessons. The minutes of intervention each student received ranged from 270 to 1,430 in the immediate and from 111 to 705 in the delayed treatment. Generally, students who received less treatment were those who caught up to average levels on the target skills and thus ceased to participate in the intervention group, although in some cases students did not receive as much instruction as scheduled because of time constraints of the TAs or prolonged student absences. Another way to consider instructional quality is the number of instructional activities used that represent advanced skill levels (e.g., Segment to Spell and Blend It Back) versus low skill levels (e.g., Blending Stretched Sounds with Pictures or First Sound activities), although this criterion is also problematic because some students took considerable time to progress even when instruction was excellent.

We found large differences in the number of easy and advanced activities used between the poor and good responders, with good responders receiving twice the number of advanced activities that integrated letter sounds with phonemic awareness in spelling and reading words. The fast responders, however, received fewer of these activities because they surpassed the exit criteria and ceased to participate in the groups.

Results

Pretests

We conducted MANOVA between the immediate and delayed intervention groups and between California and Montana schools on pretest scores for the selection criteria (LNF, ISF, and PPVT-III), WPPSI and CELDT. We found no significant differences between immediate and delayed intervention groups, $F(5, 63) = .491$, $p < .05$. The CELDT scores were not collected in the Montana sample; however, we found no significant differences between California and Montana students on early literacy skills, except for a difference in the PPVT-III that favored Montana students, probably because of their sites including no ELs. The correlation between letter naming and initial sound fluency was not significant ($r = -.03$); however, the PPVT-III was significantly correlated with letter naming ($r = .32$) and with the vocabulary portions of the WPPSI, as expected ($r = .60$ and $r = .40$ for vocabulary and receptive vocabulary, respectively). The WPPSI reasoning was not correlated significantly with

Table 2
Correlations Among Pre- and Posttest Measures

Tests	LNF Pretest	ISF Pretest	PPVT-III	Reasoning	Vocabulary	CELDT	LNF Posttest	PSF Posttest	NWF Posttest
LNF pretest	1							.	
ISF pretest	–.027	1							
PPVT-III	.322*	.224	1						
Reasoning	.084	.071	–.048	1					
Vocabulary	.528*	–.084	.599*	.057	1				
CELDT	.064	.264*	.339*	–.044	.260*	1			
LNF posttest	.098	–.006	.294*	–.083	.291*	.028	1		
PSF posttest	.248*	.076	.258*	.192	.397*	.038	–.006	1	
NWF posttest	.138	.122	.245*	.029	.158	.044	.636	.509*	1
Minutes	–.149	–.097	.044	–.030	.054	.010	–.188	.037	–.195

Note: LNF = Letter Naming Fluency; ISF = Initial Sound Fluency; PPVT-III = *Peabody Picture Vocabulary Test, 3rd Edition*; CELDT = *California English Language Development Test*; NWF = Nonword Fluency.

any of the pretests, including other WPPSI sections. The CELDT scores were correlated significantly with the PPVT ($r = .34$), the WPPSI scores on Vocabulary ($r = .26$) and Picture Naming ($r = .45$), and ISF ($r = .26$), but not with LNF or WPPSI Receptive Vocabulary or Reasoning (see Table 2).

Posttests: Short-Term Effects of Early Intervention

We used MANCOVA to determine differences between the immediate and delayed intervention groups on outcome measures of LNF, PSF, and NWF, with pretests of LNF and ISF as covariates. The MANCOVA on end-of-year outcomes was significant, $F(3, 63) = 3.508$, $p < .05$, and demonstrated advantages for intervening early in kindergarten. Table 1 shows means and standard deviations for these measures. Effect sizes for immediate over delayed treatment on LNF, PSF, and NWF were 0.25, 0.66, and 0.83, respectively.

Differences between students with cognitive-based or EL-based language difficulties. Because of the large proportion of ELs in our sample, we tested the influence of CELDT scores on outcomes with MANOVA. We found no significant main effect for EL status (EL vs. EO) on outcomes for LNF, PSF, or NWF, $F(3, 63) = .013$, or EL × Treatment interaction, $F(3, 63) = .234$. Given the range of English ability among the ELs, we also correlated level of English (range 1–5) with outcomes; however, none of these correlations were significant ($r = .050$, .053, and .039 with LNF, PSF, and NWF, respectively). Table 3 shows means and standard deviations for pretest and posttest measures for EL and EO students.

