Small groups, big gains: Efficacy of a tier 2 phonological awareness intervention with preschoolers using a multiple-baseline design

Dissertation

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By
Lydia Kruse, M.Ed.

Graduate Program in Human Ecology: Human Development and Family Science

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Dissertation Committee:
Dr. Howard Goldstein, Advisor
Dr. Cynthia Buettner
Dr. Shayne Piasta
Dr. Diane Sainato
Abstract

This multiple baseline design study evaluated the efficacy of a Tier 2 early literacy intervention on low-income preschool children’s phonological awareness (PA) skills. The intervention was delivered three to four days a week by a trained interventionist to small groups of children using an interactive approach with frequent opportunities to respond and contingent feedback. Groups participated in 28 to 36 lessons that lasted about 10 minutes and focused on PA and alphabet knowledge. Seven children, across three groups, participated in the lessons and weekly progress monitoring assessments. All children demonstrated gains on the primary outcome measure of first sound identification as a result of the Tier 2 intervention. Most children also demonstrated gains on secondary and distal measures of PA and alphabet knowledge. Results provide support for the application of Response to Intervention (RTI) in early childhood and signify the potential benefits to learners who need instruction beyond the core curriculum.
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Vita

1998.................................................. Ashland Crestview High School
2002.................................................. B.A. Psychology, The College of Wooster
2003-2005 ....................... Graduate Research Associate, Department of Education and
Allied Studies, John Carroll University
2005.................................................. M.Ed., John Carroll University
2006-2010 ........................................ School Psychologist, various school districts
2010-present......................... Graduate Research Associate, Department of Human
Development and Family Science, The Ohio State University
Autumn 2012 ......................... Lecturer, Department of Human Development and
Family Science 3620, The Ohio State University

Fields of Study

Major Field: Human Development and Family Science
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Introduction

Unfortunately, many children in elementary school demonstrate below-grade level reading skills; nearly two thirds of fourth graders do not read at grade level and this trend has persisted for years (National Center for Education Statistics, 2011). Fundamental skills necessary for learning to read, such as phonological awareness (PA), develop in the early years of life and are predictive of reading outcomes (e.g., Storch & Whitehurst, 2002). Indeed, PA is one of the two best predictors of future reading success (Share, & Jorm, Maclean, & Matthews, 1984). Weakness in PA skills is associated with difficulty reading (Ehri et al., 2001b; Ehri, Nunes, & Stahl, 2001), and many children, especially those from low socioeconomic status (SES), exhibit deficits in PA (Ehri & Stahl, 2001; McDowell, Lonigan, & Goldstein, 2007). Given this evidence, interventions that address the development of early literacy skills of young children with identified deficits are highly important to promoting long-term literacy skills.

Phonological Awareness

PA has been defined as “ability to detect and manipulate the sound structure of words independent of their meaning” (Phillips, Clancy-Manchetti, & Lonigan, 2008, p. 3). PA has been consistently reported as predictive of reading outcomes (Byrne & Fielding-Barnsley, 1993; Storch & Whitehurst, 2002) and the rate of reading acquisition (e.g., Wagner & Torgesen, 1987). Specifically, children who are proficient at detecting
parts and sounds of words are able to decode words more quickly even after controlling for other factors, including intelligence and social class (Wagner, Torgesen, & Rashotte, 1994). Not surprisingly, deficits in PA are associated with difficulty reading (Wagner & Torgesen, 1987). Despite being fundamental to reading success, PA does not seem to develop naturally. Phillips et al. (2008) reported that “phonological awareness, as with other decoding skills, is not an intuitive or naturally developing ability, as language skills may be for some children, but rather may require deliberate teaching and practice opportunities” (p. 4). Although PA may not be an intuitive skill, some children acquire mastery of PA skills with minimal instruction. Other children, however, demonstrate difficulty developing these skills, including children with speech or language impairments (Catts, 1993) and many children from low-income families (Lonigan, Anthony, Bloomfield, Dyer, & Samwell, 1999). Fortunately, there is evidence that PA is a skill that can be measured and taught successfully (e.g., Gillon, 2000; Troia, 1999).

With an intensified focus on literacy research due to federal legislation regarding the prevention of reading difficulties (e.g., No Child Left Behind), there is accumulating evidence about how to teach and measure PA.

**Response to Intervention**

There is little debate about the importance of PA skills; however, there is less consensus about what instructional methods to use to teach them and when to start instruction. Although PA skills have been observed in children as young as two years old (Lonigan, Burgess, Anthony, & Barker, 1998), there is some evidence that PA instruction is most effective at the outset of learning to read (Ehri et al., 2001). PA instruction is
included in commercially available preschool curricula (e.g., The Creative Curriculum for Preschool) and state early learning standards. In addition, there is a growing expectation that preschool and Kindergarten-aged children master some PA skills evidenced by the widespread use of generalized outcome measures for early literacy (e.g., Dynamic Indicators of Basic Early Literacy Skills [DIBELS], Good, Gruba, & Kaminski, 2002). The consideration of teaching PA to preschool-aged children is especially relevant within an instructional framework, such as response to intervention (RTI).

RTI is a “comprehensive early detection and prevention strategy that identifies struggling students and assists them before they fall behind” (Gersten et al., 2008, p. 4) using a combination of careful assessment and high-quality instruction and interventions. Graphically, RTI is typically represented as a pyramid divided into tiers, usually three (Fox, Carta, Strain, Dunlap, & Hemmeter, 2010; Fletcher & Vaughn, 2009). These tiers signify increasingly levels of intensity of instruction (moving up the pyramid) and the approximate percentage of the student group. The lowest level of the pyramid (Tier 1) represents the general education curriculum that applies to all children. The peak of the pyramid (Tier 3) represents the most intense, individualized services, which are reserved for those few students for whom other services did not result in adequate progress. The nature of “intensity of instruction” can refer to changes in the intervention, the duration or frequency of the intervention, the interventionist, or the group size (Gersten et al., 2008).

In between the general education curriculum and intense, individualized interventions (i.e., Tiers 1 and 3) is secondary tier prevention that targets students who
need additional support based on screening and progress monitoring data (Gersten et al., 2008). Fletcher and Vaughn (2009) suggest that “children who do no achieve specified levels of progress…receive additional instruction in small groups of three to five students for 20-40 minutes daily” (i.e., Tier 2; p. 31). Only a limited number of children in a given classroom are likely to require Tier 2 support; Buysse and Peisner-Feinberg (2010) suggest that only 15-25% of an early childhood population will likely need explicit, small group interventions.

The application of the tiered model of instruction to the preschool population was improved with the recent advancement of early literacy screening and generalized outcome measures. For example, the Individual Growth and Development Indicators (IGDIs; McConnell, Priest, Davis, & McEvoy, 2002) and DIBELS provide educators with information about students’ skills that are known predictors of reading success, such as PA. As such, educators are better able to determine which students require Tier 2 interventions. Equipped with data regarding children’s early literacy skills, educators need Tier 2 interventions that they can implement in small groups in the classroom to promote these skills in children who demonstrate deficits (Coleman, Buysse, & Neitzel, 2006).

**Phonological Awareness Training**

Although interventions to promote early literacy have been the focus of many ongoing research efforts, their application to the needs of children in Tier 2 in a preschool RTI framework is limited for several reasons. First, many interventions appear to serve as Tier 1 instruction or target children who need Tier 3 instruction instead of Tier 2. For
example, many were conducted in a large group (whole class) setting (e.g., Massetti, 2009; Lefebvre, Trudeau, & Sutton, 2011; Nancollis, Lawrie, & Dodd, 2005) but some children require more individualized instruction. On the other hand, many interventions were designed to be implemented with individual children. For example, Bowyer-Crane et al. (2008) and Castiglioni-Spalten and Ehri (2003) observed improvements in PA skills after children participated in intervention programs; however, participants were trained individually and received daily training sessions. Roth and colleagues (Roth, Troia, Worthington, & Handy, 2006; Roth, Troia, Worthington, & Dow, 2002) developed the Promoting Awareness of Sounds in Speech (PASS) program to teach rhyming, segmenting, and blending to preschoolers with speech/language impairments. Participants in the intervention demonstrated gains on PA measures; however, the intervention was conducted individually and even after an extensive number of intervention sessions (e.g., 23), some children had not yet mastered rhyming (segmenting and blending had not yet been introduced). It is also important to note that other studies did not specify an inclusion criterion that participants had phonological deficits (e.g., Bowyer-Crane et al., 2008; Byrne & Fielding-Barnsley, 2002), which suggests that participants were children who may not have required Tier 2 instruction.

Second, many training programs require daily training sessions that are 20 to 30 minutes long or require many weeks of implementation (e.g., Justice et al., 2003; Roth, Troia, Worthington, & Dow, 2002; Castiglioni-Spalten & Ehri, 2003). These characteristics might make the interventions difficult to implement in a preschool setting. For example, the Bowyer-Crane et al. (2008) program required that children participate in
daily individual (20 minute) or group (30 minute) lessons (alternating) for 20 weeks. Results of PAVEd for Success (Schwanenflugel et al., 2010) indicated greater improvement in preschoolers’ PA in the treatment group compared to control participants. However, results were most convincing for children who participated in a comprehensive, program that spanned the entire school year that included extensive teacher professional development.

Third, PA interventions tend to be targeted at children in Kindergarten and elementary school (Castiglioni-Spalten, & Ehri, 2003; Henning, McIntosh, Arnott & Dodd, 2010) instead of the preschool population. For example, Torgesen, Morgan, and Davis (1992) provided combined segmenting and blending, blending instruction only, and language instruction only to three groups of Kindergarteners. They observed greater improvements in segmenting, blending, and word learning skills in the children who received the combined instruction compared to the children in the other experimental groups. Despite their positive findings, application to the preschool population is limited. Finally, many PA intervention programs focus on children with speech or language impairment (e.g., Gillon, 2000; Wilcox, Gray, Guimond, & Lafferty, 2011) or reading disabilities (Gillon & Dodd, 1995), which limits generalization to other populations, including children with typical development.

