Classroom Phonological Awareness Instruction and Literacy Outcomes In the First Year of School

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Abstract

Purpose: Despite strong investment in raising literacy achievement for all children significant inequalities in literacy outcomes continue to exist among some of the world's most advanced economies. This study investigated the influence of a short and intensive period of phonological awareness (PA) instruction implemented by classroom teachers on raising literacy achievement for children with and without spoken language difficulties. **Method:** A quasi-experimental design was employed to measure the PA, reading, and spelling development of 129 children aged five years. Thirty-four children received 10 weeks of PA instruction from their teachers. Ninety-five children continued with their usual reading program, which included phonics instruction but did not target PA. **Results:** Children who received PA instruction demonstrated superior literacy outcomes compared to children who followed the usual curriculum. Children with spoken language difficulties showed significant improvements in PA, reading, and spelling, but varied in their response to instruction compared to children with typical language. Importantly, the number of children experiencing word decoding difficulties declined from 26% among children who followed the usual literacy curriculum to 6% among children who received PA instruction. **Implications:** A short and intensive period of classroom PA instruction can raise the literacy profiles of typically developing and at-risk readers.

*Keywords***:** phonological awareness, classroom literacy instruction, reading and spelling instruction, duration and intensity of instruction

Ensuring that children become proficient readers through effective classroom instruction is a critical issue in reading education. International prevalence statistics suggest that up to one in three children struggle with the acquisition of basic reading and writing skills (National Assessment of Educational Progress —NAEP, 2003), and that large inequalities exist between good and poor readers residing in developed nations (United Nations Children's Fund—UNICEF, 2010). One method towards raising achievement and reducing inequality in reading statistics is to ensure key predictors of early literacy success are taught effectively and efficiently in the classroom curriculum. Towards this goal, the current investigation examined the benefits of one key predictor of literacy success, namely phonological awareness (PA), on reading outcomes when taught in a time-efficient framework by teachers as part of the beginning reading program. New Zealand provides an interesting context to evaluate whether teacher-implemented PA programs at the class level can help raise reading achievement for all children. New Zealand has a strong reputation for achieving high literacy levels among school-aged children and is ranked third out of 34 countries within the Organization for Economic Co-operation and Development (OECD) in terms of average reading ability (OECD, 2010). However, OECD data also reveal a large gap between the ability of good and poor readers in New Zealand (Martin, Mullis, & Kennedy, 2007), and thus scrutiny of interventions that may contribute towards successful reading outcomes for all children is critical.

The Role of Phonological Awareness in Reading Development

The development of proficient reading relies on the integration of a complex tapestry of knowledge and skills (Gillon, 2004). One widely recognized predictor and prognostic marker for early reading success is PA (Carroll & Snowling, 2004; Catts, Fey, Zhang, & Tomblin, 2001). PA can be defined as the purposeful ability to attend to and manipulate the sound structure of spoken words at the syllable, onset-rime, and phoneme levels (Gillon, 2004). The more sensitive

children are to the sound structure of spoken words, the more likely they will become stronger readers irrespective of educational measures such as socioeconomic status, intelligence, and receptive vocabulary (MacDonald & Cornwall, 1995; Torgesen, Wagner, & Rashotte, 1994). PA knowledge allows children to link phonemes to graphemes that in turn support word decoding ability and subsequent reading comprehension. Early difficulties in acquiring PA skills are linked to increasingly larger gaps in reading outcomes (Torgesen et al., 1994), not dissimilar to those inequalities reported in international studies of reading achievement. Of particular concern is the development of literacy abilities in young children with spoken language impairment. These children are four to five times more likely to struggle with reading acquisition due to deficits in underlying skills, such as PA, that support written language development (Catts et al., 2001). Despite new initiatives over the last decade to improve reading standards, the gap between high risk populations and good readers does not appear to be closing (Morgan, Farakas, & Hibel, 2008). Thus, it seems worthwhile that educators and researchers investigate how to efficiently and effectively integrate key predictors of literacy success into the classroom to improve reading equality.

Classroom Phonological Awareness Instruction

Understanding how to effectively and efficiently integrate PA instruction into everyday classroom environments is critical for supporting initiatives that aim to elevate reading achievement and reduce inequality in reading outcomes. The scientific evidence surrounding the benefits of PA instruction for literacy growth is well reported for children with typical development and children with risk for reading disorder. A majority of evidence supporting the benefits of PA instruction comes from studies conducted in individual or small group frameworks under controlled research settings outside of the classroom (Ehri, Nunes, Willows, Schuster, Yaghoub-Zadeh, & Shanahan, 2001; Gillon, 2000, 2005). Less is known about the effectiveness

of PA instruction, in particular optimal duration and intensity, when exported to the heterogeneous classroom environment.

Successful integration of teacher-delivered PA instruction into beginning reading curricula requires consideration of a number of classroom logistics. One key consideration is the time-efficiency of the program. According to McLeod, Fisher, and Hoover (2003) the time required to implement a particular program plays a critical role in determining whether it can be successfully implemented as part of classroom practice. Activities that are too time consuming may be omitted by teachers in an attempt to balance a busy classroom schedule. Frequent and intensive sessions are considered an important component of effective PA instruction (Elbaum, Vaughn, Hughes, & Moody, 1999; Gillon, 2004). In controlled clinical settings, two one-hour individual sessions per week are considered high intensity (i.e., two hours per week). In particular, instruction of this intensity for 20 hours over a 10-week period focused at the phoneme level has proven effective in raising reading achievement for at-risk populations in individualized therapy settings using the Gillon Phonological Awareness Training Program (PAT) (Gillon, 2000, 2005). Adapting the PAT program to investigate whether the benefits 10-weeks (20 hours) of PA instruction can be replicated when taught by teachers to an entire classroom will offer a valuable addition towards emerging research regarding the optimal duration and intensity of PA instruction in the classroom.

Recent Studies of Phonological Awareness Instruction in the Classroom

Research into the effectiveness of classroom-based literacy programs that include a focus on PA have varied in duration and intensity. Knowledge of these variables is critical for designing effective and efficient classroom reading programs. In this study, the literature was reviewed to identify research programs that included a focus on PA instruction and were delivered by teachers to an entire classroom. Four studies met this criteria and were compared using the following classifications: (a) duration: programs implemented for more than one

academic year (i.e., longer than 36 weeks) were considered long in duration, and programs implemented for less than one academic year (i.e., less than 36 weeks) were considered short in duration and; (b) intensity: programs involving two hours or more of instruction per week were viewed as high intensity, while programs involving less than two hours of instruction per week were considered low intensity. A cut-off of two hours per week was selected based on evidence demonstrating that this intensity of PA instruction over a 10-week period is sufficient for eliciting improved reading outcomes in at-risk children (Gillon, 2000, 2005), whereas less than 10 hours of instruction has proven less effective in improving reading accuracy ($p<.05$) and reading comprehension ($p<.001$) ability in school-aged children (Gillon & Dodd, 1997).

An additional area of variability between studies is the content of instruction. To compare content, programs that target PA at the phoneme level (i.e., developing awareness of individual sounds in words, also known as phoneme awareness) were classified as narrow, and programs that target a wide range of PA skills (e.g., syllables, onset-rime, and phonemes) were classified as broad. Table 1 compares the duration, intensity, and content of PA instruction on reading outcomes from four recent classroom investigations.

[Insert Table 1 about here]

Of the studies reviewed in Table 1, Shapiro and Solity (2008) demonstrated a significant reduction in the prevalence of reading disorder using a long duration and high intensity classroom program focused on PA at the phoneme level. For two years, 251 British school children received explicit instruction in phoneme blending and segmentation, high frequency phoneme-grapheme correspondences, and sight vocabulary over three 12-minute sessions per day as part of the classroom reading program. This equated to approximately 110 hours of instruction. The prevalence of reading disorder reduced from 20% among children who received the usual program to 5% among children who received instruction in phoneme awareness. Investigating

whether a similar reduction in the number of children experiencing reading problems can be achieved through a shorter period of phoneme-focused instruction may contribute to the manageable integration of PA into the classroom.

Studies of short duration (i.e., less than one academic year), low intensity, and have a broad PA focus often report improved reading outcomes immediately following instruction but struggled to demonstrate sustained improvements beyond five months of the program's completion. Using a short 20-week program, Fuchs, Fuchs, Thompson, Al Otaiba, Yen, Yang, Braun, & O'Connor (2001) compared the effectiveness of teacher-delivered PA instruction with and without instruction in decoding printed words. Four hundred and four five-year-old children received instruction in either (a) PA and decoding instruction, (b) PA instruction, or (c) the usual literacy curriculum (i.e., control). Fifteen PA activities were taken from the *Ladders to Literacy* program and targeted syllable, onset-rime, and phoneme awareness. Decoding instruction was based on Peer Assisted Learning Strategies (PALS) and involved children working in pairs on word reading tasks. PA and word decoding instruction involved three 15-minute sessions per week totalling 15 hours of teaching and was considered low intensity. Children who received PA and word decoding instruction outperformed children in the PA only and control classrooms on reading and spelling tasks immediately following instruction. Similarly, children in the PA only condition performed significantly higher on post-instructional literacy measures compared to the control classrooms. Five months post-instruction, children who received PA and word decoding instruction no longer demonstrated a statistically significant advantage in reading and spelling ability compared to children in the PA only and control conditions. These results suggest that teaching a broad range of PA skills with low intensity (i.e., 45-minutes per week) over a short period of time is less effective in achieving sustained improvements for reading outcomes. It is possible that a narrow focus on phoneme level skills with high intensity over a short time period may produce more promising results.

In a short, low intensity program focused on a wide range of PA skills Justice, McGinty, Cabell, Kilday, Knighton, and Huffman (2010) demonstrated the importance of including specific teaching in PA at the phoneme level for children vulnerable for reading disorder. Sixty-six children aged between three years three months and five years six months received literacy and language instruction using a program called *Read It Again (RIA)*. The program involved two 20 to 30 minute classroom sessions per week for 30 weeks that targeted PA, print, vocabulary, and narrative knowledge. PA instruction targeted syllable, onset-rime, and phoneme awareness and was taught at least once per week, equating to 10 to 15 hours of instruction. Children who received RIA instruction performed significantly higher than comparison children (n=71) on measures of language and literacy immediately following instruction. For children with low language abilities, this program did not advance phoneme awareness and alphabetic knowledge to the same extent as it did for children with average to high language abilities. It is important to note that additional risk factors beyond language capabilities (e.g., socioeconomic status) may have moderated results. Nonetheless, these results suggest that investigation into the benefits of specific phoneme-focused PA instruction, particularly for at-risk children, appears worthwhile in a classroom context.

Furthermore, McIntosh, Crosbie, Holm, Dodd, and Thomas (2007) investigated the benefits of a short, high intensity, and broad PA program on the reading outcomes of 97 preschool children from low socioeconomic localities. Children received 10 weeks of daily PA instruction targeting syllable segmentation, onset-rime identification, and initial sound identification. Although significant improvements were identified in PA knowledge immediately following instruction, follow-up indicated that initial gains in PA in preschool did not support accelerated literacy development in the early school years. These studies show that a short 10-week period of high intensity instruction focused on a broad range of PA skills is less advantageous in generating sustained improvements for reading outcomes. Thus, it could be

argued that a similar 10-week high intensity period of instruction focused specifically on phoneme-level knowledge, as opposed to syllables and onset-rime, could have a significant and sustained impact on literacy growth.