Table 3
Descriptive Statistics (Means and Standard Deviations) for English Learners and English-Only Students

Subtests	English Learners	English Only
Pretests		
Rapid Letter Naming	1.95 (2.11)	2.08 (2.34)
Initial Sound Fluency	2.38 (1.63)	3.44 (2.10)
PPVT-III	68.14 (15.14)	76.00 (12.07)
WPSSI Picture Naming	4.57 (1.57)	6.30 (1.96)
Posttests		
Rapid Letter Naming	32.05 (18.66)	32.46 (15.86)
Phoneme Segmentation Fluency	33.71 (20.46)	34.21 (17.34)
Nonword Fluency	16.48 (15.87)	18.52 (18.51)

Note: PPVT-III = *Peabody Picture Vocabulary Test, 3rd Edition*, standard scores with a mean of 100, *SD* of 15; WPSSI = *Wechsler Primary Scale of Intelligence*, Picture Naming subtest scaled scores with a mean of 10, *SD* of 3.

Responsiveness to Intervention

Students were released from intervention groups when they scored above 40 on LNF and 35 on PSF, which are considered protective levels of early literacy in other studies (Good et al., 2001; O'Connor et al., 2005). Twenty-one students in the interventions met or surpassed these levels of letter naming and segmenting (means of 47.3 letters and 50.3 segments per minute for students who exited treatments), with 14 students from the immediate and 7 from the delayed treatment appearing to be no longer at risk according to these indicators of early literacy progress. Some students in the immediate intervention group caught up with average-reader classmates as early as

Table 4
Descriptive Statistics for Fast Responders, Good Responders, and Poor Responders in Literacy Skills

	Exited Intervention	Continued Interventions	
Subtests	Fast Responders (n = 21)	Good Responders (n = 29)	Poor Responders (n = 19)
Pretests			
Rapid Letter Naming	1.33 (0.48)	1.38 (0.49)	1.53 (0.51)
Initial Sound Fluency	3.38 (1.50)	2.86 (2.22)	3.21 (2.25)
PPVT-III	74.57 (10.68)	77.31 (12.96)	66.89 (15.05)
CELDT	2.38 (.92)	2.59 (.78)	2.32 (.95)
Midtests			
Rapid Letter Naming	36.57 (12.97)	22.10 (13.87)	8.11 (8.41)
Phoneme Segmenting Fluency	24.33 (16.39)	15.21 (12.77)	7.89 (9.78)
Posttests			
Rapid Letter Naming	47.24 (4.93)	35.24 (11.79)	11.42 (8.14)
Phoneme Segmentation Fluency	51.10 (7.73)	31.38 (14.64)	19.32 (16.47)
Nonword Fluency	36.14 (13.72)	24.44 (14.01)	9.00 (7.89)

Note: PPVT-III = *Peabody Picture Vocabulary Test, 3rd Edition*, standard scores with a mean of 100, *SD* of 15; CELDT = *California English Language Development Test*.

February and maintained these levels through the end of kindergarten. We referred to these students as fast responders (FR), and they comprised 34% and 25% of the immediate and delayed groups, respectively. We defined poor response to treatment as students who despite increasingly intensive instruction and modifications to the activities ended the year naming fewer than 19 letters and 16 segments in words, which is about half the growth of the FR. We called these students poor responders (PR), and they comprised 22% and 35% of the immediate and delayed groups, respectively.

We called students who grew more than the PR but did not reach the exit criteria for intervention good responders (GR). They comprised 44% and 39% of the immediate and delayed groups, respectively. Means and standard deviations on measures collected at the beginning, middle, and end of kindergarten for each classification of growth are shown in Table 4.

Student characteristics related to responsiveness to intervention. We wanted to determine student characteristics that were associated with growth in the interventions and end-of-year status as PRs, GRs, or FRs in the intervention. First, we considered individual differences across all of the measures collected and used to select and describe participants as potential predictors for the three growth categories. Second, we examined score ranges across student characteristics at the beginning of the study to identify whether particular levels of characteristics, such as range of vocabulary, IQ, or level of English acquisition, were related to membership in the fast or poor grower categories. We used all of the pretest measures (LNF, ISF, PPVT-III, CELDT, and WPPSI subtests) and minutes of treatment in the first analysis. The MANOVA across groups on pretest measures was not significant, $F(2,64 = 1.716)$. Univariate follow-up tests with a Bonferoni adjustment to $p = .01$ revealed that only the PPVT-III differed across rate-of-growth groups ($F = 4.57$, $p = .01$).