**Phonological Awareness Training in Preschool**

There are a number of empirical studies of PA interventions designed to be conducted with small groups of preschool children that are applicable to Tier 2 instruction. For example, van Kleeck, Gillam, & McFadden (1998) evaluated the effects
of PA training with two classrooms of eight preschool children (mean ages of 49 months and 60 months) diagnosed with communication disorders. The study relied on a quasi-experimental design without randomization of participants and a comparison group that was older (mean age of 71.5 months) than the treatment group. Graduate students training to become speech-language pathologists (SLPs) conducted the 24-week training, which occurred in the classrooms, two days a week with 3 to 4 children at a time and lasted 10 to 15 minutes. The instruction focused on rhyming for the first 12 weeks and phoneme awareness for the second 12 weeks. A series of researcher-developed rhyming and phoneme awareness pre- and post-test measures indicated that participants demonstrated gains in both rhyming and phoneme awareness (e.g., initial sound identification, generating initial sounds) skills. However, the participants’ rhyming post-test scores fell well below the mean of the comparison group, suggesting that the intervention was not responsible for the observed gains in rhyming. On the other hand, the children in the treatment group demonstrated phoneme awareness skills well above the comparison group at post-test.

Justice, Chow, Capellini, Flanigan, and Colton (2003) implemented an emergent literacy intervention with 18 preschool children (mean age of 53 months). Two, 12-week interventions (experimental explicit and comparison) were evaluated using a within-subjects alternating treatment design. Children participated in two, 30 minute intervention sessions a week delivered in small groups by a speech language pathologist or a reading specialist. The experimental explicit intervention consisted of activities to promote orthographic knowledge and phonologic features of oral language, such as name
writing, alphabet recitation, and rhyme detection games. In contrast, the comparison intervention involved adult-child shared storybook reading during which the adult read a storybook and used strategies (e.g., dialogic strategies) to encourage prediction, engagement, and retelling skills. Participants’ emergent literacy skills were evaluated at pre-test, interim, and at post-test using five criterion-referenced measures (e.g., Phonological Awareness Test). Results indicated significant growth from pre-test to posttest on all five measures (i.e., alphabet knowledge, print awareness, name writing, phonological segmentation, and rhyme production). Children’s skills improved significantly on all five measures during the 6 weeks that they received the explicit instruction. Only gains in phonological segmentation were observed as a result of the comparison treatment.

Koutsoftas, Harmon, and Gray (2009) evaluated the efficacy of a Tier 2 intervention designed to teach phonemic awareness to Head Start children. Preschool children were assigned to the intervention based on lack of responsiveness to high-quality Tier 1 instruction. Speech/language pathologists or experienced teachers delivered the intervention to groups of three to four children for 20-25 minutes, two days a week for six weeks. The intervention targeted skills related to first sound identification. Results are difficult to interpret because the researchers reported that it was effective for 71% of participants.

Maslanka and Joseph (2002) compared the effects of two, 26-day interventions on 19 preschoolers’ PA skills. Half of the children received instruction using sound boxes; the other half received instruction using sound sorts. Results indicated that children in the
sound box treatment group outperformed children in the sound sort group on segmenting phonemes and isolating medial sounds. However, the small sample size and lack of a non-treatment control group make the results difficult to interpret. Bryne and Fielding-Barnsley (1991) randomly assigned 126 preschoolers to either a 12 week, small group intervention (Sound Foundations) teaching phoneme identity or to a control group. Children in the treatment group outperformed children in the control group on researcher-developed measures of phoneme-identity (e.g., identifying which picture started with the same sound as a target).

O’Connor, Jenkins, Leicester, and Slocum (1993) identified 47 young children (ages 4 to 6 years) with developmental delays who scored below a cut point on a PA pretest. Children were randomly assigned to a control group or one of three treatment groups that focused on rhyming, blending, or segmenting. Treatment consisted of instruction in small groups for seven weeks. Children’s performance on 9-item, researcher-developed measures indicated that each treatment group’s scores improved on the target skill (e.g., rhyming) when familiar words were presented but there was limited generalization to unfamiliar words or other PA skills.

Despite some positive findings, the results of these studies do not directly inform Tier 2 instruction because many of the studies did not specify an inclusion criterion that children demonstrate PA deficits at the onset of the study (i.e., van Kleeck, Gillam, & McFadden, 1998; Maslanka & Joseph, 2002; Justice, Chow, Capellini, Flanigan, & Colton, 2003; Bryne & Fielding-Barnsley, 1991). Other studies had inconclusive results (i.e., Koutsoftas, Harmon, & Gray, 2009; Maslanka & Joseph, 2002; O’Connor, Jenkins,
Leicester, & Slocum, 1993). However, these studies (and others) suggest several important elements for future studies. For example, programs should include: (a) instruction at the phoneme level (Lundberg, Frost, & Petersen, 1988; Nancollis et al., 2005; van Kleeck et al., 1998); (b) direct, explicit instruction (Ayres, 1995; Justice et al., 2003); (c) a combination of PA instruction and alphabet knowledge (Justice et al., 2003); and (d) limited focus on the instruction of rhyming (e.g., van Kleeck, Gillam, & McFadden, 1998).

Measurement considerations. An important, and perhaps too often overlooked, variable related to PA intervention outcome comparison is the assessments used to report results. A prominent issue related to measurement of PA in young children is the variability among tasks. For example, Yopp (1988) identified 11 unique tasks that researchers had used to measure young children’s PA skills, including sound-to-word matching and phoneme reversal. Hesdale, Herriman, and Tunmer (1984) warned that “considerable caution must be exercised in comparing the results of specific studies since the child’s assessed level of PA will depend greatly on the task” (p. 60). Furthermore, Yopp (1988) noted an additional problem because often times rhyming is the primary PA measure in intervention studies. Based on a factor analysis of phonemic awareness tasks administered to kindergarten children, she found that “rhyming ability is only minimally involved in these factors…therefore, generalizations about phonemic awareness drawn from research which focuses on rhyme tasks should be considered with caution” (p. 172). These measurement issues are important for two reasons. First, a thorough review of phonological intervention research revealed that many programs were evaluated using
research-developed measures, often measuring rhyming (e.g., Roth et al., 2002, 2006; O’Connor et al., 1993, van Kleeck et al., 1998; Bryne & Fielding-Barnsley, 1991). With such variability in measurement, it is challenging to compare the effects of different programs. Second, consumers may have difficulty predicting intervention effects on published generalized outcome measure (e.g., DIBELS, IGDIs) with established benchmarks, which a growing number of preschools programs (e.g., Head Start) and elementary schools are using to measure the early literacy skills of young children.

**Research Questions and Hypotheses**

The purpose of the present study was to evaluate the efficacy of a PA intervention designed to be delivered with small groups of preschool students. The study intent and design were based on evidence that learning to read is a developmental process during which children acquire code-focused skills. Namely, children must become sensitive to the sound structure of words and children must make the connection between sounds and letters (Adams, 1990).

In comparison to other PA interventions, the intervention under investigation holds great promise for four reasons. First, the intervention was designed for use with preschool children. Preschoolers have “little PA and hence stand to gain much from PA instruction” (Ehri et al., 2001b, p. 255). PA skills in preschool and Kindergarten are predictive of later reading achievement (Lonigan, Schatschneider, & Westberg, 2008), and it was our hope that by targeting a preschool population, participants will demonstrate better school readiness skills. Early literacy intervention is critical; children with reading difficulty at the end of first grade are at great risk for never achieving on
grade level without substantial support (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996).

Second, the instructional sequence and teaching strategies are grounded in research. The PA intervention instruction focuses on blending, segmenting, and first sound identification because there is evidence that such skills are critical for literacy development (e.g., Gillon, 2005; Nancollis et al., 2005). In addition, segmenting and blending skills are associated with greater preventive effects (Lundberg, Frost, & Peterson, 1988; Schneider, Kuspert, Roth, & Vise, 1997) and more strongly related to future reading achievement (Muter, Hulme, Snowling, & Taylor, 1997) than rhyming skills. In addition, the instruction teaches both PA skills and alphabet knowledge as opposed to isolating instruction on a single emergent literacy skill. Alphabet knowledge is associated with reading ability (e.g., Blatchford, Burke, Farquhar, Plewis, & Tizard, 1987) and has even been identified as the strongest predictor of later reading achievement (e.g., Hammill, 2004; Scanlon & Vellutino, 1996). Neither alphabet knowledge nor PA learned in isolation is sufficient for learning to read. Indeed, Wagner, Torgesen, & Rashotte (1994) caution about the “limited effects of phonological awareness training by itself on subsequent reading achievement” (p. 84). As such, teaching alphabet knowledge in combination with PA skills results in maximum literacy outcomes for children (National Early Literacy Panel [NELP], 2008).

A third promising feature of our intervention was that it was designed to be delivered in small groups for children who would benefit from targeted instruction. To date, many PA interventions were designed to be used with individual students or with
large groups or require lengthy sessions by a trained professional. Given that “there is currently no evidence from studies...that these activities done with large groups of children or that implicit PA activities (e.g., whole-group syllable-clapping activities, singing word-play songs) result in growth in children’s PA” (Lonigan, Allan, & Lerner, 2011, p. 490), small group training appears to be a logical solution and fits well within the RTI framework for a Tier 2 intervention. Our intervention was created to be implemented by any trained adult, including a paraprofessional, which is distinctly different from many other interventions that require implementation by a trained professional (i.e., speech language pathologist; e.g., Gillon, 2000; Gillon, 2005) and improves the potential breadth of delivery and consumer satisfaction.