Comparison of studies in Table 1 suggests that little is known about the benefits of a short duration, high intensity, teacher-delivered PA program focused at the phoneme level for children in the first year of formal schooling. Shorter programs are more cognizant to the time demands of the classroom environment and can help educators ensure that children have key foundation skills in place to take advantage of reading instruction (McLeod et al., 2003). Furthermore, research shows that larger sound units (e.g., syllables) may develop from general classroom instruction, but awareness of smaller sound units (e.g., phonemes) may require more explicit and direct instruction (Fletcher, Parkhill, & Gillon, 2010). A specific focus on PA at the phoneme level may provide a time-efficient alternative to the teaching of a broad range of PA skills while also enhancing skills strongly associated with early reading success.

Children with Spoken Language Impairment

Children with spoken language impairment (SLI) present with an elevated risk for reading difficulty (Gillon, 2004). Controlled research studies suggest that individual or small group instruction can exert a positive effect on the early literacy abilities of young children with SLI (Ehri et al., 2001). In particular, it has been shown that skills at the phoneme level can be effectively stimulated in children as young as four years of age with expressive phonological impairment (Gillon, 2005). Recent studies involving teacher-implemented PA instruction demonstrated that children with language or speech impairment show greater individual variation in their response to instruction. For example, Justice et al. (2010) found that children with inferior language skills who received instruction using the RIA program appeared to benefit less in terms of phoneme awareness, letter knowledge, and print awareness but showed equal benefit in the areas of vocabulary, syntax, and onset-rime compared to typically developing peers. This

result highlights the need for further research into the effect of specifically targeting phoneme level skills on reading outcomes as part of the classroom program. Similarly, Fuchs, Fuchs, Thompson, Al Otaiba, Yen, Yang, Braun, and O'Connor (2002) found that the number of children with speech and/or language impairment who demonstrated improvements in literacy skills following classroom PA and decoding instruction was equal to the number of children demonstrating no improvement. Individual variation in response to reading instruction suggests that a classroom PA program may help teachers narrow down which children among this cohort will respond to classroom instruction and which will require specialist support beyond the classroom setting.

Modifying the PAT Program for the Classroom Environment

The *Gillon Phonological Awareness Training Program* (PAT), which has been successfully used in a number of individual or small group controlled studies (Gillon, 2000, 2005), was adapted for the current study and used in the classroom. The PAT program was originally designed for an intervention study to investigate the effect of PA instruction on the PA ability, speech production, and literacy development of children aged five to seven with SLI (Gillon, 2000). Children who received 20 hours of explicit PA instruction focused at the phoneme level over a 10-week period (two sessions per week) made significant improvements in PA and reading ability compared to children who received traditional or minimal speech-language therapy. These benefits were maintained 11 months after intervention (Gillon, 2002). The current study investigated the effectiveness of a class-adapted version of this program as a supplement to the usual literacy curriculum. Adaptations to the original PAT program included: (a) eight hours of professional development inclusive of in-class support, (b) the addition of program adaptation charts to ensure teachers could adjust activities to meet a range of abilities in the classroom, and (c) use of classroom curriculum topics and resources (e.g., books, science tables, news) as a medium through which weekly PA targets could be addressed.

The "Usual" Literacy Curriculum in New Zealand

The "usual" classroom literacy curriculum employed by teachers in the present study consisted of a whole language approach to literacy instruction, in addition to phonics instruction to teach letter-sound knowledge. Whole language instruction focuses on meaning and encourages children to read whole words and sentences in the context of real literacy experiences (Tunmer, Chapman, & Prochnow, 2006). Phonics is a method of teaching children to read by drawing attention to letters or letter patterns and the sounds they represent (Tunmer et al., 2006). PA is different from phonics in that it deals specifically with the sound structure of words only and does not focus on print. A combination of PA plus phonics instruction has demonstrated significant benefits for reading outcomes (Ehri et al., 2001). The "usual" literacy curriculum in the present study did not include a specific focus on teaching PA skills.

The goal of this investigation was to examine the effectiveness of a short and intensive PA program focused at the phoneme level, as a supplement to the "usual" class reading program, on the literacy outcomes of children with and without spoken language difficulties in the first year of school. The study addressed the following hypotheses:

1. Children exposed to teacher-implemented PA instruction focused at the phoneme level for 20 hours over a 10-week period in the classroom will demonstrate significantly higher phoneme awareness, reading, and spelling abilities both immediately post-instruction and sustained to the end of the school year compared to children who receive the “usual” literacy curriculum only.
2. Children with SLI will demonstrate significant improvements in phoneme awareness, reading, and spelling following teacher-directed PA instruction for 20 hours over 10-weeks. However, children with SLI may show less growth in phoneme awareness, reading, and spelling development when compared to children with typical spoken language profiles.

Method

Participants and School Selection

One-hundred and twenty-nine New Zealand children (54 boys, 75 girls) aged between five years zero months and five years two months (*M*=60.41 months, *SD*=0.59 months) from 12 classrooms and their respective teachers participated in this study. A stratification process was used to select and invite schools to participate in the study. One-hundred and ten government-funded primary schools in the Christchurch region were stratified into high, middle, and low socioeconomic groupings based on decile ranking (i.e., an indication of socioeconomic status (SES) where 10 equals the highest SES and one equals the lowest SES (Ministry of Education, 2011)). In this study, a decile ranking from one to four was considered low, five to seven was considered middle, and eight to 10 was considered high. Ten schools from each socioeconomic grouping were selected at random and made up the 30 schools invited to participate in the study. From these 30 schools, 12 Year 1 teachers (i.e., a teacher for children in the first year of formal schooling) agreed to participate. Two Year 1 teachers from differing schools were asked to participate as experimental teachers and were randomly assigned to either experimental Groups A (*n*=18) or B (*n*=16). These two teachers were selected to implement the class PA program because the children in their classrooms presented with similar spoken and written language profiles and socioeconomic rankings. The remaining 10 teachers and a subset of children from their respective classrooms were automatically allocated to Group C (*n*=95) and were asked to continue with their "usual" literacy curriculum. The subset of children in these 10 classrooms ranged from seven to 14 participants. Groups A and B were located in high-middle socioeconomic areas, whereas comparison Group C represented an equal spectrum of socioeconomic backgrounds. Group A, B and C teachers were appropriately qualified and registered to teach in New Zealand. Table 2 illustrates the characteristics of the teachers in Groups A, B, and C.

[Insert Table 2 about here]

Child Participants

Year 1 teachers distributed consent forms to parents asking for permission for their child to participate in the study. The inclusion criteria were broad to ensure representation of a range of skill levels present in the classroom. Participants were required to: (a) be enrolled to commence their first year of formal education at the start of 2010, (b) have written parental permission to participate in the study, (c) present with sensory, neurological, and physical abilities that did not require specialized equipment and/or additional professional support (e.g., use of sign language or a language interpreter) to achieve accurate testing, and (d) be present at school during prescribed assessment periods.

Parental consent was obtained for all children in the classrooms who were assigned as experimental Groups A and B. Four children in Group A and three children in Group B presented with spoken language difficulties at school-entry as determined by standardized testing procedures. A subset of seven to 14 children from the 10 classrooms that made up comparison Group C received parental consent to participate. In New Zealand, children typically start Year 1 on the day of their fifth birthday or as close to this day as practically possible. All participants spoke standard New Zealand English as their first language.

Procedure

A quasi-experimental design was used to investigate the PA, reading, and spelling development of five-year-old children who received teacher-implemented PA instruction or the "usual" literacy curriculum during the first year of school. This design was chosen because the research was conducted in everyday classroom environments as opposed to a highly controlled clinical setting. This research design was inclusive of a delayed treatment approach whereby Group A received class PA instruction before Group B. This was to achieve replication of study results, and to enable Groups A and B to act as an additional control for each other. The study

took place over a full school year, which in New Zealand runs from February through December and is divided into four terms; each approximately 10 weeks in duration and separated by a two-week holiday break. The study was designed around the four school terms as follows: (a) Term One: the "usual" literacy curriculum for all groups; (b) Term Two: PA instruction for Group A and the "usual" curriculum for Groups B and C; (c) Term Three: PA instruction for Group B and the "usual" curriculum for Groups A and C; and (d) Term Four: the "Usual" literacy curriculum for all groups

Professional Development for Classroom Phonological Awareness Teachers

Three levels of professional development were provided to experimental teachers. The first level involved two one-hour meetings with the lead researcher to discuss the program theory and structure. The second level involved providing teachers with an instruction manual outlining the goals, program content, suggested activity dialogue, and pre-made resources. The third level involved the lead researcher co-teaching the first three to four weeks of the program alongside experimental teachers before these teachers independently administered the program from week six to 10. Approximately eight hours of professional development was provided to each experimental teacher. Group C teachers did not receive any professional development.

Assessment Phases and Measures

All participants received a comprehensive baseline assessment of their language, PA, and early literacy skills at school-entry in addition to follow-up assessments of PA, reading, and spelling at the middle and end of the school year. Additional assessment periods were warranted for Groups A and B to measure pre- to post-instructional change. Groups A and B were assessed at the start of the school year, the start of term two (i.e., just prior to Group A PA instruction), the end of term two (i.e., after Group A PA instruction, just prior to Group B PA instruction), the end of term three (i.e., after Group B PA instruction), and the end of term four (i.e., end of year assessment for all groups).

Formal Assessment Measures of Language and Non-Verbal Abilities

The following formal measures were administered at school-entry to profile the language, speech, PA, and non-verbal intellectual abilities of all participants.

- The *Clinical Evaluations of Language Fundamentals Preschool—2nd Edition—Australian and New Zealand Edition* (CELF P-2) (Wiig, Secord, & Semel, 2006) was administered to obtain a detailed profile of receptive, expressive, and core language skills and is norm-referenced for children aged three years and zero months to six years and 11 months. Children were required to complete the following six subtests with an examiner: (a) sentence structures, (b) concepts and following directions, (c) basic concepts, (d) word structures, (e) expressive vocabulary, and (f) recalling sentences. Results from these subtests were collated to produce a receptive language index score and an expressive language index score. Test-retest reliability correlation coefficients range from excellent (0.90) to adequate (0.78). Measures of internal consistency range from 0.80 to 0.96 across the subtests.
- The *New Zealand Articulation Test* (NZAT) (Ministry of Education, 2004) was administered to evaluate speech sound development. The NZAT is appropriate for children aged five years and zero months to eight years and 11 months and includes norm-referenced tasks for the production of single consonants and initial consonant blends in words. Children were required to complete the single consonant and initial consonant blends subtests by naming pictures presented by an examiner. Inter-rater reliability is 98% for single consonants in words and 92% for initial consonant blends. Results from the NZAT were entered into Computerized Profiling of Phonology (PROPH) Software (Long, Fey, & Channell, 2002) to obtain a percentage consonants correct (PCC) score for use in data analysis.
- The *Preschool and Primary Inventory of Phonological Awareness* (PIPA) (Dodd, Crosbie, McIntosh, Teitzel, & Ozanne, 2000). The PIPA is suitable for children aged three years and zero months to six years and 11 months and provides normative data for Australian and

British children. Children were required to complete the subtests of rime oddity, initial phoneme identity and letter knowledge with an examiner. Test-retest reliability coefficients are 0.87, 0.95 and 0.98 for rime oddity, phoneme identity, and letter-knowledge respectively.