Beginning literacy skills, EL status, and IQ subtests did not reliably distinguish membership in the FR, GR, or PR groups. Although vocabulary scores from the PPVT and WPPSI were significantly related to literacy measures gathered concurrently (i.e., pretests) and predictively (i.e., posttests, see Table 2), they did not constrain responsiveness. What is important is that the strength of the correlations between language and reading skills decreased over time. Minutes in treatment did not discriminate among growth groups either, because the fast responders exited interventions midway through the year and thus received less intervention than those who either reached criteria later in the year or remained poor readers.

Of the 21 students who were FRs and reached the average range on these measures and exited the interventions, 7 were ELs (6 in the beginner range on CELDT scores), with 6 of the 7 in the immediate intervention. Among these fast responders were also English-only students with receptive language scores below 65 (6 students). At the beginning of kindergarten, 11 fast responders could identify three or fewer initial sounds, and 15 could name fewer than three letters.

By January, growth in these skills discriminated much more accurately, and the groups were reliably different on LNF and PSF ($F = 12.339$, $p < .01$). For each measure, FR > GR > PR on these measures.

Proportion of poor responders. In our sample, we identified 19 students (28% of students in the intervention) as poor responders. Of the total kindergarten sample (subtracting students for whom we lacked parent permission), the proportion of poor responders was about 4%. One way to think about this 4% is additive. That is, because we deliberately excluded students with the higher levels of receptive language associated with LD, this proportion could be considered additive to the 2% to 5% of poor responders reported in early intervention studies for students at risk of LD. Ironically, this proportion (6% to 9% total across studies) is similar to the proportion of students in the general population who have, in the past, received designations of learning or cognitive disability. But as an anonymous reviewer pointed out, not all early intervention studies that have reported responsiveness excluded the students in our 4%, thus such speculation may be unwarranted.

Discussion

In this study, we addressed early intervention techniques in reading for students who have been neglected in reading research: students with low levels of language. This study is important because these students are prevalent in public school classrooms but have been excluded from the research that established what researchers now consider to be evidence-based best practices in early reading instruction and intervention. Just more than half of the students spoke English only and had below average skills in receptive and expressive language. Nearly half of the students were English learners, and we assume their low language skills were due to lack of English proficiency. We used the instructional procedures validated with students with average language skills that integrated phoneme identification, phoneme manipulation with alphabet letters and letter sounds, and oral language activities.

To determine the effects of this type of intervention for students with low language skills and their responsiveness to procedures validated with students without oral language difficulties, we varied the duration of intervention. Students in the delayed treatment received 18 weeks of intervention, which is similar to that offered in many of the kindergarten intervention studies for students at risk for LD, whereas students in the immediate treatment began these interventions in September to allow a full academic year of treatment, or roughly twice the number of sessions. Whether students began the interventions in September or February, we matched the instructional targets to their current skill levels. This decision means that some students continued in relatively easy levels of instruction (e.g., first sound tasks) longer than others. Likewise, some students who began intervention in February skipped activities we used with students in September and October because their skill levels were higher than they had been earlier in the year.

Our results demonstrated the value of using the same early intervention activities that were developed for students at risk for LD with students who have low levels of language. Using exit criteria established by Good et al. (2001) and O'Connor et al. (2005), about one third of this sample of students reached average levels of phoneme segmenting and letter knowledge before the end of kindergarten. Two thirds of the students who met exit criteria were in the immediate intervention group.

English Learners and Literacy Outcomes

Although all of our students had poor English language skills, the reasons behind these language delays differed. Most of the EOs had language and IQ scores that could be associated with low cognitive development. The ELs were learning English as a second language. We found no statistical difference in outcomes between ELs and EOs, a finding that echoes that of Lesaux et al. (2007). Nor did we find EL by treatment interactions, which suggests that the treatment had similar effects for ELs and for students with low language because of other reasons. Among the ELs, low CELDT scores (i.e., scores of 1 or 2 on a 5-point scale) did not identify poor responders to our interventions. Moreover, half of the fast responders who reached exit criteria before the end of the school year were ELs. Given the range of English ability among the ELs, we also correlated level of English (range 1–5) with outcomes; however, none of these correlations were significant and all were below .1. These low correlations reinforce the possibility, suggested in other studies (Healy et al., 2005; Lesaux & Siegel, 2003; Quiroga et al., 2002), that the current best practice interventions used in kindergarten with English-only students (i.e., a combination of phonemic awareness, letter knowledge, and oral language) can have similar results with

English learners and others with poorly developed vocabulary in English.