In sum, our relatively brief, 24 to 36 day intervention was designed to promote metalinguistic awareness by addressing three important PA skills: segmenting, blending, and first part/sound identification coupled with alphabet knowledge instruction. The primary research question was:

- To what extent does this PA intervention improve at-risk preschoolers’ PA skills, specifically identification of first parts and sounds of words?

The secondary research questions were:

- To what extent does this small group intervention improve preschoolers’ alphabet knowledge skills, specifically letter-naming fluency?
- Do pretest to posttest gains on distal measures of PA support primary findings by indicating a generalization of PA?
We hypothesized that the PA intervention delivered by an adult in small groups would improve the PA skills (i.e., first sound fluency and word parts fluency) and letter-naming fluency of preschool children with identified deficits in PA. Children’s scores on the progress monitoring measures (FSF, WPF, LNF) were expected to steadily increase during the treatment condition, after children acquired the skills and as they become more fluent. In addition, we anticipated several specific effects. First, we expected a delayed effect for WPF and FSF due to the instructional sequence of the intervention. Specifically, the concept of “first” and identification of the first part of words was not introduced until Lesson 5 so we did not expect an increase in WPF scores until after children were delivered Lesson 5. Second, children’s FSF scores were not expected to increase until after groups were delivered explicit instruction on the manipulation of sounds in words (i.e., phonemes), which began in Lesson 7. Third, we expected that most children would have some fundamental letter-naming ability as a result of Tier 1 instruction prior to the intervention; however, we anticipated that children’s scores on LNF would improve as a result of the daily PA lessons. Finally, gains were expected on distal outcome measures, especially on measures that aligned well with our instruction (i.e., Sound ID IGDI) but not necessarily on measures of other PA skills (i.e., Rhyming IGDI, TOPEL PA) given that improvements in children’s PA skills do not automatically generalize to other PA skills (e.g., O’Connor et al., 1993). We were also interested in sampling information about child engagement during the lessons. Children who demonstrated low levels of engagement were expected to demonstrate poorer learning.
Although this study was designed to be an initial efficacy trial of the PA intervention, information about teachers’ perceptions of social validity and consumer satisfaction provided preliminary evidence of effectiveness and acceptability. Primarily, we sought information about whether teachers felt children’s skills improved as a result of the intervention (social validity) and whether teachers felt the intervention was appropriate and practical for implementation in their classrooms (consumer satisfaction). We hypothesized that teachers’ feedback would indicate that the intervention had high social validity and consumer satisfaction given its focus on critical early literacy skills, scripted nature, brief lessons, and engaging activities.

There are two important implications of this study. First, an efficacious intervention has the potential to enhance early literacy skills (and, by proxy, future reading skills) of preschoolers with observed delays. Second, positive results will inform future research efforts targeting PA skills. To date, there has been mixed support for instruction of PA skills with preschool children. These data have the potential to inform future efforts targeting different populations and/or modes of delivery (e.g., elementary students, whole classroom instruction), especially within an RTI framework.
Chapter 1: Method

All procedures for this study were approved by The Ohio State University Behavioral and Social Sciences Institutional Review Board (see Appendix A).

Participants

Children attending three Head Start preschool classrooms in an urban setting in the Midwest served as participants. Preschools were selected based on administrator consent. Each classroom had one lead teacher and at least one assistant teacher (lead teachers provided written consent for participation in the study). All three lead teachers had earned a four-year college degree. Two teachers reported using Teaching Strategies Gold and one teacher reported using Creative Curriculum; all teachers indicated that they used the curriculum on a daily basis. Participants received the classroom curriculum on a daily basis, which included some emergent literacy instruction. Children in two classrooms (groups A and C) attended preschool five days a week for six hours each day; children in the third classroom attended preschool four days a week for three and a half hours each day. Each classroom’s daily attendance averaged between 15 and 17 children.

Children were included in the study if they met the following criteria: (a) parent consent, (b) regular Head Start attendance (as observed during screening and as reported by classroom teachers); (c) vision and hearing within typical limits (according to Head
Start screenings); (d) at least four years old at the start of the study; and (d) demonstration of deficits on PA screening measures (i.e., a score of 5 or less on First Sound Fluency [FSF] and scores below the cut-point on the Rhyming IGDI [10 or less]). These screening measures provided evidence that the children required Tier 2 PA intervention for several reasons. First, the Rhyming IGDI was developed to identify children who might require additional instruction beyond the general curriculum and has sound psychometric properties (Bradfield, McConnell, Rodriguez, & Wackerle-Hollman, 2013). Second, we excluded some children from the study because their scores on the Rhyming IGDI and FSF were too high, which suggests that we excluded children benefiting from Tier 1 instruction. Third, our inclusion decision-making process was based on converging evidence of (a) low scores on two measures (Rhyming IGDI and FSF) and (b) low FSF scores over a period of time (i.e., screening through baseline) after a period of exposure (two to three months) to Tier 1 instruction.

We also administered the Clinical Evaluation of Language Fundamentals Preschool - Second Edition (CELF) and the Test of Preschool Early Literacy (TOPEL). The CELF provided information about children’s language skills and the TOPEL provided additional information about their early literacy skills. We intended to exclude participants with below average CELF standard scores because we wanted evidence that the children possessed adequate language skills to comprehend the instructional language of the intervention. Likewise, we intended to exclude participants with average or above average TOPEL standards scores because they demonstrated some level of mastery of early literacy skills. However, given our limited sample, we included several children
with CELF and/or TOPEL scores in these ranges. We felt justified in making these exceptions for two reasons. First, the intervention instruction is simple and repetitive with a substantial amount of adult modeling such that we expected most children to be able to participate successfully. Second, an analysis of the performance of those children who earned average or above average scores on the TOPEL indicated that they earned points for segmenting and blending at the syllable level but not at the phoneme level, which was the goal of our study.

Nine preschool children (7 girls, 2 boys) attending three different preschool classrooms qualified for inclusion in the study. Participant characteristics and screening scores are summarized in Table 1 (note: participants’ names have been changed). The children’s ages ranged from 48 months to 59 months with a mean age of 51 months. Six parents reported the ethnicity of their children as African American, two as Caucasian, and one as Latino. Two parents indicated that a second language other than English was spoken in the home, although these children’s teachers reported that they spoke English proficiently in the classroom. All but one of the parents reported having completed High School but only two parents had any post-secondary education. No parent reported any concerns with his/her child’s development. According to the children’s teachers, no participants received special education service; however, two children were referred for an evaluation for special education services during the study, one for speech concerns (Eva) and one for global developmental concerns (Teshawn).

One participant (Isabel) moved during the course of the study and one participant (Olivia) was removed from the study after repeated refusals to participate; therefore,
seven children completed the entire study. (The child who was removed from the study demonstrated behavior problems throughout the study despite our efforts to engage her in the lessons.) After an extended trial period, it was determined that the participant’s behavior was adversely affecting the engagement of the other children in the group and her removal from the study was necessary. The participant’s teacher reported that the child also demonstrated behavior problems in the classroom.

Setting

All testing and intervention sessions occurred in a room or hallway near the children’s classrooms, contingent on available space in the building. At times, there were distractions (e.g., children walking in the hall) during lessons or testing sessions; however, when this happened, the interventionist or examiner quickly redirected the students to the task. Children were directed from their classroom to the nearby, designated area with a table and chairs for daily sessions. Children participated in the intervention during non-literacy instruction time so they would not miss important classroom instruction.

Measures

Participants’ demographic and background information was obtained through a survey provided to parents/guardians with the study parent permission form (see Appendix B). Information about teacher and classroom characteristics was collected using a survey provided to teachers at the end of the study (see Appendix C). Consumer satisfaction and social validity information was also obtained from the teachers at the end of the study using a brief survey (see Appendix D) and an in-person interview.
Table 1. Participant characteristics and screening assessment scores.

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Age</th>
<th>Ethnicity</th>
<th>Parent Education</th>
<th>CELF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva</td>
<td>Female</td>
<td>53</td>
<td>African American</td>
<td>College degree</td>
<td>86</td>
</tr>
<tr>
<td>Olivia</td>
<td>Female</td>
<td>48</td>
<td>Caucasian</td>
<td>Some HS</td>
<td>100</td>
</tr>
<tr>
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<td>Female</td>
<td>49</td>
<td>African American</td>
<td>HS graduate</td>
<td>75</td>
</tr>
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Note. Names have been changed. Age is reported in months and the child’s age at the beginning of the study; CELF = Clinical Evaluation of Language Fundamental Preschool – Second Edition (Wiig et al., 2004); HS = high school.

Screening measures included the following individually administered assessments: the TOPEL, FSF, WPF, Rhyming IGDI, and Sound ID IGDI. The CELF was administered during screening as a descriptive measure. The following measures were used to examine intervention effects: FSF, WPF, and Letter Naming Fluency (LNF). The IGDIs and the TOPEL also were administered as post-tests.

**Test of Preschool Early Literacy (TOPEL).** Participants’ PA and print knowledge skills were evaluated using two subtests of the TOPEL (Lonigan, Wagner, Torgesen, & Rashotte, 2007; α = .93 [Print Knowledge] & α = .86 [Phonological Awareness]). The TOPEL is a standardized measure of print knowledge, vocabulary, and PA (mean = 100; standard deviation =15). For the current study, only the Phonological Awareness and Print Knowledge subtests were administered. The Print Knowledge subtest consists of items related to letter knowledge, letter-sound correspondence, and the use of print in text. The PA subtest consists of items related to blending (e.g., What word
do these make: horse – shoe; What word do these make: /b/ all?) and elision (e.g., Say horseshoe without shoe; Say bike without /k/.) with compound words and one-syllable words. Alpha reliability coefficients for the TOPEL ranged from .87 to .96. Criterion validity estimates ranged from .59 to .77.