- The *Primary Test of Nonverbal Intelligence* (PTONI) (Ehrler & McGhee, 2008) was used to obtain a measure of non-verbal intellectual ability. This test is appropriate for children aged three years and zero months to nine years and 11 months. Children were required to examine pictures on a page to identify which picture does not belong. This test progresses in difficulty, beginning with lower-order reasoning skills such as visual and spatial recognition, and moving towards more advanced reasoning skills such as sequential reasoning and categorical formulation. Internal consistency reliability coefficients are greater than 0.90 from three to nine years of age. Test-retest reliability is excellent (0.97).

The *Neale Analysis of Reading Ability—3rd Edition* (NARA) (Neale, 1999) was administered when participants turned six years of age and coincided with the end of the school year. This test measures reading accuracy (decoding) and reading comprehension of connected text and is standardized on Australian children from six years of age. Children were required to read aloud a series of passages of increasing difficulty which provides a reading accuracy score. After each passage, children are required to answer a series of comprehension questions which provides a reading comprehension score. Test-retest reliability coefficients are reported as 0.95 for reading accuracy and 0.93 for reading comprehension. Internal consistency reliability coefficients range from 0.71 for accuracy and 0.95 for comprehension in the first year of school.

Informal Assessment Measures of Phonological Awareness, Reading, and Spelling

The following assessments were administered to all participants at the start, middle, and end of the year and were also used as pre- and post-instruction measures for Groups A and B:

- Phonological Awareness: PA was measured using a *Computer-Based Phonological Awareness Assessment* (Carson, Gillon, & Boustead, 2011): This assessment measures rime oddity, initial phoneme identity, final phoneme identity, phoneme blending, phoneme deletion, and phoneme segmentation ability. Letter-name and letter-sound knowledge are also assessed. The rime oddity, initial phoneme identity, and letter knowledge subtests are modelled on paper-based probes developed and reported by Gillon (2000, 2002) which in turn are based upon earlier work by Bradley and Bryant (1983). The final phoneme identity, phoneme blending, phoneme deletion, and phoneme segmentation subtests are modelled on work developed and reported by Stahl and Murray (1994). The children were required to watch the computer present each test item (i.e., verbal instructions and pictures/letters as multiple-choice response options) and then click their response (i.e., click a picture/letter) using the computer mouse. The computer then scored each response. Test-retest reliability estimates and internal consistency reliability coefficients are above 0.70 for all PA and letter knowledge tasks.
- Real and Non-Word Reading: Real word reading was measured using the *Burt Word Reading Test— New Zealand Revision* (Burt) (Gilmore, Croft, & Reid, 1981). This test requires children to read single words across a test sheet until 10 consecutive errors are made. The words are represented in a graded order of difficulty. Internal reliability is excellent (0.97). Although this test does not provide normative data for children under the age of six years, it was used to provide information on early decoding and sight word abilities. Non-word reading was measured using the 10 non-words (i.e., 10 simple CVC words using short vowels) from the *Non-Word Reading Task* in the *Reading Freedom Diagnostic Reading Test* (Calder, 1992). Children were required to read non-words across a test sheet until 10 non-words were attempted. This non-word reading task has been used to track PA development in a number of PA intervention studies (Gillon, 2000, 2002, 2005).

- Real and Non-Word Spelling: Real word spelling was measured using the *Schonell Essential Spelling Test* (Schonell, 1932). This test requires children to spell single words spoken by an examiner until 10 consecutive words are spelled incorrectly. The words are graded in order of difficulty. Satisfactory correlations between the Schonell and the Phonic Inventories (0.60) have been reported (Potter, 2009). Non-word spelling was measured using 10 non-words from the *Pseudoword Spelling Subtest of the TOPA-2+* (TOPA - 2+) (Torgesen & Bryant, 2004). Children were asked to spell 10 non-words presented one-by-one by an examiner. Internal reliability, inter-rater reliability, and test-retest reliability estimates are greater than 0.80 for all age groups in the TOPA-2+.

Tables 3 and 4 illustrate the language and literacy abilities of participants in Groups A, B, and C at the start of the school year. These tables include one-way ANOVA results which did not reveal any significant between-group differences at baseline.

[Insert Tables 3 and 4 about here]

Assessment Administration and Scoring Reliability

Assessments were administered individually to each child by the primary researcher or a qualified speech-language pathologist trained in test administration procedures for this study. Children were tested in a quiet area near their classroom across two sessions for initial school-entry testing and then across one session for middle and end-of-year assessments. Data were scored in real-time with 50% of measures being scored twice using DVD recordings. Inter-rater reliability for PA, language, and non-verbal intellectual measures was 100%. Inter-rater reliability for speech sound performance on the NZAT was 98.2%.

Classroom Phonological Awareness Program

The *Gillon Phonological Awareness Training Program* (PAT) was adapted for the classroom environment and used as the instructional program for this study (Gillon, 2000). The content of the PAT program covers onset-rime knowledge, phoneme analysis, phoneme identity,

phoneme segmentation, phoneme blending, and linking speech to print. The PAT program was adapted for the classroom in three primary ways. First, teachers were provided with eight hours of professional development that included discussion regarding program theory to in-class support for the first four weeks of the program. Second, activity adaptation charts were created so that teachers could adjust each activity to meet a wide range of ability levels in the classroom. For example, when using the word 'nest' in a phoneme blending activity, the teacher could make the task easier for children with lower ability by asking them to identify the first sound in the word. The task could be made harder for children with higher ability by asking them to manipulate sounds to create new words. Third, classroom resources were used alongside activities in the original PAT program. For example, when linking speech to print during PA sessions classroom library books could be used to target the PA skill of the week (e.g., for initial phoneme identity the teacher may say, "This book is about a cat. What sound do you hear at the start of *cat*"?). In addition, classroom topics (e.g., going to the beach) or news (e.g., school productions) were used to reinforce PA targets. This adapted version of the program required approximately 20% of the classroom literacy teaching time.

The original PAT program involves two one-hour sessions per week until 20 hours of instruction is complete. Following collaboration with the teachers of Groups A and B, it was agreed that four 30-minute sessions per week for 10 weeks during the morning literacy block were most cognizant to the needs of the classroom timetable. PA instruction targeted rime oddity for one week before progressing to explicit teaching of phoneme level skills for nine weeks. Outside of the specified instructional periods, Groups A and B continued with the "usual" literacy curriculum which involved whole language instruction in addition to Jolly Phonics (Lloyd, 1992). Table 5 illustrates the weekly schedule of PA skills targeted.

[Insert Table 5 about here]

A 30-minute session involved a five-minute review of activities from the previous session and discussion about how listening for sounds in words helps with reading and spelling. The next 20 minutes were devoted to two activities of approximately 10 minutes each in duration. Each 10-minute activity targeted the PA skill for that week and also ensured that an explicit link to print was demonstrated. For example, when listening for initial sounds in words children were encouraged to write the letters that represented those sounds on a laminated piece of card in front of them. Each session finished with five minutes of shared reading using a book from the classroom with emphasis being placed on the PA target for that week.

Children in Groups A and B were not required to reach a pre-determined performance criterion before moving on to the next PA skill in the program. Instead, children were exposed to a range of PA activities known to support literacy development, and teachers were encouraged to modify and scaffold activities to match different ability levels using program adaptation charts.

The "Usual" Literacy Curriculum

The "usual" literacy curriculum consisted of a whole language approach to the teaching of reading, but each classroom in this study also incorporated a phonics program. The teachers of Groups A and B and eight teachers from Group C specifically used the Jolly Phonics Program. This program involves teaching children letter-sound correspondences and also includes a section that instructs children on how to blend sounds together to form simple words (e.g., CVC) (Lloyd, 1992). Groups A and B teachers reported using this program to teach letter-sound skills and used the concept of blending sounds together during shared book reading. Seven Group C teachers used the Jolly Phonics Program to teach letter-sound knowledge but did not report using the blending section of this program. One Group C teacher reported using the blending section of this program regularly. Two teachers from Group C used school-developed programs to teach letter-sound knowledge. No teachers used a program that specifically targeted PA knowledge in an explicit and systematic manner.

The "usual" literacy curriculum across Groups A, B and C involved 15 minutes of guided reading with the teacher in small groups in which meaning-based strategies such as using knowledge of sight words, looking at the pictures, and attempting to read to the end of the sentence were utilized. Shared book reading as a whole class for approximately 10 to15 minutes also involved the use of meaning-based strategies. Each day children were given up to 15 minutes for silent reading during which they selected a book from the class or school library. The teaching of letter-sound knowledge using the Jolly Phonics Program or using a school-developed program usually involved 20 to 25 minutes of instruction at the start of the day.

Independent Review of Post-Treatment Data

An independent examiner conducted all post-instructional testing for both Groups A and B to ensure data were collected by an individual who was blinded to the experimental versus comparison conditions (Troia, 1999). Furthermore, 30% of post-instructional assessment measures from DVD recordings were randomly selected and reviewed by an independent examiner with a qualification in speech and language pathology. A 100% agreement rate was achieved between the real-time examiner results and the independent review of DVD recordings of post-assessment measures.

Treatment Fidelity

Teachers in Groups A and B were required to complete a PA teaching log for each week of instruction. In this log, teachers had to name the PA skill that was targeted (e.g., phoneme blending), the activities that were used from the program to address that target (e.g., phoneme blending bingo), and the duration of time spent on each activity. The teachers were also required to write a short paragraph outlining the responses of children to this instruction, in particular children who were demonstrating difficulty relative to their peers. Out of 10 log entries for classroom teacher A and 12 log entries for classroom teacher B, all were validated as accurately matching the activities described in Table 5. Comparison teachers were also required to complete

a weekly teaching log for the same periods over which Groups A and B were receiving PA instruction. In this log teachers were asked to document the types of literacy activities that were implemented in the classroom (e.g., guided reading), the types of teaching methods and strategies employed (e.g., context-based cues, letter-sound knowledge), and the duration of time spent on each activity. Out of 82 log entries for classroom teachers in Group C, all were validated as matching a whole language approach to reading instruction with the supplementation of phonics instruction. In addition, the lead researcher visited each teacher in the study twice during each school term and twice during Group A and Group B's 10-week period of instruction to observe in the classroom and recorded details of the classroom literacy program for treatment validity purposes.