Most small groups for instruction included ELs and EOs, and the practice activities in our treatments were supported with pictures of objects and actions to make the specific skills we targeted as concrete as possible. We have bolstered abstract activities (particularly those requiring phonemic awareness) with pictures in many of our studies, and this kind of scaffolding is useful for students with mild cognitive disability (Bos & Vaughn, 2002). Reducing the difficulty of abstract tasks with scaffolding may be particularly relevant and influential for English learners. Future research could investigate the role that pictures and concrete supports play in acquisition of early literacy skills for ELs.

Responsiveness to Interventions

Our pretests were accurate in identifying the students likely to have reading difficulties (i.e., we missed only one student in eight schools); however, these measures did not discriminate significantly among the children who successfully caught up, those who grew well but did not catch up, and the poor responders. Although vocabulary scores were significantly lower for students in the poor growth group than among more responsive students, we found children among the fast responders who had very low language scores (several children in the 50–65 range) on the PPVT-III and WPSSI vocabulary subtests.

This situation leads to a theoretical and practical predicament. All students in the interventions scored below 85, which gave us an intentionally restricted range for student vocabulary scores. On the one hand, language scores, even in this restricted range, were correlated significantly to early literacy measures at the end of kindergarten, although the strength of the correlations was modest (i.e., below .3). On the other hand, using any particular cut score on language measures to predict end-of-year status would err by predicting that students with poor language skills would not benefit from early literacy interventions when in fact many of our fast growers—EOs and ELs—had very low language scores in English.

One could argue that the restricted range in our sample created this problem of predicting responsiveness, however, restricted scores of students on the other side of the 85 divide (i.e., language scores of 85 and higher) also fail to predict responsiveness to intervention in kindergarten (O'Connor, Fulmer, et al., 2005; O'Connor et al. 1996). By fourth grade, language scores are related to reading skills more strongly (Catts et al., 2005), although we do not know whether language predicts responsiveness in this group because the studies have relied on correlations rather than response to intervention.

Presumably, researchers have excluded students with low language from participating in the early intervention studies designed to reduce the incidence of LD either because our participants with low language do not match an LD profile or because students with poor language skills might not be expected to benefit from the extra doses of phonemic awareness and letter knowledge instruction offered by these programs. Nevertheless, although the research base has focused on students at risk for LD, students with low language skills make up a large proportion of the students likely to struggle with reading acquisition in schools. Our results suggest that students should be considered for early literacy interventions even when receptive language is low.

Imbalance in Skill Development

Of course, not all students in this study responded well to the intervention. Criteria for identifying poor responders to interventions vary widely across studies, and we set the bar for determining response intentionally high. We identified 19 students (28% of students in the intervention) as poor responders because they made only half (or less) the growth of students who reached the average range on early literacy skills by the end of the year. The proportion of poor responders was greater in the delayed than in the immediate intervention group (35% vs. 22%, respectively), which suggests that longer interventions may be needed for students who grow slowly. Students we called poor responders ended kindergarten knowing only 11 letters, on average, even though they also received instruction in letters and sounds in their classrooms. This finding suggests a need to develop stronger instructional methods for teaching letters and sounds to students in the language range included here.

In contrast, our participants learned to segment words into phonemes relatively easily. Our poor responders, on average, identified two or three phonemes in three-phoneme words by the end of kindergarten. Only 7 of the 19 poor responders ended kindergarten identifying fewer than 10 phonemes in a list of 10 words, which is the level considered as high risk for reading difficulties in the prediction studies of O'Connor and Jenkins (1999), Compton, Fuchs, Fuchs, and Bryant (2006), and others. This imbalance (e.g., relative ease

of learning to segment, difficulty learning letters and sounds) surprised us for several reasons.

First, other intervention studies have suggested that students at risk have great difficulty learning phonemic awareness (Fuchs et al., 2001; Torgesen et al., 1992). Of the three focus areas in our study (letter knowledge, phonemic awareness, and oral language), students made the strongest gains in segmenting. Twenty-five of the students in interventions exceeded scores of 35 on PSF by the first of March, and many students in the Good Growth group exceeded the exit criteria for segmenting but not for naming letters and sounds.