First Sound Fluency (FSF). Participants’ first sound fluency skills were measured using a modified version of FSF (Dynamic Measurement Group, 2006). This measure is a one-minute task designed for Kindergarteners that asks children to produce the first sounds of orally presented, single-syllable words. There are multiple, equivalent probes of the measure, which prevents repetition of the same test items. FSF has been reported to have adequate reliability and validity for use with preschoolers (Cummings, Kaminski, Good, O’Neil, 2011). Children earn 2 points for providing the initial phoneme of a word (e.g., /k/ for cat) and 1 point for providing the initial blend of a word (/ka/), and the number of points accumulated in one minute equals the child’s total score. The maximum score for this measure is 60. A score of 10 or higher at the beginning of the Kindergarten school year is indicative of a child “at or above benchmark” according to DIBELS protocol (Dynamic Measurement Group, 2010).

Three modifications were made to the published FSF measure (see Appendix E). At the onset of the study, we reduced instruction and feedback during the sample items given the requirement of repeated testing (i.e., up to 20 test sessions) in our study design. The original FSF measure includes three sample items to which the child is asked to respond with up to two rounds of corrective feedback for each item. To reduce the possibility of children learning and/or becoming fatigued from so much feedback, we
reduced the sample items to two examples modeled by the examiner (i.e., no child responses and no corrective feedback).

Second, midway through the study (i.e., week 8 of treatment for Group A), we observed that although participants were able to do the tasks during the lessons, their progress monitoring scores did not all reflect substantial gains. Therefore, two additional sets of sample items (and rotated them between test sessions) were added because the original sample items had been repeated so many times (i.e., 9) with the hope that novel items might help cue the children to the task. Additional sample items were chosen based on perceived difficulty and familiarity.

Finally, some additional modifications were made late in the study for two participants (Eva and Teshawn) who appeared to have a testing transfer problem (i.e., they were able to do the tasks during the lessons but demonstrated a pattern of responding in whole words from the onset of the study). To ensure children responded to the correct assessment stimuli and not to extraneous variables or restricted patterns of responding, we included three “practice” items from the lessons for the child after the examiner modeled the three sample items (as before). The child received minimal feedback from the examiner on these practice items, after which they examiner immediately started delivering test items (i.e., we omitted the introductory testing language to maintain the flow).

**Word Parts Fluency (WPF).** Participants’ initial word part fluency was assessed using a modified version of WPF (under development at Dynamic Measurement Group; Kaminski & Powell-Smith, 2011). This measure is a one-minute task designed for
preschoolers that asks children to produce the first parts of orally presented, two-syllable words. Unlike FSF, on WPF children earn 1 point for producing either the first syllable, blend, or phoneme of each word (e.g., /peng/, /pe/, or /p/ for penguin), and the number of points accumulated in one minute equals the child’s total score. The maximum score for this measure is 18. No benchmarks have been established for this measure yet.

We made the same modifications to WPF as we did to FSF (see Appendix E). That is, the published WPF measure includes three sample items to which children are asked to respond with up to two rounds of corrective feedback for each item. Initially, we reduced the sample items to two examples modeled by the examiner (i.e., no child responses and no corrective feedback). Midway through the study, we added two more sets of sample items into the rotation for all participants; additional sample items were chosen based on perceived difficulty and familiarity. We made the same changes to WPF for Eva and Teshawn as we did for FSF.

**Letter Naming Fluency (LNF).** Participants’ letter naming fluency was measured using LNF (Good & Kaminski, 2002). This standardized, individually administered task measures children’s ability to quickly and accurately name letters of the alphabet. Children are presented with a page of randomized upper- and lower-case letters and asked to tell the examiner the names of the letters. This measure is timed; children earn one point for each letter that they correctly identify in one minute. The maximum score for this measure is 52. This measure was designed for use with Kindergarteners and has strong alternate-form reliability (.88; Good et al., 2004). A score of 8 or higher at the beginning of the Kindergarten school year is indicative of a
child “at or above benchmark” according to DIBELS protocol (Dynamic Measurement Group, 2010).

**Rhyming Individual Growth and Development Indicators (IGDI).**

Participants’ rhyme identification skills were assessed using the Rhyming IGDI 2.0 (currently under development by researchers at the University of Minnesota; Bradfield, Wackerle-Hollman, Albano, & Rodriguez, 2011). The Rhyming IGDI is a 15-item measure that involves the examiner pointing to and naming three or four pictures on the card, then asking the child to identify which words (or pictures) rhymed (i.e., “Bees, cheese, cat. Which two rhyme?”). This measure was untimed and had a maximum score of 15. The reported estimate of internal consistency based on congeneric reliability was 0.90 (Bradfield et al., 2013). Concurrent construct-related validity correlation with the TOPEL-PA was .49.

**Sound ID IGDI.** Participants’ letter-sound correspondence was assessed using the Sound ID IGDI 2.0 (currently under development by researchers at the University of Minnesota; Bradfield, Wackerle-Hollman, Albano, & Rodriguez, 2011). The Sound ID IGDI is a 15-item measure that involves an examiner showing the child a stimulus card with three letters printed in a row and asking the child which letter makes a target sound (i.e., “Which letter makes the sound /f/?”). This measure was untimed and had a maximum score of 15. The reported estimate of internal consistency based on congeneric reliability was 0.81 (Bradfield et al., 2013). Concurrent construct related validity correlation with the TOPEL-PA was .71.

Participants’ general language skills were measured using the CELF Preschool-2 (Wiig, Secord, & Semel, 2004), which is a standardized, norm-referenced measure of children’s language skills. This measure was developed for use with children 3;0 to 6;11 years old. Standard scores in the average range fall between 85 and 115. For the purposes of this study, three core subtests were administered: Sentence Structure, Word Structure, and Expressive Vocabulary. For this measure, the range for internal consistency was reported as .73 to .96 and test-retest reliability for subtests was reported as .77 to .92 (Wiig, Secord, & Semel, 2004).

Child engagement. Child engagement was calculated using a researcher-developed checklist that was divided into lesson activities (the number of which varied by lesson). Trained researchers completed the checklist while reviewing a video of a lesson and awarded each child 0, 1, or 2 points for attention (0 = poor, 2 = undivided) and participation (0 = minimal, 2 = active) during each activity. The maximum value that a child could earn for each activity was 4 points. The total possible points were divided by the child’s earned points and multiplied by 100 to determine the engagement percentage. Approximately 15% of the lessons, balanced across groups, were reviewed for engagement.

Measurement protocol and reliability. Trained researchers administered and scored all measures. Screening and post-testing measures were administered in multiple sessions, depending on the needs of the child. All assessment sessions of key measures (i.e., FSF, WPF, LNF) were audio recorded. To calculate scoring reliability for FSF and
WPF, 20% of all assessments (from Baseline, Treatment, and Maintenance) were randomly selected and scored by an additional scorer. The additional scorer was the other interventionist, which we recognize introduces the potential for bias; however, all scorers participated in a check-out procedure to ensure accuracy of scoring. Inter-observer agreement (IOA) was calculated on an item level by taking the total number of agreements divided by the total number of agreements plus disagreements, multiplied by 100. Mean IOA was 95% for FSF and 98% for WPF. IOA of LNF was difficult to calculate without a videotape (or live fidelity check) because it was difficult to determine what letter (on a printed sheet) a child was naming. The single probe reliability for LNF is between .89 and .94 (Dynamic Measurement Group, 2008).

Materials and Instruction

The OSU CRTIEC 1 research team developed a series of PA lessons teaching blending, segmenting, first part identification, and first sound identification of words. The intervention consists of 12 units of lessons, with 3 lessons in each unit (e.g., 1A, 1B, and 1C) for a total of 36 lessons. The lessons within a unit contain the same instructional language but different instructional items so that children were exposed to multiple exemplars to promote generalization of the skills. The lessons are designed to be brief (i.e., less than 15 minutes) and engaging. The instruction across units includes examples of different kinds of words, including compound, two syllable, single syllable words, and words with simple and complex initial sounds/parts. Intervention materials include (a) a script for the interventionist to teach the skills, (b) scripted instructions for providing

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1 This work was supported in part by Grant R324C080011, the Center for Response to Intervention in Early Childhood, from the Institute of Education Sciences (IES), U.S. Department of Education.
feedback to a group during activities that ask children to respond, and (c) lesson materials (e.g., printed pictures) for lesson activities.

The instruction in the PA lessons is grounded in research in several ways. First, the scope and sequence was carefully developed based on how children acquire PA (see Appendix F). The units are sequenced systematically so that larger components of words (e.g., syllables) are taught first, followed by increasingly smaller components (e.g., phoneme; Lonigan, Burgess, & Anthony, 2000). Second, each lesson introduces a letter and its sound and reviews previous letters/sounds, because children’s emergent literacy skills develop best when they are exposed to both PA and alphabet knowledge (Ehri et al., 2001b). To further support alphabet knowledge development, several lessons later in the sequence (e.g., Lesson 7) include activities printed words and instruction that connects sounds of spoken words to the printed letters. Finally, PA skills (i.e., blending, segmenting, and first sound identification) are taught simultaneously to help develop metalinguistic abilities. Metalinguistic abilities “enable one to reflect on and manipulate the structural features of spoken language” (Tunmer, Herriman, & Nesdale, 1988, p. 136) and require a person to actively process features of spoken language, unlike other automatic language processing abilities.

All lessons include short games to help maintain the children’s attention and engagement. Games include the use of pictures of lesson items, “bingo” cards, hand and body movements (e.g., clapping, stretching), singing songs, etc. Several teaching strategies associated with positive outcomes for children (Joyce & Weil, 1996; Archer & Hughes, 2011) were employed during instruction. First, the instruction was carefully
created using the strategic use of models (e.g., “Listen to me say the parts of the word”), leads (“Say the parts of the word with me”), and tests (“What are the parts of the word?”) to prevent errors. Second, children had frequent opportunities to respond and practice the skill(s). Specifically, children were encouraged to respond twice for each letter presented during the alphabet knowledge portion of the intervention at the beginning of the lesson, to approximately 12 target PA instructional items (with up to 2 additional opportunities per item if the children responded incorrectly or didn’t respond), and imitatively to frequent (e.g., 20 times) models (e.g., “Say /p.”) throughout each lesson.