All PA sessions were recorded using a Sony DCR-DVD201 camcorder. Twenty percent of DVD footage was randomly selected and reviewed by an independent researcher to ensure that each PA skill was targeted during the program (e.g., phoneme blending, phoneme segmentation) and that the link between speech and print was emphasized. DVD footage was coded by having the independent researcher tick a box to indicate whether or not the PA activities (i.e., listed in Table 5) were targeted in the DVD sessions viewed. One hundred percent of the reviewed data was validated as accurately illustrating the instructional content reported in Table 5. Ten teachers in the comparison classrooms participated in four recording sessions to enable data gathering on what constituted activities and strategies within the "usual" literacy curriculum (i.e., approximately one per term). To ensure that Groups A and B returned to the "usual" literacy curriculum following classroom PA instruction, Group A received recording sessions in terms three and four, while Group B received one recording session in term four. Twenty percent of data from Group C was reviewed by an independent examiner who validated that instructional strategies consisted of guided, shared, and silent reading with a focus on meaning-based cues. The examiner also validated the use of letter-sound knowledge instruction and the absence of

explicit and systematic teaching in phoneme identification, phoneme blending, phoneme segmentation, phoneme deletion, and phoneme manipulation skills. The independent examiner also investigated the instructional strategies used in the "usual" literacy curriculum by experimental teachers following their 10-week implementation of classroom PA. It was possible that exposure and practice at implementing PA activities and strategies would affect the reversal back to the "usual" literacy curriculum. Review of each recording session showed that instructional strategies and resources were predominantly focused on whole language instruction (e.g., there were no time slots allocated specifically to PA), but teachers were more likely to spontaneously draw children's attention to the initial sounds in words and how to blend and segment sounds in words during classroom reading and spelling activities.

Results

Literacy Outcomes Following Classroom Phonological Awareness Instruction

Group performances on measures of PA, reading, and spelling were compared at the start, middle, and end of the school year. A multivariate approach to repeated measures, Wilk's Lambda (Assessment T1, T2, and T3 X Group), was used to explore between-group differences on measures of PA, reading, and spelling development over time. A significant group x time effect when adjusted for sphericity using the Greenhouse-Geisser Correction method was identified for measures of initial phoneme identity ($F(3.403, .851)=9.095$, $p=.000$), final phoneme identity ($F(2.820, .705)=22.306$, $p=.000$), phoneme blending ($F(3.554, .889)=9.171$, $p=.000$), phoneme deletion ($F(3.650, .912)=16.723$, $p=.000$), phoneme segmentation ($F(3.580, .895)=23.996$, $p=.000$), real word reading ($F(3.078, .769)=18.540$, $p=.000$), non-word reading ($F(3.091, .773)=16.817$, $p=.000$), real word spelling ($F(2.961, .745)=31.450$, $p=.000$), and non-word spelling ($F(3.698, .925)=13.677$, $p=.000$). A significant group x time effect was not identified for rime oddity ($F(3.758, .940)=.971$, $p=.420$). Linear and quadratic group x time results from repeated measures analyses validated significantly different growth trajectories for

phoneme level skills and literacy measures, but not for rime oddity. Tamhane's T2 post hoc tests showed that Groups A and B did not perform significantly different to each other on measures of phoneme awareness and early reading and spelling development, but did perform significantly different to Group C on all measures except for rime oddity.

The *Neale Analysis of Reading Ability* was administered after one year of schooling when participants were six years of age. This was six months post-instruction for Group A and three months post-instruction for Group B. A one-way ANOVA followed by post hoc tests showed that Groups A and B performed significantly better than participants in Group C in reading accuracy ($F(2, 126)=39.937$, $p=.000$, $\eta^2=.39$) and comprehension ($F(2, 126)=38.434$, $p=.000$, ($\eta^2=.38$). The resulting effect sizes using Eta Squared were considered large (Cohen, 1988). Importantly, only 5.88% of children who received PA instruction performed below an age-expected level in reading accuracy after one year of school compared to 26.32% of children who received the "usual" literacy curriculum. Similarly, 5.88% of children who received PA performed below the age-expected range in reading comprehension at six years of age compared to 31.58% of children who received the "usual" curriculum. These results demonstrate that sustained benefits for literacy were achieved beyond the immediate conclusion of the program.

Classroom Phonological Awareness Instruction and Spoken Language Impairment

Data were analysed to examine the response of children with SLI to classroom PA instruction and to compare this response to that of children with typical language development (TD). To achieve a larger sample size of children with SLI who received classroom PA instruction, data from Groups A and B were aggregated to form one experimental group. It is important to acknowledge that aggregation of Groups A and B may introduce an error margin because Group A received instruction 12 weeks earlier than Group B. In total, the experimental condition consisted of seven children with SLI and 27 children with TD. Paired t-test showed that children with SLI who received 10-weeks of classroom PA instruction showed significant

improvements (i.e., $p < .01$) on measures of initial phoneme identity ($t(6)=7.33$, $p<.0001$, $d=3.92$), final phoneme identity ($t(6)=9.98$, $p<.0001$, $d=5.34$), phoneme blending ($t(6)=3.90$, $p=.002$, $d=2.08$), phoneme deletion ($t(6)=3.70$, $p=.003$, $d=1.98$), phoneme segmentation ($t(6)=8.08$, $p<.0001$, $d=4.32$), letter-name recognition ($t(6)=3.71$, $p=.003$, $d=3.03$), letter-sound knowledge ($t(6)=6.40$, $p=< .0001$, $d=5.23$), real word reading ($t(6)=8.49$, $p<.0001$, $d=4.54$), non-word reading ($t(6)=3.81$, $p=.0025$, $d=2.04$), real word spelling ($t(6)=9.17$, $p<.0001$, $d=4.90$) and non-word spelling ($t(6)=7.69$, $p=.0001$, $d=4.11$). Paired t-tests did not reveal any significant pre-to post-instructional differences for rime oddity ($t(6)=1.86$, $p=.09$, $d=1.0$).

Gain scores were calculated to measure growth in response to classroom PA instruction and to determine whether children with SLI benefited equally from instruction in comparison to children with TD. Independent sample t-tests on gain scores showed that children with SLI and children with TD differed in how they benefitted from classroom PA instruction. Children with SLI and TD appeared to gain equally in the development of deeper-level phoneme awareness skills including phoneme blending ($t(32)=0.69$, $p=.50$, $d=0.24$) and phoneme segmentation ($t(32)=1.22$, $p=.23$, $d=0.43$). Children with TD showed significantly more growth in phoneme deletion ($t(32)=8.83$, $p<.0001$, $d=3.12$). This skill was not taught as part of the classroom PA program suggesting that children with TD were more readily able to transfer PA knowledge to an untrained task. Children with SLI demonstrated significantly more growth on measures of rime oddity ($t(32)=3.11$, $p=.004$, $d=1.10$) and initial phoneme identity ($t(32)=8.43$, $p<.0001$, $d=2.98$) compared to children with TD. Children with TD were approaching mastery of, or had already mastered, these skills before instruction. Therefore, they had less potential for gain on these tasks compared to children with SLI.

Children with TD showed significantly greater gains in reading and spelling development compared to children with SLI. Specifically, children with TD produced significantly higher gain

scores on measures of non-word reading ($t(32)=4.27$, $p=.0002$, $d=1.51$), real word spelling ($t(32)= 9.20$, $p<.0001$, $d=3.25$) and non-word spelling ($t(32)=3.06$, $p=.004$, $d=1.08$). The resulting effect sizes were large. Comparison of gain scores in real word reading revealed no significant differences between children with SLI and TD ($t(32)=0.50$, $p=.62$, $d=0.18$). The *Burt Word Reading Test* (Gilmore et al., 1981), which was used to measure real word reading, may have been too difficult for this age group, resulting in low and non-significant results. These results suggest that children with TD in this sample were more readily able to transfer their enhanced PA knowledge to reading and spelling tasks. Although children with SLI made significant improvements in reading and spelling relative to their own pre-instructional abilities, they did not demonstrate as much growth in these literacy areas as did children with TD who received the same classroom PA instruction.

Finally, the performance of children with SLI who received classroom PA instruction was compared to children in Group C who followed the "usual" literacy curriculum. At the start of the school year the PA and alphabetic skills of children with SLI were significantly lower than children in Group C. However, at the end of the year the PA and literacy profiles of children with SLI following class PA were not significantly different to children in Group C who did not receive class PA (e.g., phoneme blending ($t(100)=1.0184$, $p=.311$, $d=.20$), phoneme deletion ($t(100)=1.5745$, $p=.184$, $d=.31$), phoneme segmentation ($t(100)=1.7801$, $p=.078$, $d=.36$), non-word reading ($t(100)=.1185$, $p=.906$, $d=.02$), and real word spelling ($t(100)=.5152$, $p=.608$, $d=.10$). At six years of age, only one child in Group A and one child in Group B performed below the age-expected level in reading accuracy and comprehension. This suggests that it is possible to raise the reading abilities of at-risk children to a typical level following exposure to classroom instruction that includes a short-term intensive focus on phoneme level skills.

Discussion

This study investigated the impact of a short and intensive teacher-directed classroom PA program on raising literacy achievement for children with and without spoken language difficulties in the first year of school. Understanding variables such as duration, intensity, and content of PA instruction may help with effective and efficient integration of PA teaching into the classroom environment. This in turn may contribute to the elevation of reading achievement in the early school years.

The Positive Impact of Classroom Phonological Awareness on Reading Outcomes

The first study hypothesis stated that children who received a short and intensive period of classroom PA instruction focused at the phoneme level would show significantly higher scores on PA and early literacy measures immediately post-instruction and sustained to the end of the school year compared to children who followed the "usual" literacy curriculum only. This hypothesis was supported by statistical analyses of the data. Children who received teacher-directed classroom PA instruction performed significantly higher on end-of-year reading and spelling measures compared to children who continued with the "usual" classroom reading program. For example, by six years of age, 5.88% of children who received PA instruction performed below the age-expected level in word decoding ability compared to 26.32% of children who did not receive class PA instruction. Furthermore, 5.88% of children who received PA instruction and 31.58% of children who continued with the "usual" curriculum performed below the age-expected level in reading comprehension after one year of school. This represents a 20% reduction in the number of children presenting with reading difficulties through modification of the classroom curriculum to include a short-term focus on PA. This initial finding holds promise for establishing comprehensive evidenced-based classroom programs aimed at raising reading achievement and reducing reading inequality.

Collecting information that will contribute to a greater understanding regarding the optimal duration and intensity of classroom PA instruction is critical for ensuring educators can

teach this skill efficiently and effectively in the classroom. The current study differs from previous investigations referred to in Table 1 by employing a short duration, high intensity, phoneme-focused PA program. Previous classroom-based studies of shorter duration have generally struggled to show maintenance of reading improvements (e.g., Fuchs et al., 2001) compared to studies of longer duration and higher intensity (e.g., Shapiro & Solity, 2008) which have reported sustaining improvements for literacy development. Contrastingly, the results of the current investigation demonstrate that a short duration and high intensity teacher-directed PA program can result in improved reading outcomes both immediately and up to six months post-instruction. A reduction in the percentage of children experiencing reading difficulties was similar to that reported by Shapiro and Solity (2008) and was achieved in a shorter timeframe (e.g., 10 weeks compared to two years). This result holds educational implications for classroom practice in that a shorter period of PA instruction may be more manageable for teachers to integrate into existing curriculums. Time-efficient periods of PA instruction may help ensure children possess the necessary precursory skills to take advantage of beginning reading instruction, thereby minimizing the possibility of growing inequality in reading outcomes. In addition, these results demonstrate that the efficacy of the PAT program, previously used in individual or small group clinical settings, is maintained when modified for the classroom and administered by teachers to a large group of children with differing skill levels.