Perhaps the nature of the two constructs explains the relatively strong growth in segmenting over letter knowledge. Several studies have attempted to disaggregate the various skills of phonemic awareness (PA) to determine whether the skills that comprise PA represent one construct or several distinct skills. As examples, Stahl and Murray (1994) and O'Connor et al. (1995) found PA skills in their studies loading on one factor, whereas Wagner and Torgesen (1987) and Yopp (1988) identified a two-factor structure for an array of PA skills. For the phonemic skill of segmenting, however, most researchers agree that learning to segment is generalizable; that is, once students have learned to identify the phonemes in a short list of consonant-vowel-consonant words, it is likely that these students will be able to identify phonemes in words from any other similarly constructed list, even if the words are unpracticed.

Letter knowledge, on the other hand, is stimulus specific. Recognizing the letter *s* and associating the sound /s/ with that letter reveals nothing about the letter *u* and its sound, /u/. Thus, each letter-sound pairing represents unique learning, whereas phonemic segmentation acts as a generalized concept across a range of stimuli. Our students began learning new letters and sounds and identifying the first sound in words during their first few weeks of intervention. They began to approach exit criteria in segmenting after 3 to 4 months of instruction, however, it took much longer to learn the 40 to 41 unique letter shapes and sounds (i.e., some letter shapes, such as O, S, and X, are identical or similar in their upper and lower cases) than to learn the concept of segmenting spoken words.

Limitations

Identifying students who were ELs was relatively straightforward in these school districts; however, identifying students with language scores that suggest cognitive impairments was more difficult. Similar to LD, most students who will later receive eligibility for special education under the cognitive impairment label are not identified in kindergarten, and the assessment tools that we used (the PPVT-III and the WPPSI) are less reliable for younger than for older students. Moreover, classification criteria for eligibility for cognitive disability vary widely from state to state, and cognitive impairment is just one of many possible diagnoses associated with poor language development. Thus, the categorizations we used to select and distinguish among students in our sample should be interpreted cautiously.

An additional concern is the variability in the implementation of the intervention by our TAs. The consistency of implementation in a single lesson was uniformly good, and we worked hard to hold to our rigorous standards—in one case, replacing a tutor who taught poorly consistently. However, we frequently had to provide substitutes for regular TAs because of competing demands at school sites (e.g., cancelled sessions when TAs administered CELDT tests). Because of this variability, our results might underestimate responsiveness to intervention for similar samples of students.

Implications

Several implications from this study relate directly to classroom instruction in kindergarten. First, students with poorly developed English language, whether the deficit is related to experience and exposure, to cognitive development, or to learning English as a second language, responded well to instruction very similar to what the field considers best practice in kindergarten literacy instruction. Specifically, intervention that focuses on letter knowledge, phonemic awareness, the alphabetic principle, and oral language appears to be successful for the majority of students with limited vocabulary in English.

Second, we combined students with similar literacy skill levels in our instructional groups, regardless of their native language. The activities were scaffolded with pictures, which encouraged students with language challenges to participate. As in most intervention studies, students' skills grew at different rates and these differences were more important instructionally than their native language. The similar response rates across native English speakers and ELs suggests that teachers and interventionists can combine these students for instruction and use their response rates to determine when and how to regroup students periodically.

Although our collection of measures caught the students in need of reading intervention, the least useful was ISF; it was also the least reliable of our measures. Future research could be designed to evaluate the utility of a measure of segmentation that is accessible to students near the beginning of kindergarten (i.e., thus reducing floor effects), because segmentation holds predictive power to discriminate among students for a longer period of time than ISF.

Conclusions

All of the students in this study were selected because their scores on early reading assessments suggested risk, based on criteria from earlier studies. The measures we used were effective at identifying the children in the larger sample (all but one kindergartner in the eight schools) who ended the year with low scores on early reading measures, but these measures did not reliably predict which students in this group would astonish us with large gains that would bring them into the average range by the end of the year. This study is among the first to demonstrate that instructional practices heretofore validated with students at risk for LD (i.e., students with vocabulary and IQ scores in the average range) can also be effective for students with mild cognitive impairments, students learning English, and students with low language skills because of other conditions. Of crucial importance, we have yet to determine whether these early gains can be maintained. This issue is of concern to all researchers who have provided interventions and improved literacy skills in kindergarten or first grade, when the construct of reading represents less complicated abilities than are required later in schooling. As early intervention research expands to system-wide efforts that include students with a wider range of characteristics, we can begin to untangle the important issues of instructional content and persistence for particular learners.

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