Third, following each opportunity to respond, the interventionist read scripted feedback contingent on the children’s responses. The differential types of feedback were as follows: when children responded correctly, the interventionist confirmed the answer and continued with the lesson; if a child responded incorrectly, the interventionist modeled the correct response, asked the group to repeat the correct response, and re-presented the item; or if the child did not respond, the interventionist modeled the correct response and re-presented the item. The feedback was delivered to the group, and for this reason, the most intensive feedback was always used (i.e., if one child responded incorrectly and one child did not respond, the feedback for an incorrect response was delivered). See Appendix G for a lesson script with examples of corrective feedback.

Child engagement was a high priority during instruction because high engagement is associated with learning (Brophy, 1986). The interventionists employed systematic ways of increasing and maintaining child engagement, including the use of “stamp strips” (on which each child earned stamps if he/she was participating), game boards (on which
each child could move a game piece if he/she was participating), verbal praise, and special jobs (e.g., choosing the stamp). Reinforcement was provided for participation and not accuracy of responses. Despite our efforts, child engagement was a challenge during the study. There were several factors that affected child engagement that were out of our control, including when we were able to work with children (e.g., sometimes they missed gross motor time in the gym) and the location of our intervention (e.g., we often had to work in the hallway). We report on child engagement data in the Results section.

Midway through the intervention (i.e., about week 8 of treatment for Group A) we added a data collection portion to the end of each lesson. These data served two purposes. First, we had observed that some children had difficulty transferring the skills they learned in the lessons to the progress monitoring measures, and we wanted some objective evidence to confirm these observations. Second, these data provided us with some information about the difficulty level of particular lessons across participants. This “end-of-the-lesson” data collection portion included the interventionist asking each child to respond independently to two items (“What’s the first sound you hear in the word barn?”), recording their responses, and providing minimal feedback (i.e., “Yes” or the correct answer).

**Experimental Design**

This study used a multiple-baseline design across groups of children to evaluate the effects of the Tier 2 PA intervention on children’s first sound identification. We choose this design for two reasons. First, single-case research “allow[s] confirmation of a functional relationship between manipulation of the independent variable and change in
the dependent variable” (Horner et al., 2005, p. 168), especially because threats to interval validity are minimized (Martella, Nelso, & Marchand-Martella, 1999). If baseline data are assumed to predict future performance if the treatment is not initiated, then the gains we observe after the treatment is introduced give us confidence that the treatment was responsible for the skill growth. In addition, the treatment will be introduced in a staggered fashion and if similar improvements are replicated across participants, we can accept this as strong evidence for a functional relationship between the treatment and behavior change. As such, multiple baseline designs are “particularly well-suited to literacy research” (Kucera & Axelrod, 1995, p. 47). Second, single-case research allows for careful examination of individual differences. For example, Swanson and Sachse-Lee’s (2000) meta-analysis of 85 single-case research design studies indicated that such designs were exceptionally useful in identifying factors that influence student learning. Single-case research will allow us to frequently analyze each child’s performance to determine progress, which models data-based decision making, a key facet of an RTI model (Fuchs & Fuchs, 2006).

There were three intervention conditions: baseline, treatment (i.e., PA instruction), and maintenance. The primary dependent variable was FSF, and WPF was used as a secondary outcome measure. Although FSF was developed for use with Kindergarteners, we opted to use it as our primary outcome measures because first sound identification is a common indicator of readiness to read (Gillon, 2005), and we felt that it would signify stronger PA development than simply blending and segmenting.
Procedures

Baseline. Baseline data collection was initiated at the same time for all participants. During this time period, children were not exposed to any treatment materials but participated in regular classroom instruction. All participants were administered a series of baseline measures to evaluate their first sound fluency (i.e., FSF), word part fluency (i.e., WPF), and letter-naming fluency (i.e., LNF). To reduce testing fatigue and the potential for learning due to repeated testing, children were tested in a multiple probe fashion during the baseline condition.

The baseline condition involved multiple assessments for each group; Group A (Eva and Courtney) participated in 3 baseline points, Group B (Teshawn and Andre) participated in 6 baseline points, and Group C (Kaylee, Anna, and Cristina) participated in 9 baseline points. Groups were randomly selected for the initiation of the treatment condition, which was staggered after each group completed the appropriate baseline points and after the preceding group completed two treatment data points (for Groups B and C). The three groups were randomly assigned to treatment starting points (and baseline lengths) for two reasons. First, the preschool schedule restricted the time frame in which to complete our study, limiting the potential for a long baseline. Second, we expected differential treatment effects for the individual children, making it difficult to determine adequate growth during treatment for a triad. Data points were concurrent across groups when applicable (e.g., the first 3 baseline points for each group).

Treatment. Following baseline, the PA intervention was introduced in a staggered fashion to groups of three children. The treatment consisted of the
interventionist reading the script with lesson instructions. Each lesson lasted about 7 to 15 minutes. The lessons were not conducted unless at least two of the three children in a group are present on a particular day so that it was always delivered in a small group instead of individually. Children did not receive “make-up” lessons if they were absent on a day when a lesson occurred.

Delivery of lessons was somewhat flexible depending on the needs of the group. That is, the interventionist always delivered two versions of each of the 12 units (e.g., 1a and 1b) to each group, and, depending on the participants’ mastery of relevant skills, the interventionist chose to deliver the third lesson in that unit (e.g., 1c) or move onto the next lesson (e.g., 2a). Mastery was monitored by the children’s performance on the last three instructional items of the “b” version of a lesson (i.e., the interventionist recorded if children’s responses were correct). If all children in a single group responded correctly to two of the last three items, then the interventionist did not deliver the third lesson of the unit. On the other hand, if any or all of the children did not demonstrate mastery (i.e., incorrect responses on 2 of the last 3 items), the third lesson of the unit (e.g., 1c) was conducted on the subsequent day.

All participants were administered the three progress monitoring assessments every fourth day during the treatment condition (after 3 lessons, regardless of which lessons were delivered). WPF, FSF, and LNF were administered to measure progress. Midway through the treatment (i.e., about week 10 of treatment for Group A), we observed that participants were having difficulty transferring the skills that they had learned during the lessons to the progress monitoring measures. Therefore, we initiated a
brief curriculum-based probe before each progress monitoring session to try to cue them to the task using familiar language and activities. These probes consisted of three test items drawn from the instruction in the previous lesson and two additional (novel) items using instructional language from the lessons. An example of the curriculum-based probe follows:

*I'm going to help you figure out the first sound of a word. You tell me the first sound you hear. Listen: sunshine (1) sun (1) /s/. (Hold hands apart and move closer for each part.) What's the first sound? (2) Yes OR /s/. Now we need to figure out the first sounds of some words. I'll try one first. Listen to a word: sock. The little parts of the word are /s/ (1) /ok/. The first sound of the word sock (hold hands apart) is /s/. (Move hands closer.) Now it's your turn. What are the little parts of the word bug? (2) (Yes OR /b/ (1) /ug/.) What's the first part of the word bug (hold hands apart)? Yes OR /b/. (Move hands closer).

The entire treatment condition lasted between 10 and 15 weeks (i.e., 26 to 38 treatment days and progress monitoring testing every fourth day). The treatment condition lasted longer than expected due to children’s absences, scheduled preschool events that interfered with our ability to conduct the lessons, and the need for repeated lessons for two groups. We repeated several lessons (i.e., 10a, 11a, 12a) at the end of the lesson sequence with Groups A and B because several participants’ scores were low or unstable.

**Maintenance.** After groups completed the treatment condition of the intervention, we conducted three or four progress monitoring sessions with each child. These test
sessions were conducted on different days and at least 2 weeks after the final lesson was delivered to the respective group. Three participants (Eva, Anna, and Teshawn) demonstrated inconsistent and/or low performance (relative to their scores during treatment) during maintenance testing, so we collected a fourth data point for them.

**Treatment and assessment integrity.** Two doctoral students in human development with Master’s degrees in education or speech and hearing science served as interventionists and examiners. Prior to data collection and program implementation, they were trained and participated in a check-out process in which they demonstrated an adequate level of skills determined necessary for each component of the study by achieving 100% on both checklists. All components of the study protocol are described in a manual.

Treatment integrity was monitored throughout the study using video recordings. A portion (20%) of the total number of treatment sessions (20/98) was recorded so that an independent observer could document fidelity of treatment. Video recorded sessions were balanced across interventionists, groups of participants, and lessons. A trained researcher reviewed the videos for key intervention criteria (related to setup and implementation) using an eight-item, researcher-developed checklist. Mean percent of steps completed correctly was 97 with a range of 88 to 100. Assessment integrity of WPF and FSF was evaluated by trained researchers using a researcher-developed checklist (related to testing language, timing, and prompts) on a randomly selected 20% of the test sessions. Mean percent of administration steps completed correctly was 99 (range = 83-100) for WPF and 98 (range = 83-100) for FSF during the reviewed sessions.
Chapter 2: Results

Treatment dosage varied by group (contingent on the need for the extra “C” lesson or repeated lessons) and participant (depending on attendance). Group A received 38 lessons, Group B received 34 lessons, and Group C received 26 lessons. Five participants (i.e., Eva, Anna, Teshawn, Andre, and Cristina) participated in 96% to 100% of the lessons but Courtney and Kaylee were only in attendance for 53% and 62%, respectively.