Another key variable that may underpin the positive literacy outcomes reported in the current study is the specific focus on developing PA skills at the phoneme level. Skills at the phoneme level are critical to early literacy success, are often deficient in children at-risk for reading disorder, and can be stimulated in children as young as four years of age with spoken language difficulties (Gillon, 2005). As indicated in Table 1, classroom-based studies of shorter duration have often taught a broad number of PA skills (e.g., syllables, onset-rime and phonemes) and appear to be less effective in achieving sustained literacy improvements. In the current

study, a specific focus on skills at the phoneme level, as opposed to a broad focus on PA, may have allowed a shorter period of instruction to contribute to the maintenance of improved literacy outcomes by maximizing teaching time on the level of PA most strongly associated with early reading success. In this study, the first week of instruction was directed at onset-rime awareness before moving to an explicit focus at the phoneme level for nine weeks. Children in Group A maintained their enhanced performance on both PA and literacy measures six months following instruction. Similarly, children in Group B maintained their advances in PA and literacy development three months following classroom PA instruction. In addition, onset-rime awareness developed similarly across the three groups, irrespective of exposure to PA. This suggests that classroom instruction may be sufficient in scaffolding the awareness of larger sound units but less efficient in raising awareness at the phoneme level without supporting PA instruction. The educational implication of this finding posits that PA teaching time should include a comprehensive focus on developing children's awareness at the phoneme level.

Children with Spoken Language Impairment and Response to Classroom Phonological Awareness Instruction

The second hypothesis stated that children with typical spoken language and children with SLI would show significant improvements in reading and spelling following short and intensive phoneme awareness instruction. However, in line with previous research (e.g., Fuchs et al., 2001, 2002; Justice et al., 2010) children with SLI may show less growth in phoneme awareness, reading, and spelling development due to lower language skills. In this study, children with TD and SLI who received classroom PA instruction showed significant improvements on all PA reading and spelling measures (except onset-rime awareness). Children with TD and SLI equally benefited from instruction in growth of final phoneme identity, phoneme blending, and phoneme segmentation abilities. However, children with SLI showed less ability to transfer phoneme level knowledge to an untrained PA activity, namely phoneme deletion, compared to children with TD.

Children with SLI showed significantly more growth in initial phoneme identity and onset-rime awareness compared to children with TD. This is most likely because children with SLI had more scope for growth in these early PA skills. These findings may suggest that children with SLI can benefit equally if not greater than children with TD in the development of phoneme awareness, and are in contrast to the latter part of the second hypothesis stating that children with SLI may benefit less in development of skills at the phoneme level. This suggests that an explicit focus on phoneme level skills is necessary to enhance knowledge at this critical level of PA.

Children with TD showed significantly higher gain scores in reading and spelling development compared to children with SLI. That is, children with poorer language skills appeared less able to transfer their enhanced PA knowledge to the processes of reading and spelling. On-going support in applying phonologically based knowledge to the written language process may therefore be necessary for this group of children. Although children with SLI who received classroom PA instruction did not demonstrate as much growth in reading and spelling development compared to children with TD, this cohort did perform at similar reading and spelling levels to children in the comparison group who did not receive PA. This suggests that inclusion of a short period of phoneme-focused instruction, as part of the beginning reading program, can exert a positive influence on the reading outcomes of children who enter school with an increased risk for reading disorder. It is important to acknowledge that these results are based on a small sample size which may limit generalization of results. Despite this, these results provide promise for future initiatives aimed at achieving greater equality in reading outcomes.

Limitations

A number of study limitations must be acknowledged. First, the use of a quasi-experimental design in which participants were not randomly assigned at an individual level to each instructional condition may limit the causal relationships postulated in this study. A quasi-experimental design was employed because participants were already found as part of “intact”

(i.e., classrooms) groups in their local areas. Attempts to counteract this lack of random assignment included the use of comparison Group C and ensuring that Groups A, B, and C were not significantly different at the start of the study. Furthermore, it is plausible that generalization of findings may be confounded by variability in teacher, child, and location factors that exist between educational settings. All participants resided in the same metropolitan city and those participants who received intervention came from average socioeconomic backgrounds. It must also be acknowledged that gains in reading and spelling may in part be related to the quantity of professional development experimental teachers received. Teachers of Groups A and B received eight hours of professional development and in-class support, whereas teachers of children in Group C did not receive any formal professional development. These limitations warrant further investigation through replication studies involving a range of education contexts. The limited number of children with SLI necessitates future investigation through the use of larger sample sizes to ensure improvements are not mediated by regression towards the mean. Research to help children with SLI transfer their phonological knowledge into written language is also necessary.

In summary, teaching children to become efficient readers in their own classrooms is paramount to future academic learning and lifelong success. The findings from this study contribute to existing literature by demonstrating that a short and intensive period of teacher instruction in PA focused at the phoneme level during the first year of schooling has the potential to exert a significant and positive influence on the reading and spelling development of children with and without typical language development. Pursuing improved literacy outcomes for all children requires exposure to a comprehensive multi-focal curriculum. This study suggests that such a curriculum should include a period of concentrated and time-efficient instruction in PA.

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Table 1. Duration, intensity, and content of PA instruction on reading outcomes

	Duration		**Intensity**		**Content**		**Reading Outcomes**	
	Long	Short	High	Low	Broad	Narrow	Immediate	Sustained
Shapiro & Solity (2008)	+		+			+	+	+ (3 years)
McIntosh et al., (2007)		+	+		+		+	– (2 years)
Fuchs et al., (2001)		+		+	+		+	– (5months)
Justice et al., (2010)		+		+	+		+	N/A

Note. + indicates the type of duration, intensity and content included in each study; "Reading Outcomes Immediate +" refers to improvements demonstrated immediately after the program's conclusion; "Reading Outcomes Sustained + (duration post-instruction)" refers to improvements still evident at least five months post-instruction; "Reading Outcomes Sustained – (duration post-instruction)" refers to reading improvements that were not sustained at least five months post-instruction; "N/A" indicates that follow-up assessment is unreported thus far.

Table 2. Teacher characteristics for experimental Groups A and B

Teacher	Age (Years)	Experience (Years)	Decile*	Gender	Class Size
Group A	39	13	7	F	18
Group B	40	14	8	F	16
Group C-1	37	15	10	F	7
Group C-2	38	13	10	F	8
Group C-3	39	16	9	F	8
Group C-4	37	12	6	F	7
Group C-5	37	11	7	F	14
Group C-6	37	14	6	F	13
Group C-7	39	18	6	F	10
Group C-8	38	16	4	F	10
Group C-9	39	13	3	F	8
Group C-10	38	6	2	F	10

Note. Each numeral beside a label 'Group C' represents one teacher in the comparison group; * In New Zealand, each school is assigned a decile ranking that provides an indication of the socioeconomic community within which the school is located and is based on national census data (Ministry of Education, 2011).

Table 3. School-entry performance on formal measures of verbal and non-verbal skills

	CELF-P2		PTONI	PIPA			PCC
	RLI	ELI		RO	IPI	LS	
Group A (*n*=18)							
M	102.7	100.3	106.2	5.9	7.9	6.3	94.1
SD	8.3	2.2	6.1	2.2	3.7	2.0	11.7
Range	85-115	83-110	92-115	0-9	0-11	4-9	63-100
Group B (*n*=16)							
M	102.9	100.6	106.9	6.4	7.9	6.9	94.2
SD	7.0	2.3	5.1	2.1	2.7	1.5	11.1
Range	85-110	80-111	95-113	3-9	0-10	0-8	64-100
Group C (*n* = 95)							
M	98.3	96.8	103.2	6.3	9.1	7.2	93.2
SD	10.8	1.1	7.3	2.5	2.6	2.1	11.0
Range	79-119	80-116	85-116	2-13	3-15	4-11	61-100
One-way ANOVA	$F(2,126)=2.501$, $p=.086$	$F(2,126)=1.656$, $p=.195$	$F(2,126)=3.003$, $p=.056$	$F(2,126)=.218$, $p=.805$	$F(2,126)=2.548$, $p=.082$	$F(2,126)=1.449$, $p=.239$	$F(2,126)=.105$, $p=.90$

Note. CELF-P2 RLI=Clinical Evaluation of Language Fundamentals—Preschool 2, Receptive Language Index (Wiig et al., 2006); CELF-P2 ELI=Clinical Evaluation of Language Fundamentals—Preschool 2, Expressive Language Index (Wiig et al., 2006); PTONI=Primary Test of Non Verbal Intelligence standard scores (Ehrler & McGhee, 2008); PIPA=Preschool and Primary Inventory of Phonological Awareness Standard Scores where RO=rhyme oddity, IPI=initial phoneme identity, LS=letter-sound knowledge (Dodd et al., 2000); PCC=Percentage Consonants Correct.

Table 4. Group performance on informal measures of literacy ability at school-entry

	Phonological Awareness								***Reading***		***Spelling***	
	*RO**	*IPI**	*FPI**	*PB**	*PD**	*PS**	*LN**	*LS**	*Real*	*NW*	*Real*	*NW*
Group A (*n*=18)												
M	5.4	5.4	0.3	1.3	0.3	0.3	13.7	10.9	4.06	2.3	1.1	2.7
SD	2.4	2.2	0.5	1.1	0.5	0.4	4.3	4.7	3.2	3.9	0.9	1.9
Range	0-8	1-8	0-1	0-3	0-1	0-1	4-18	1-16	0-10	0-4	0-3	0-6
Group B (*n*=16)												
M	5.7	4.8	0.5	1.6	0.5	0.4	13.9	11.5	3.9	2.6	1.1	2.8
SD	2.4	1.8	0.7	1.2	0.5	0.5	3.9	4.7	2.7	3.6	0.7	1.8
Range	1-9	1-6	0-2	0-3	0-1	0-1	3-18	1-16	0-10	0-4	0-2	0-6
Group C (*n*=95)												
M	5.3	5.3	0.6	1.3	0.5	0.6	13.4	11.1	3.7	2.2	1.2	2.5
SD	2.5	3.0	0.7	1.2	0.8	0.9	4.6	5.4	4.5	3.4	1.7	0.3
Range	0-10	0-10	0-2	0-5	0-4	0-4	2-18	0-18	0-10	0-7	0-9	0-9
One-way ANOVA	*F*(2,126) =.219, *p*=.804	*F*(2,126) =.254, *p*=.783	*F*(2,126) =.980, *p*=.378	*F*(2,126) =.588, *p*=.557	*F*(2,126) =.649, *p*=.525	*F*(2,126) =1.247, *p*=.291	*F*(2,126) =.110, *p*=.896	*F*(2,126) =.059, *p*=.943	*F*(2,126) =.123, *p*=.885	*F*(2,126) =.092, *p*=.912	*F*(2,126) =.077, *p*=.926	*F*(2,126) =.127, *p*=.881

Note. *Part of a Computer-Based Phonological Awareness Assessment (Carson et al., 2011) where RO=rhyme oddity, IPI=initial phoneme identity, FPI=final phoneme identity, PB=phoneme blending, PD=phoneme deletion, PS=phoneme segmentation, LN=letter-name, LS=letter-sound; Real Word Reading=The Burt Word Reading Test—New Zealand Revision (Gilmore et al., 1981); NW Reading =Calder Non-Word Reading Probes (Calder, 1992); Real Word Spelling=Schonell Spelling Test (Schonell, 1932); NW Spelling=Pseudoword Spelling Subtest of the Test of Phonological Awareness—2nd Edition (TOPA—2+; Torgesen & Bryant, 2004).

Table 5. Content of the classroom phonological awareness program.

Week	PA Skill	Activity Description
1	Rhyme	Rhyme bingo and odd-one-out activities were used by the teachers to encourage children to listen for rhyming components of spoken words.
2	Initial Phoneme Identity	Initial sound bingo, initial sound matching, and odd-one-out activities were used to draw children's attention to the first sound in spoken words. Medial or final sounds were included for children with more advanced skills.
3	Final Phoneme Identity	Final sound bingo, final sound matching, and odd-one-out activities were used to draw children's attention to the final sound in spoken words. Medial or final sounds were introduced for children with advanced skills.
4 & 5	Phoneme Blending	Drawing, singing, and bingo games were used to teach children to blend words together. Two and three phoneme words were predominantly used; however, words with four phonemes and initial and final blends were used for children with more advanced abilities.
6 & 7	Phoneme Segmentation	Drawing, singing, and bingo games were used to teach children how to segment sounds in words. Two and three phoneme words were used; however, four phoneme words and initial and final blends were used to extend students.
8 & 9	Manipulation	Large letter cards or a white board was used to teach children to manipulate letter sounds in words to create new words.
10	Review	Activities from each of the nine weeks of instruction were reviewed. Focus was directed toward phoneme segmentation and blending activities.
Linking Speech to Print: All activities required a demonstration of how the PA task related to print. For example, during or after initial sound bingo, children were asked to select three pictures from the bingo board, articulate the first sound they heard, and then write the letter for that sound.		

Tier 1 Effective classroom practices

What classroom practices are effective in facilitating young children's learning?

Prof. Gail T Gillon, PhD
University of Canterbury
NEW ZEALAND

Instructional approaches that have a significant positive effect on children's learning (Hattie, 2005)

- Teacher feedback (effect size, 0.81);
- Direct instructional approaches (0.81);
- Phonological awareness (0.66);
- Early intervention (0.66);
- Peer assessment strategies (0.63);
- Self assessment strategies (0.56);
- Setting challenging goals (0.59); and
- Mastery learning approaches (0.55)

Quality professional development for teachers also has a positive influence (effect size 0.48)

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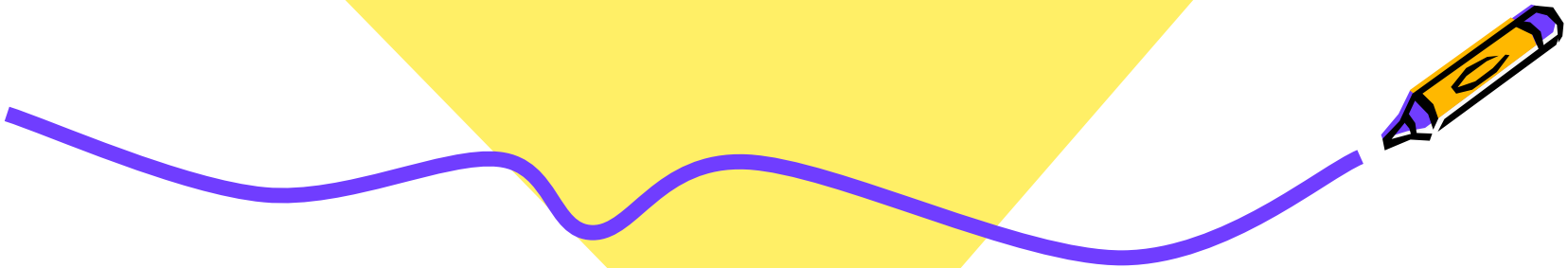
Introducing phonological awareness into the class reading programme



Karyn Carson, Gail Gillon & Therese Boustead, 2012 *(Ref: LSHSS paper accepted for publication)*

PARTICIPANTS

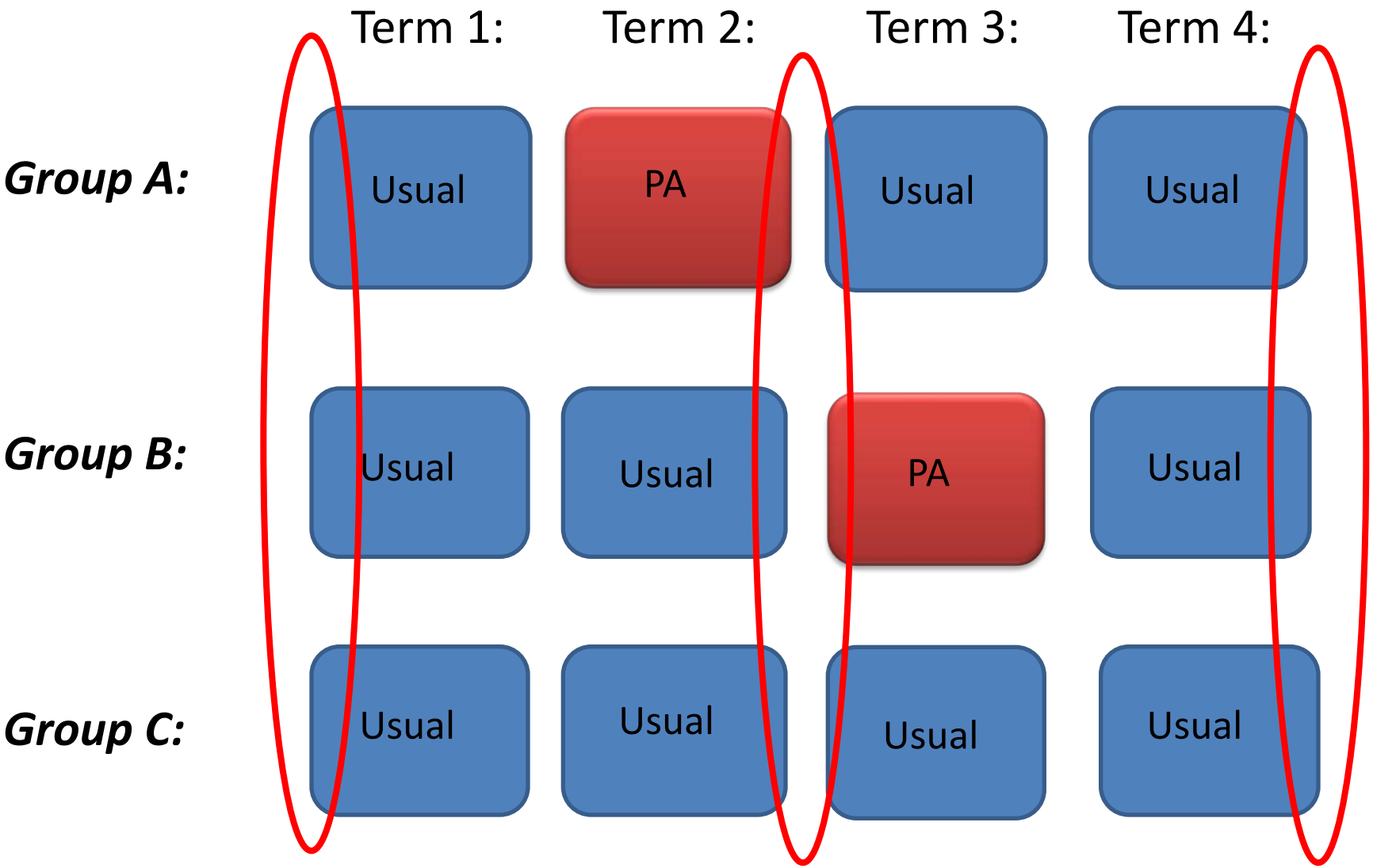
•One-hundred and twenty-nine children (75 girls & 54 boys). classes randomly divided into:

- –Group A (*n*=18, 4 with language delay)
- –Group B (*n*=16, 3 with language delay)
- –Group C (*n*=95, 21 with language delay)

•Sample Demographics:

- -Aged between 5;00 and 5;02
- -12 Government funded schools
- -High, middle and low SES

Study Design: A school term = 10 weeks



Assessment Measures

Computer-Based Phonological Awareness Assessment

- Rhyme Oddity
- Initial Phoneme Identity
- Final Phoneme Identity
- Phoneme Blending
- Phoneme Deletion
- Phoneme Segmentation
- Letter Knowledge

In addition....

Reading:

Burt Word Reading Test
Calder Non-Word Probes

Spelling:

Schonell Spelling Test
TOPA Non-Word Subtest

Classroom Phonological Awareness

Framework:

- 10-weeks
- 4 x 30-minute sessions per week (total 20 hrs)
- Initial sessions co-taught by SLT and teacher, remainder taught only by teacher

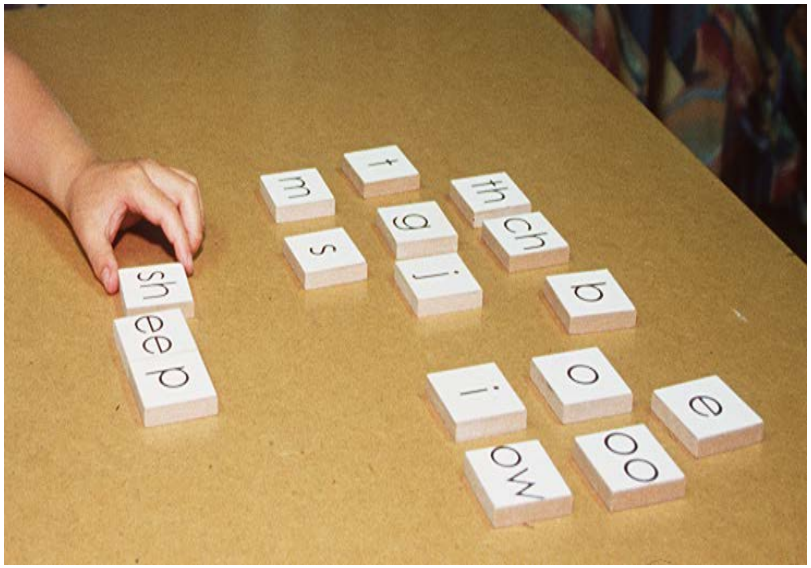
Principles:

- Targeted skills at the phoneme level
- Explicit and systematic instruction
- Frequent and intensive sessions
- Integrated with letter knowledge and real written language contexts
- Professional development for teachers

Programme Content

- Generating rhyming words
- Identifying initial and final sounds in words
- Blending sounds to form words
- Segmenting words into individual phonemes
- Manipulating sounds in words
- Letter-knowledge & generalisation to reading and spelling tasks
- Making explicit the link between speech and print

Adapted from The Gillon Phonological Awareness Training Programme



http://www.education.canterbury.ac.nz/people/gillon/

Initial Sound Sorting

Each child has a card

They

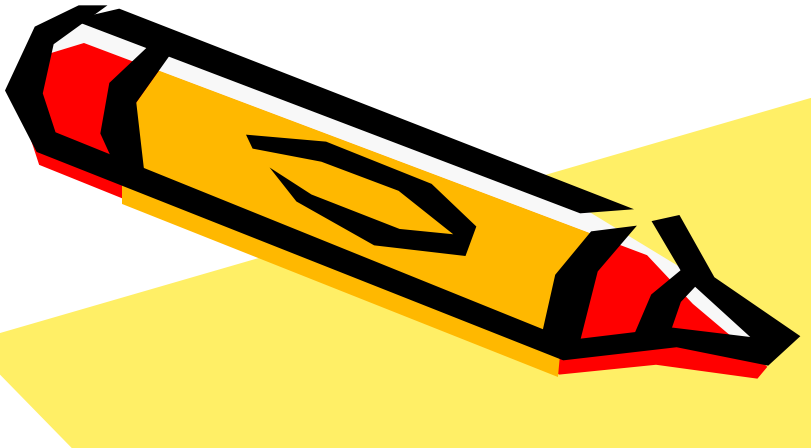
- name the picture
- say the initial sound
- Put the card with the grapheme