Children’s FSF and WPF scores are presented in Figures 1 and 2, which includes a graph of each participant’s scores during baseline, treatment, and maintenance conditions (separated by solid lines). FSF or WPF scores are on the y-axis; the x-axis indicates the test session. Phase changes during the treatment condition (e.g., instruction at the syllable versus phoneme level) are indicated by dashed lines. Extra data were collected for several participants (i.e., Eva, Teshawn, Anna) at the end of the treatment and/or maintenance phase because their performance on WPF or FSF was inconsistent. Overall, the graphs suggest that all seven children made substantial gains in FSF. Also, the five children who had not mastered WPF during baseline improved from baseline to treatment.
Figure 1. First Sound Fluency (FSF) scores.
Figure 2. Word Parts Fluency (WPF) scores.
In general, participants demonstrated low and stable baseline performances for FSF (our primary outcome variable), with the exception of Anna, who showed some growth and ended the baseline condition with a score of 9. Although FSF was our intended primary outcome, instruction on identification of first sounds of words was not initiated at the onset of the treatment condition but after several lessons on segmenting and blending (i.e., Lesson 7), which is indicated by the dashed vertical lines on Figures 1 and 2. Courtney, Andre, Kaylee, and Cristina demonstrated an increase in FSF scores following the start of instruction on identification of first sounds. Improvements were not detected on FSF and WPF for Eva and Teshawn; their performance during progress monitoring sessions was not consistent with their performance during the lessons. For example, Teshawn and Eva earned very low scores on FSF on early progress monitoring probes; however, they accurately responded to 84% and 71% (respectively) on our “end-of-the lesson” items during lessons 11 (a and b) and 12 (a and b), which were very similar to FSF. Given the flexibility of single-case research designs, it was possible to problem solve and make necessary adjustments. As such, we made some changes to the testing language for progress monitoring measures, as indicated on Figures 1 and 2. Immediately after we made these minor changes, Eva and Teshawn’s scores dramatically increased. This is an example of data-based decision making that is essential to an RTI model and was possible in this study because of the design.

All seven participants performed at or above the benchmark for the beginning of Kindergarten (i.e., 10) on FSF during at least 3 progress monitoring sessions at the end of
the treatment condition. A score of 10 or higher on FSF is indicative of a child “at or above benchmark” according to DIBELS protocol (Dynamic Measurement Group, 2010), which suggests that children with such scores will not require additional literacy instruction beyond the core curriculum. WPF (a secondary outcome measure) baseline scores were, in general, higher and less stable than FSF baseline scores. Some children’s (i.e., Kaylee, Anna) performance indicated mastery of the skill (i.e., scores at or near the maximum score [18]) during baseline. Three participants (i.e., Eva, Teshawn, Andre) were unable to do the task at all during the baseline condition, but their scores indicated skill growth during the treatment condition.

Participants’ LNF scores are presented in Figure 3. Most participants’ (i.e., Eva, Courtney, Kaylee, Anna, Cristina) scores were not stable or demonstrated an upward trend during baseline. These data suggest that most children had some fundamental letter naming skills even before the treatment condition was initiated. Only Teshawn and Andre demonstrated relatively low and stable LNF baselines, and, of these two participants, only Andre demonstrated a positive slope during the treatment condition.

Six measures were administered at pre- and post-treatment: Rhyming IGDI, Sound ID IGDI, TOPEL (PA and Print Knowledge subtests), WPF, FSF, and LNF. Means of baseline scores and treatment scores were calculated separately to evaluate any increase in level. Post-test scores for WPF, FSF, and LNF were calculated by averaging the final three data points in the treatment condition, because we felt this was an accurate reflection of their skills (compared to the mean of all treatment points or the final data
Figure 3. Letter Naming Fluency (LNF) scores.
Table 2. Gains on pre- and post-test measures.

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</table>

|M  | 0.6 | 19.4 | 18.6 | 0.8 | 14.5 | 14 | 7.2 | 23.2 | 17.1 | 3.9 | 8.4 | 6 | 7.9 | 9.4 | 0.4 | 87.3 | 8.4 | 6 | 98.8 | 106.4 | 8.4 |
|SD | 0.9 | 4.8  | 4.8  | 1.6 | 4.4  | 4.1 | 3.4 | 13.4 | 11.6 | 4.2 | 2.9 | 5.1 | 3.2 | 3.6 | 3.2 | 14 | 2.9 | 5.1 | 15.1 | 13.9 | 7.5 |

Note. Gains are over a period of 28 to 36 daily treatment sessions. FSF = First Sound Fluency (Dynamic Measurement Group, 2006); WPF = Word Parts Fluency (Kaminski & Powell-Smith, 2011); LNF = Letter Naming Fluency (Good & Kaminski, 2002); IGDI = Individual Growth and Development Indicators (McConnell et al., in press); TOPEL PA and PK = standard score on PA and Print Knowledge subtests of the Test of Preschool Early Literacy (Lonigan et al., 2007); Post and Gain scores (M and SD) are calculated without Olivia’s and Isabel’s scores because they did not complete treatment.

a Mean of final 3 intervention data points.

b First progress monitoring data point.
point). All participants who completed the treatment condition demonstrated discernable gains on WPF and FSF (see Table 2). Six of the 7 children made gains of 10 or more on WPF (only Teshawn did not), and all of the children made gains of at least 15 (and as much as 26.7) on FSF. The average gain for WPF was 14.0 and was 18.6 for FSF. All but one of the seven children made gains on LNF (only Teshawn did not); however gain scores for LNF were less consistent. Two children (i.e., Courtney and Anna) made gains of about 9, but the other four children, whose LNF scores improved, demonstrated gains of 23 or more. The average gain for LNF was 17.1. All but one of the participants consistently performed at or above the benchmark for the beginning of Kindergarten (i.e., 8) on LNF (only Teshawn did not).

Means of participants’ FSF, WPF, and LNF scores in baseline, treatment, and maintenance conditions are presented in Table 3. In general, these data confirm gains from baseline to treatment for all participants on all three measures with the exception of Teshawn’s LNF scores. Each participant’s mean maintenance score for FSF, WPF, and LNF was within three points of (or higher than) his/her treatment score, with the exception of Teshawn’s WPF score and Eva’s LNF score. All participants’ mean maintenance scores for FSF and LNF were above the benchmark for the beginning of Kindergarten (i.e., 10, 8, respectively) with the exception of Teshawn’s LNF score.

Six of the seven children who completed the treatment condition improved on the Rhyming IGDI (only Teshawn did not), four improved on the Sound ID IGDI (Courtney, Kaylee, and Anna did not), and 4 improved on the PA subtest of the TOPEL (Courtney, Cristina, and Andre did not). Teshawn’s TOPEL PA score improved 11 points and Anna’s score improved 16 points; such dramatic gains indicate that these children made
progress more quickly than expected with typical development. The average gains were 6.0 for the Rhyming IGDI, 0.4 for the Sound ID IGDI, and 3.1 for the PA subtest of the TOPEL. (It is worth noting that Andre had difficulty attending and participating during the post-test of the TOPEL; the score reported appears to be a low estimate of his abilities.)

Table 3. Means of baseline, treatment, and maintenance data.

<table>
<thead>
<tr>
<th></th>
<th>BL</th>
<th>FSF</th>
<th>T⁰</th>
<th>M</th>
<th>BL</th>
<th>WPF</th>
<th>T⁰</th>
<th>M</th>
<th>BL</th>
<th>LNF</th>
<th>T⁰</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva</td>
<td>0</td>
<td>15.0</td>
<td>13.8</td>
<td>0</td>
<td>15.7</td>
<td>17.0</td>
<td>10</td>
<td>33.3</td>
<td>23.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtney</td>
<td>.3</td>
<td>13.7</td>
<td>29.7</td>
<td>9.0</td>
<td>17.0</td>
<td>16.3</td>
<td>2</td>
<td>10.7</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaylee</td>
<td>2.3</td>
<td>23.7</td>
<td>22.3</td>
<td>13.7</td>
<td>18.0</td>
<td>15.7</td>
<td>5</td>
<td>35.7</td>
<td>37.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anna</td>
<td>3.9</td>
<td>15.7</td>
<td>13.3</td>
<td>13.3</td>
<td>16.7</td>
<td>17.8</td>
<td>8</td>
<td>18.7</td>
<td>20.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cristina</td>
<td>0</td>
<td>20.0</td>
<td>25.0</td>
<td>.4</td>
<td>17.7</td>
<td>17.7</td>
<td>9</td>
<td>32</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teshawn</td>
<td>0</td>
<td>20.7</td>
<td>17.8</td>
<td>0</td>
<td>7.0</td>
<td>2.5</td>
<td>3</td>
<td>1</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andre</td>
<td>0</td>
<td>26.7</td>
<td>36.0</td>
<td>0</td>
<td>9.7</td>
<td>10.0</td>
<td>6</td>
<td>31.3</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. FSF = First Sound Fluency (Dynamic Measurement Group, 2006); WPF = Word Parts Fluency (Kaminski & Powell-Smith, 2011); LNF = Letter Naming Fluency (Good & Kaminski, 2002); BL=baseline, scores are the mean of the baseline data points; T=Treatment; scores are the mean of final 3 intervention data points; M=maintenance, scores are the mean of the maintenance data points.

a Mean of final 3 intervention data points.
b First progress monitoring data point.

Effect sizes were calculated using partial eta squared, which compared the pre-test and post-test means of the within-subjects group design. Results indicated significant values for FSF, F(1,6) = 107.21 , p < .01, η² = .947, WPF, F(1,6) = 94.695 , p < .01, η² = .932, the Rhyming IGDI, F(1,6) = 9.818 , p < .05, η² = .621, and the Print Knowledge subtest of the TOPEL, F(1,6) = 6.807 , p < .05, η² = .532. Although these effect sizes may be inflated because of the small n, these would be considered large effect sizes (Fritz, Morris, & Richler, 2012). Effects were not significant for the Sound ID IGDI,
F(1,6) = .129, p = .732, η² = .021, or the PA subtest of the TOPEL PA, F(1,6) = .916, p = .375, η² = .132.

Nonoverlap of All Pairs (NAP) scores was calculated to estimate effect sizes for the multiple baseline design data. These results are summarized in Table 4. We chose to use NAP because of its application to single-case experimental data and its advantages over other single-case design overlap-based effect sizes analyses (especially, percent of nonoverlapping data [PND]; Parker & Vannest, 2009). NAP was calculated by totaling the overlap of each baseline point with all treatment and maintenance points divided by total possible overlap pairs. Parker and Vannest (2009) suggested describing effects using NAP values as “weak” (0-.65), “medium” (.66-.92), and “large/strong” (.93-1.0); therefore, we observed large effects for FSF for Anna and Cristina and medium effects for Eva, Courtney, Teshawn, Andre, and Kaylee. Effect sizes for WPF were large for Courtney and Cristina, medium for Eva, Teshawn, Andre, and Kaylee, and weak for Anna. Average NAP values for both FSF (.86) and WPF (.78) fell in medium effects range. Accounting for trends in the data, the effects do not appear as strong for WPF for Anna and Kaylee.

Child Engagement

Percentages of children’s time engaged during approximately 15% of the lessons are presented in Table 5. On average, most children were engaged at least 81% of a lesson. However, we observed variability in children’s engagement across lessons. For example, the range of Anna’s engagement was 50 to 100%. We offer three explanations for the variability in scores and occasional low rates of engagement. First, the time
during the school day (e.g., during gym activities) and location of our lessons (e.g., the hallway) adversely affected children’s engagement due to distractions. Second, some children appeared bored when the instruction focused on a skill they had already mastered. Finally, teachers reported that they did not regularly deliver small-group instruction in the classroom, so some children may not have been accustomed to the demands (e.g., attending and responding) of structured instruction.

Table 4. Nonoverlap of All Pairs (NAP) Values for FSF and WPF.

<table>
<thead>
<tr>
<th></th>
<th>NAP</th>
<th>FSF</th>
<th>WPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva</td>
<td>.79</td>
<td>.68</td>
<td></td>
</tr>
<tr>
<td>Courtney</td>
<td>.83</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>Teshawn</td>
<td>.82</td>
<td>.74</td>
<td></td>
</tr>
<tr>
<td>Andre</td>
<td>.77</td>
<td>.73</td>
<td></td>
</tr>
<tr>
<td>Kaylee</td>
<td>.90</td>
<td>.74</td>
<td></td>
</tr>
<tr>
<td>Anna</td>
<td>.94</td>
<td>.64</td>
<td></td>
</tr>
<tr>
<td>Cristina</td>
<td>.96</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>.86</td>
<td>.78</td>
<td></td>
</tr>
</tbody>
</table>

*Note. NAP values = “weak” (0-.65), “medium” (.66-.92), and “large/strong” (.93-1.0; Parker & Vannest, 2009); FSF = First Sound Fluency (Dynamic Measurement Group, 2006); WPF = Word Parts Fluency (Kaminski & Powell-Smith, 2011).*

Table 5. Participants’ engagement during lessons.

<table>
<thead>
<tr>
<th></th>
<th>Mean Percent Engaged</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva</td>
<td>89</td>
<td>75-100</td>
</tr>
<tr>
<td>Courtney</td>
<td>88</td>
<td>81-94</td>
</tr>
<tr>
<td>Kaylee</td>
<td>75</td>
<td>50-90</td>
</tr>
<tr>
<td>Anna</td>
<td>79</td>
<td>50-100</td>
</tr>
<tr>
<td>Cristina</td>
<td>85</td>
<td>70-100</td>
</tr>
<tr>
<td>Teshawn</td>
<td>74</td>
<td>63-85</td>
</tr>
<tr>
<td>Andre</td>
<td>78</td>
<td>65-90</td>
</tr>
</tbody>
</table>
Consumer Satisfaction and Social Validity

Consumer satisfaction and social validity information was collected through a teacher survey (see Appendices B & C) and an in-person interview with all three preschool teachers; both the survey and interview were completed at the end of the study. The 5-question survey asked about the benefits of the PA intervention and the application of its use with preschoolers; each question was presented using a six-point Likert item (1=strongly disagree, 6=strongly agree). In general, teachers indicated that they “agreed” or “strongly agreed” with all of the statements, suggesting positive reactions to the intervention. Teachers’ responses during the interviews indicated that they felt that content of the intervention was appropriate for use with their students and that they would like to implement such an intervention in their classrooms. However, teachers reported that they were concerned they would not be able to deliver the intervention regularly to a small group of children unless they had more support in the classroom (i.e., another assistant teacher).
Chapter 3: Discussion

The purpose of this study was to evaluate the efficacy of a PA intervention delivered by an adult to small groups of preschool children. Results supported our primary hypothesis that children identified with deficits in PA would make gains on both primary and secondary progress monitoring measures of PA during the treatment condition. Children’s gains on FSF (our primary outcome measure) were the strongest. FSF baseline data provided evidence that the children’s first sound fluency skills were low and not showing improvement prior to treatment. As expected, all seven participants demonstrated discernable gains on FSF during the treatment condition, especially after explicit instruction on identification of first sounds was initiated (i.e., Unit 7). Data from the secondary measure (WPF) supported the finding that children’s PA skills increased; all of the children whose WPF were low in baseline demonstrated gains during treatment. As hypothesized, children became more fluent on these tasks throughout the treatment condition. Maintenance FSF and WPF data (collected three to four weeks after the final lesson) suggested that children maintained the PA skills that they learned during lessons. In general, study results indicate that the Tier 2 PA intervention is an effective method of improving identification of first sounds and first parts with preschool children who are not able to do these tasks. It is plausible to conclude that as a result of the PA intervention, these children may not require additional PA instruction beyond the general
classroom instruction (i.e., Tier 1) following the treatment.

Results also supported our hypothesis that the children would make gains on distal measures of early literacy skills. Specifically, partial eta squared (effect sizes) values indicated significant effects on many pre-test and post-test measures (e.g., FSF, WPF, LNF, TOPEL [Print Knowledge], Rhyming IGDI), confirming that children made gains in PA. One surprising finding was that children demonstrated gains on the Rhyming IGDI instead of the Sound ID IGDI. We did not anticipate that children’s PA skills would generalize to tasks not explicitly taught in the PA intervention. It is possible that the Rhyming IGDI gains that we observed were a function of typical maturation, which would have been apparent with comparison group data. Minimal gains on the Sound ID IGDI could be explained by the fact that the measure tested only a limited number of letter sounds (i.e., 10) and most of the letters did not overlap with the letter sounds taught in the PA intervention.

We hypothesized that we would not observe substantial gain on the PA subtest of the TOPEL, and results confirmed this hypothesis, which we explain with two possible reasons. First, PA items on the TOPEL did not align with the PA intervention instruction, and, second, the skills that children gained as a result of the PA intervention did not generalize to PA skills not explicitly taught (e.g., elision). Future research efforts could focus on whether the development of some PA skills (e.g., segmenting) generalize to other PA skills (e.g., rhyming) in preschoolers and the development of PA measures to use with preschoolers.

Unfortunately, results did not confirm that the PA intervention was responsible for children’s gains in letter-naming fluency skills, as hypothesized. We offer two
explanations for this finding. First, LNF did not align well with the PA intervention instruction. LNF measures children’s identification of all alphabet letters and fluency of letter identification; however, the alphabet knowledge instruction embedded in the PA intervention focused on only a limited number of letters (i.e., 11) and also on letter-sound correspondence. Second, teachers reported teaching letter names and sounds as part of the classroom curriculum, which confounded the effects of the PA intervention. As expected, many children had some fundamental letter-naming skills before the start of the treatment condition. As such, LNF scores are hard to interpret in the context of our intervention. Future research efforts with the PA intervention could include a measure that provides evidence of children’s ability to identify the letter names and letter sounds of the letters taught in the PA intervention.

In addition, the study provided preliminary evidence of children’s engagement during the lessons and several classroom teachers’ feedback about the intervention. Children’s average percent of engaged time during lessons was 81%; however, engagement varied between lessons. Contrary to expectations, levels of engagement did not appear to be a strong predictor of performance on outcomes measures. For example, both Eva and Courtney demonstrated high levels of engagement but Eva demonstrated delayed effects on progress monitoring measures. On the other hand, we observed lower levels of engagement for Teshawn and Andre, and although both boys demonstrated low scores during early progress monitoring sessions, Andre demonstrated remarkable gains weeks prior to Teshawn. One explanation for these inconsistencies is that there is
another variable (e.g., opportunities to practice a skill) that is more predictive of outcomes than engagement for particular children.

Three classroom teachers’ feedback indicated high consumer satisfaction and social validity, which boosts our expectation of potential use by teachers in preschool classrooms. We recognize some teachers may have difficulty implementing the intervention in their classes given limited staff, demanding schedules, and minimal experience delivering interventions; however, we are optimistic about classroom use based on teacher consumer satisfaction information. Some advantages of the PA intervention include that it was designed to be delivered in small groups, lessons are scripted, and each lesson takes less than 15 minutes to deliver. In addition, optional “C” lessons allow teachers some control in the pacing of instruction, and data are easily collected at the end of each lesson that regularly inform teachers about children’s progress.