Hearing and recording sounds

sleep: s…l….ee…p

let's write the letters for sleep

s l ee p. Say the word together: sleep



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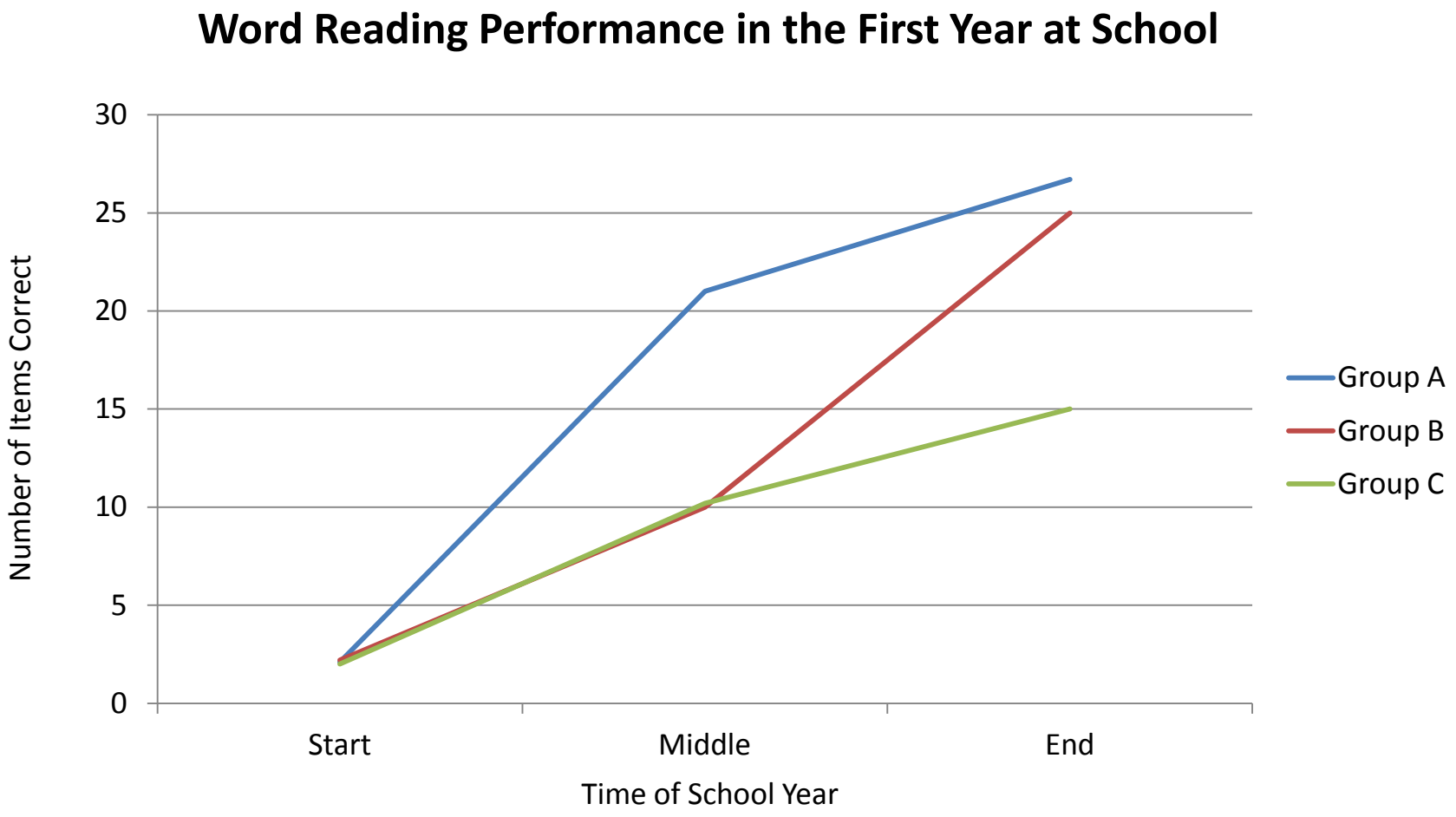
Key research findings

Phonological awareness

Literacy outcomes

Word decoding ability



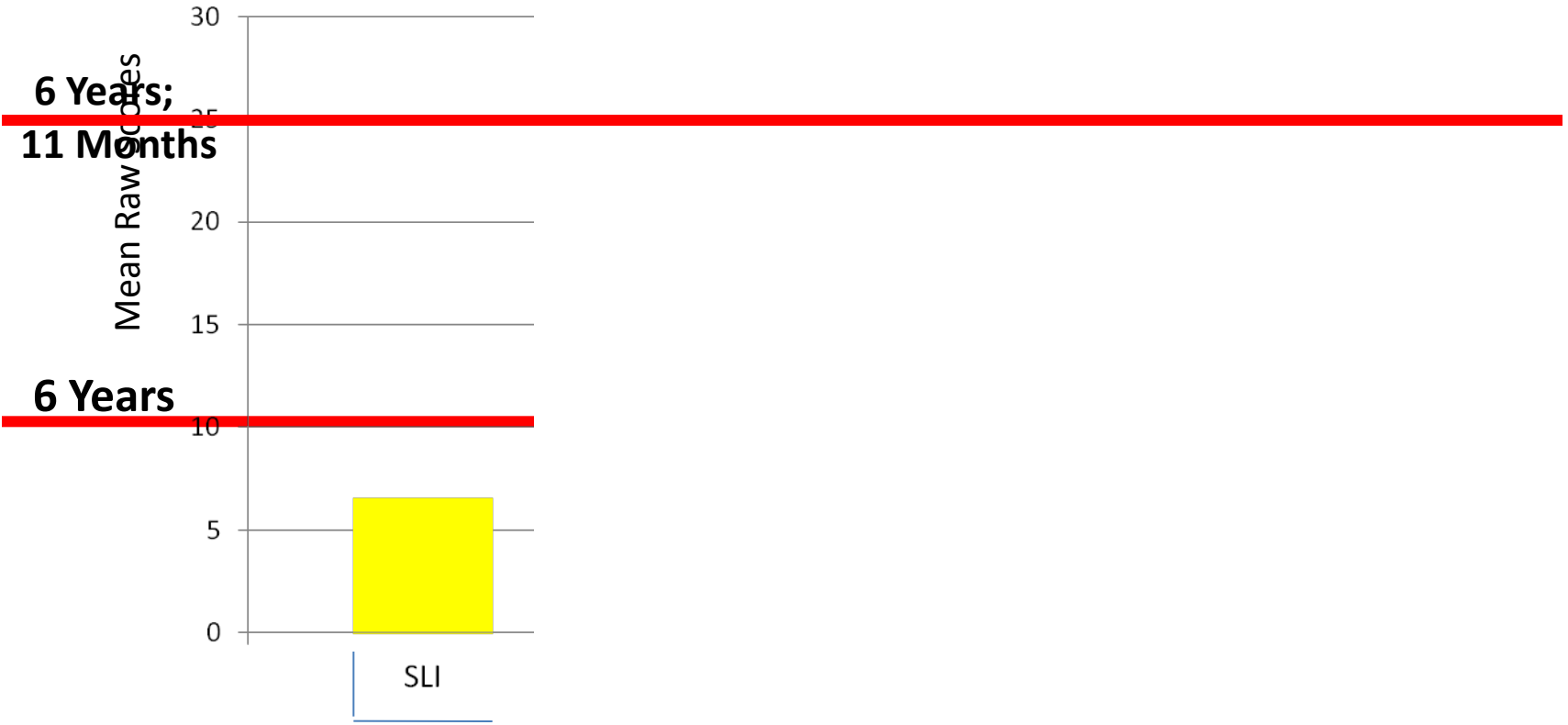
Repeated Measures ANOVA:
$F(3.091, .773)=16.817$, $p=.000$

Tamhane's T2 Post Hoc Test:
Groups A & B: $p = 1.000$; Groups A & C: $p = .000$; Groups B & C: $p = .000$

Results:

Reading Fluency after One Year of School…..

Mean Reading Fluency Performance Between Children Who Received and Did Not Receive Classroom PA



Usual Literacy Program

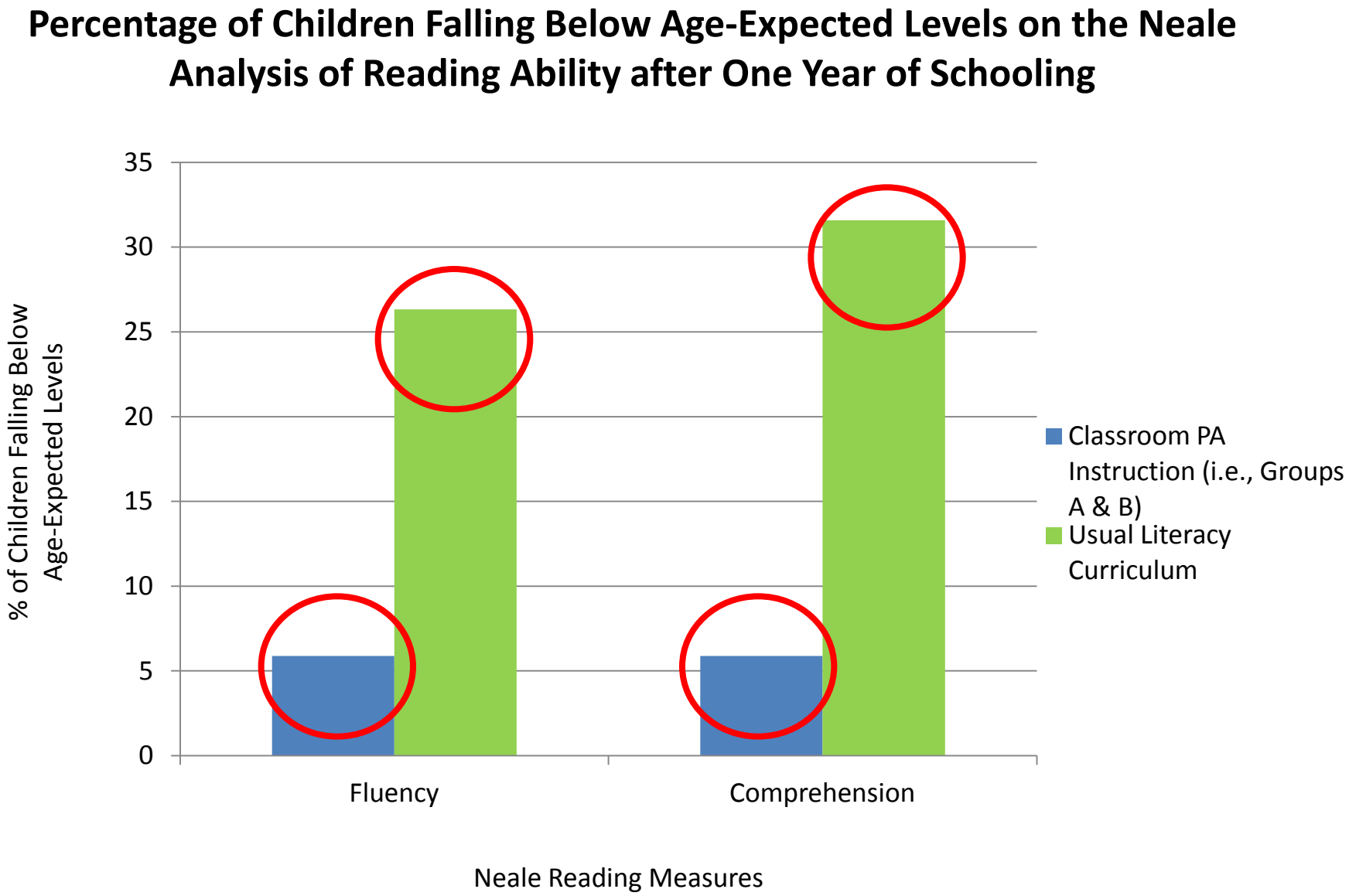
Classroom Phonological awareness

Results:

Reading Comprehension after One Year of School…..

Mean Reading Comprehension Performance Between Children Who Received and Did Not Receive Classroom PA

Percentage of Children At-Risk



Children with LD (Group A): Language Profiles at 5 Years

Child ID #	Gender	Ethnicity	Receptive Language Index	Expressive Language Index	Speech Sound Production	Vocabulary	Phonological Awareness
1A	F	NZ	89	86	63%	90	<7
2A	M	NZ	85	83	64%	88	<7
3A	M	Maori	95	83	89%	93	<7
4A	F	NZ	93	84	88%	94	<7

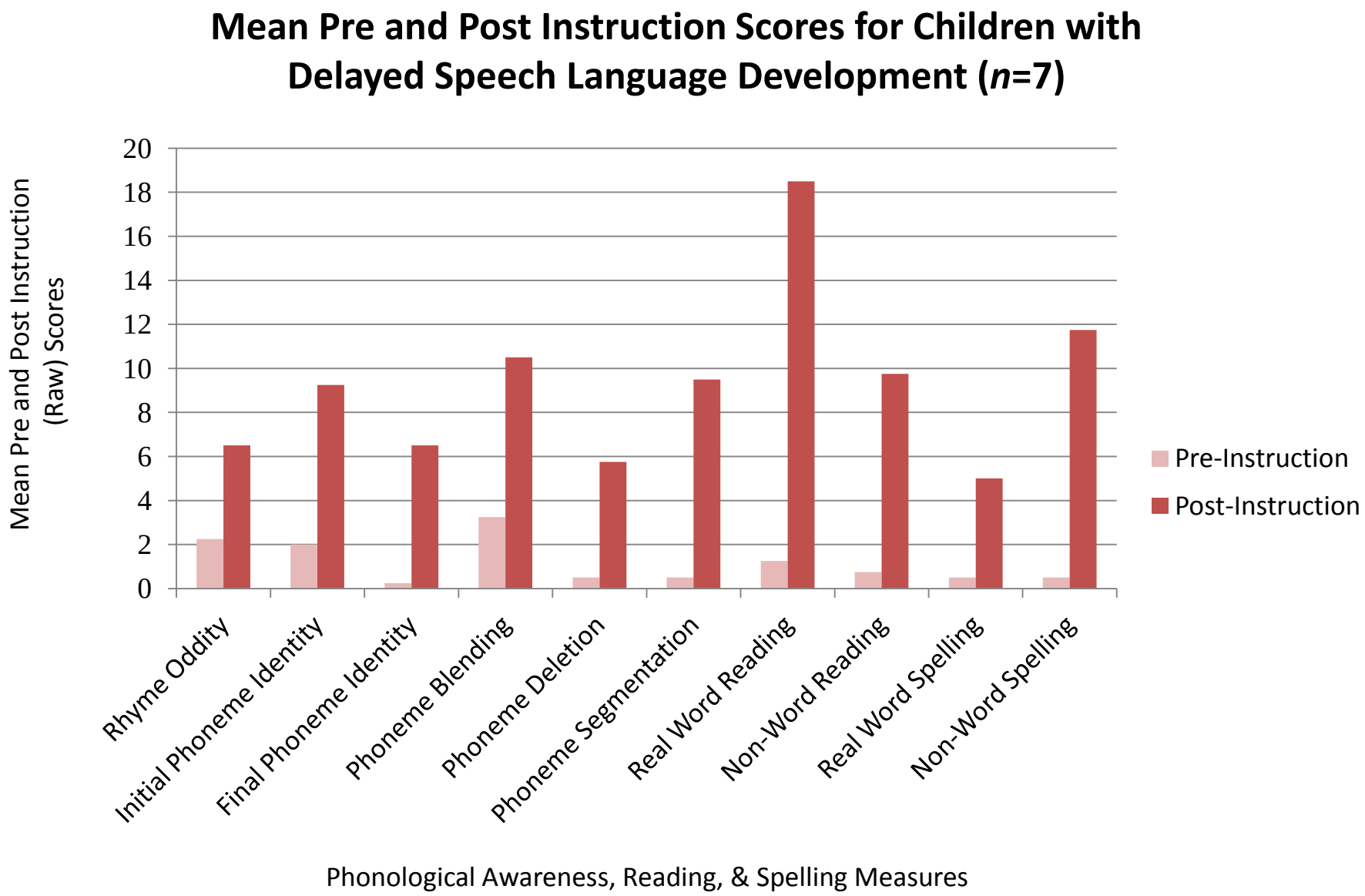
Receptive Language Index (CELF-P2): A score between 85-115 is considered within normal limits
Expressive Language Index (CELF-P2): A score between 85-115 is considered within normal limits
Speech Sound Production: <50% = severe; 50-65% = moderate-severe; 65-85% = mild-moderate; > 85% = mild
Vocabulary (PPVT-4): A score between 85-115 is considered within normal limits
Phonological Awareness (PIPA: RO, IPI, LS): A standard score between 7-13 is considered within normal limits

Children with LD (Group B): Language Profiles at 5 Years

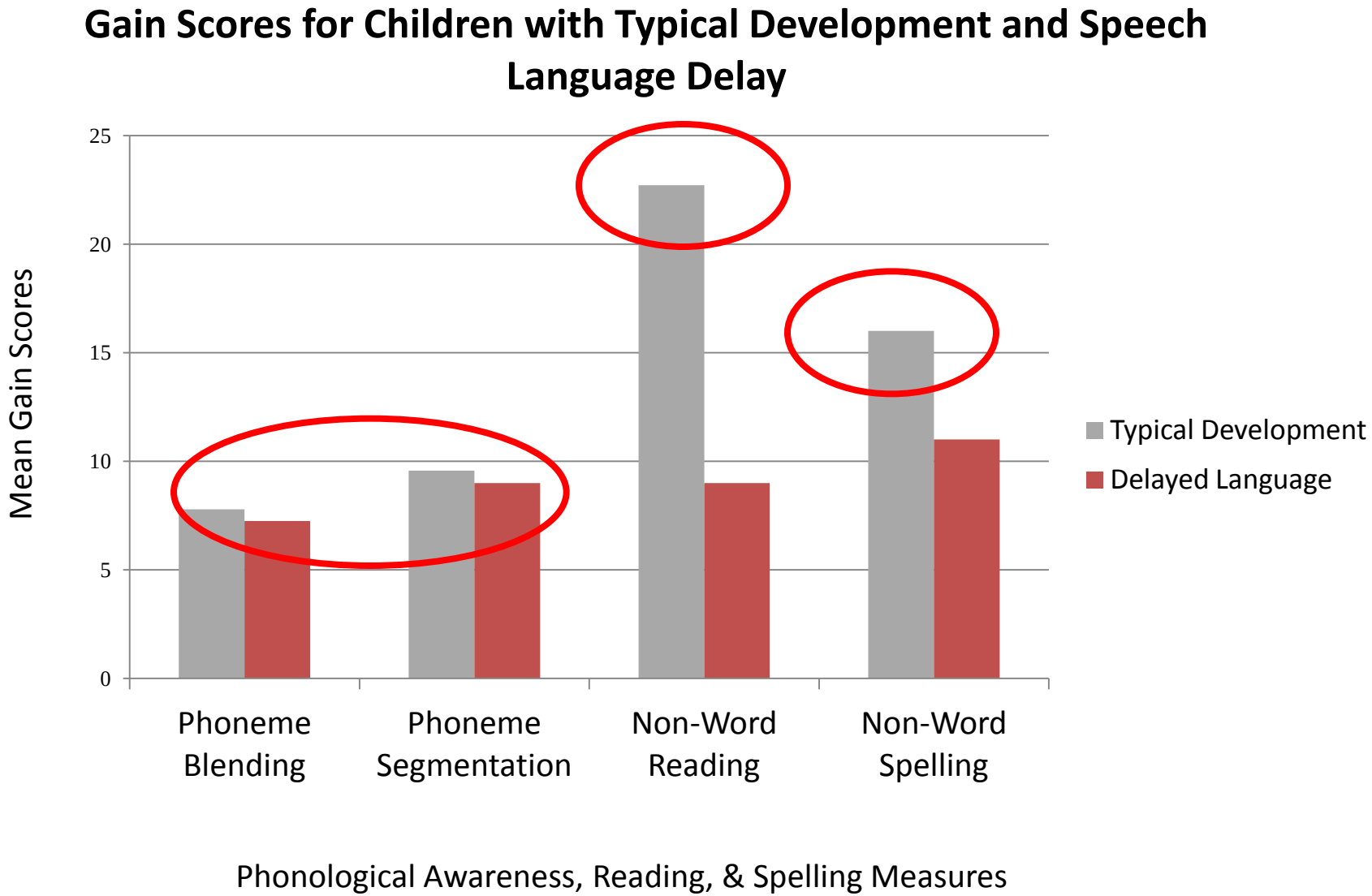
Child ID #	Gender	Ethnicity	Receptive Language Index	Expressive Language Index	Speech Sound Production	Vocabulary	Phonological Awareness
1B	F	Maori	93	89	79%	90	<7
2B	M	NZ	85	80	64%	89	<7
3B	M	NZ	94	83	70%	96	<7

Receptive Language Index (CELF-P2): A score between 85-115 is considered within normal limits
Expressive Language Index (CELF-P2): A score between 85-115 is considered within normal limits
Speech Sound Production: <50% = severe; 50-65% = moderate-severe; 65-85% = mild-moderate; > 85% = mild
Vocabulary (PPVT-4): A score between 85-115 is considered within normal limits
Phonological Awareness (PIPA: RO, IPI, LS): A standard score between 7-13 is considered within normal limits

Responsiveness to Instruction



Responsiveness to Instruction



Key Findings

- Classroom phonological awareness instruction delivered by teachers can be beneficial for literacy development.
- Percentage of at-risk students can be minimized by 6-years of age.
- A short intensive burst can result in significant and maintained benefits for reading and spelling.
- Children with spoken language difficulties can

  benefit from classroom PA instruction- their reading and spelling accelerated to the level of their peers with TD peers who did not receive classroom PA but they may need more assistance in transferring skills to reading and spelling activities.

Contact details

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