**Possible Outcome Predictors**

A careful examination of children’s individual differences related to their performance during the study revealed only one meaningful pattern. That is, children who demonstrated early growth on or mastery of WPF seemed to demonstrate progress earlier on FSF than children whose WPF scores improved midway or later in the treatment condition, which is consistent with the development of PA skills (i.e., an understanding of larger units of words precedes an understanding of phonemes). Conversely, other individual differences did not seem to predict performance. For example, pretest TOPEL PA scores did not appear linked to children’s performance on
FSF or WPF, given that Anna and Andre both earned a standard score of 71 and Eva earned a score of 93 on the pretest but Eva demonstrated a delayed effect compared to her peers. Likewise, performance on the CELF did not appear predictive of children’s progress. Specifically, Teshawn earned an 88 and Andre earned a 65 on the CELF, but Andre’s scores on the outcome measures increased sooner than Teshawn’s scores. Future replications might provide more evidence about what child factors are predictive of PA outcomes.

**Study Strengths**

There are several strengths of the study that are worth noting. First, the positive outcomes of our intervention are particularly salient given that all of the participants were low-income, a variable that has been consistently associated with reading problems (NELP, 2008). We carefully selected Head Start students who we felt demonstrated the need for small group early literacy instruction (i.e., Tier 2). Previous PA intervention studies (e.g., van Kleeck et al., 1998; Roth et al., 2006) have not specified selection criteria, which limits the application of their results to a Tier 2 population. We also proposed some criteria for identifying children who require Tier 2 support, which may inform future Tier 2 early literacy research efforts. It is also worth noting that the intervention was effective for a dual-language child (Andre) whose CELF standard score (i.e., 65) suggested language deficits. Future replications will provide more evidence about the effectiveness of the intervention for children with language deficits.

Second, our use of a single-case research design was productive. It was a rigorous method of measuring outcomes, yet allowed us the flexibility to make changes
during the study. The low and stable FSF baselines gave us confidence that it was our intervention that led to the gains we observed. Confidence of the treatment effect was boosted through the replications across participants and stable maintenance scores. In addition, continuous measurement allowed us to evaluate if children’s metalinguistic skills improved or if gains were task specific. The flexibility of the study design allowed us to make three important changes throughout the study, including adding the “end of lesson” data collection, adding the curriculum-based probe before administering the outcome measures, and modifying testing language for two participants. The addition of the data collection portion at the end of each lesson strengthened the intervention because it provided additional data on children’s progress and gave children opportunities to practice responding independently. We propose including such data collection for all of the PA lessons if this intervention for future use. The measurement changes helped to provide a more accurate representation of children’s progress as a result of the treatment.

Two additional strengths of the study are that our treatment focused on PA at the phoneme level (instead of at the syllable level) and that we used FSF as our primary outcome measure. Manipulation of phonemes is strongly associated with later reading achievement (Hulme et al., 2002), so we felt that gains in FSF would signify meaningful PA improvement. Using FSF was somewhat ambitious because it is a measure developed for use with Kindergarteners; however, it was an effective measurement choice the present study because it has strong psychometric properties and provides benchmark information. Furthermore, FSF stands in contrast to researcher-developed measures reported in many other PA intervention studies (e.g., O’Connor et al., 1993), and our
results will help consumers interpret outcomes using a measure that might be used in an early childhood education setting. All of the participants in the present study achieved a FSF performance level expected at the beginning of Kindergarten (i.e., 10) on at least three probes, which highlights the clinical significance of the intervention.

**Limitations and Future Directions**

Despite its strengths, our study is not without limitations. One challenge we encountered related to repeated testing. Despite being a critical component of a single case research design, repeated testing (as many as 21 sessions per child) introduced some adverse effects for several children. For example, we observed that Eva and Teshawn performed differently during training versus progress monitoring sessions. Their progress monitoring showed restricted patterns of responding (e.g., repeating the whole word instead of the first part). Probe data collected at the end of the lesson confirmed that they were learning the skills and prompted us to make some modifications to the testing language. Given the dramatic increase in both participants’ scores after these changes, we concluded that the repeated testing adversely affected their performance in progress monitoring sessions.

We suggest two possible explanations for children’s patterned responding. First, the examiners offered little feedback during assessment sessions, which we know is important for preschoolers, and may have reinforced their pattern of responding. Second, the opportunities for children to respond during lessons were within a context of instruction and models but during test sessions prompts were decontextualized, which may have been confusing for some children. We recognize that the changes to testing
late in the study might be interpreted as a threat to validity; however, we believe that the data suggest that our modifications actually increased the validity of the results. That is, we had evidence (i.e., “end of lesson” data) that the children had learned the skills, yet their performance on progress monitoring measures (i.e., FSF, WPF) did not reflect these gains. The children’s scores after the testing changes appeared more representative of their skills.

One may question whether we would have seen dramatic gains at the beginning of the study with similar testing changes; however, there are two reasons we believe this would not have been the case. First, the purpose of the changes was to cue the children to the task and modify their pattern of responding and not to teach them, so instruction and feedback were minimal during testing sessions. Second, the changes did not alter the requirements of the child (i.e., the child was still presented with words and asked to say the first parts or sounds) during testing. Future replications of the study with testing modifications made at the beginning of the study would confirm this belief.

Consideration of children’s patterned responding during repeated testing is important, especially due to the expectation of frequent progress monitoring of children in Tiers 2 and 3 in an RTI model. Our experience suggests that curriculum-based assessments (e.g., “end of lesson” testing) provide valuable information about children’s progress and that examiners should be trained to cue children to a task in the event of patterned responding. An advantage of the single-case research design was its flexibility, which allowed us to make problem solve during the course of the study; however, a study
design with less testing (e.g., randomized control trial, multi-probe design) would likely bypass this problem.

Another challenge involved the study’s outcome measures, including (a) problems with WPF, (b) the lack of measures for blending and segmenting, (c) the use of fluency measures (versus measures of accuracy), and (d) difficulty interpreting TOPEL scores. Although WPF aligned well with our intervention instruction, several children achieved the ceiling score for WPF in baseline so we were unable to detect changes in this skill for them during the treatment condition. In the future we might consider including more test items for this measure or using alternative scoring in order to make it more sensitive to phoneme identification. Another issue related to WPF was that we did not observe consistent gains on this measure for all participants during the treatment condition. One explanation is that by the time children’s PA skills started developing, the instruction in the lessons had moved past the identification first parts of words and was heavily focused on the identification of first sounds. In addition, we did not observe obvious gains on WPF prior to FSF as we expected. Repeated testing or testing transfer problems could explain this observation given that two of the three children who did not demonstrate early improvements in WPF (i.e., Eva and Teshawn) were also the children who seemed impacted by these testing problems and their WPF scores improved after we made testing changes. The problems that we encountered with the outcomes measures are a reminder of the challenge researchers and practitioners face when they try to evaluate children’s PA skills.

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We chose not to use a measure of blending or segmenting because we prioritized using measures with high psychometric properties, and, unfortunately, such progress monitoring measures of blending and segmenting are not yet available. Although we felt justified in making this choice, the lack of evidence of children’s skill development in blending and segmenting is a limitation of the study. Another result of prioritizing strong psychometric properties was the reliance on fluency measures versus measures of accuracy. Although fluency measures may present some problems for young children (given developing attention spans and automatized skills), FSF was an appropriate measurement choice because it was brief yet had a high ceiling score (i.e., 60), which allowed us to observe children’s skill growth over time. Future research should focus on the development and evaluation of different kinds of measures of blending, segmenting, and manipulation of phonemes for use with preschoolers.

A final challenge related to measurement included difficulty interpreting the TOPEL scores. The use of a norm-referenced measure was important in the context of understanding clinically significant change, but, unfortunately, not all children demonstrated substantial gains on the PA subtest. We caution that the TOPEL scores may not fully reflect children’s PA gains for two reasons based on an analysis of the TOPEL test items. First, most of the PA activities on the TOPEL focus on blending and elision and not identification of parts and sounds of words, which was the focus of the PA intervention. The present data suggest that children’s PA skills did not generalize to the PA tasks on the TOPEL. Second, about half of PA activities on the TOPEL required receptive skills because they asked children to point to a picture in comparison to the PA...
intervention and FSF which was focused on the production of parts or sounds of words. In the future, use of a different or additional norm-referenced measure might provide supplemental information about children’s gains.

Another limitation of our study is that the intervention was implemented independent of a broad RTI framework (in the classroom or school). For example, in an effective RTI model, Tier 2 instruction (such as the present PA intervention) would be carefully aligned with strong (evidence-based), classroom-wide early literacy instruction. Although the present PA intervention was aligned with typical preschool early literacy curricular instruction (and early literacy development), results of a recent evaluation of preschool classroom instruction in 57 classrooms indicated wide variability in early literacy instruction between and within classrooms (Carta, Atwater, & Bradfield, 2010). This implies a limitation because if the PA intervention is implemented in a classroom where children receive little or no early literacy instruction, the PA intervention might serve as the primary explicit instruction on PA for children (instead of a supplemental program as intended). One feature of the PA intervention that would enhance its use in an RTI framework is the regular data collection during lessons, which would regularly inform educators about children’s progress.

Finally, the intervention was implemented by trained researchers and not by early childhood center staff. Although this ensured high fidelity of implementation and helped establish efficacy of the PA intervention, we recognize that it limits generalizability of the intervention. It will be necessary to evaluate the feasibility of teacher implementation in preschool classrooms. We anticipate that some of the engagement challenges that we
encountered during the study might not be a concern for teachers. That is, some issues that we encountered (e.g., children were reluctant to participate in the lessons in part because they were missing time in the gym or due to distractions in the hallway) that contributed to child engagement might not be relevant if the lessons were implemented in the classroom during the daily routine by a familiar adult. In addition, features of our intervention seemed to promote engagement including a variety of activities, physical movement during activities, and visual supports. Future research is needed to determine the extent to which success with this intervention prevents reading disabilities, its application to different populations of children, and whether children maintain the skills beyond the few weeks that we documented.

**Summary**

RTI is a model for supporting the needs of every learner. Its application to preschool classrooms is underway but there is a still a need for relevant interventions, especially early literacy interventions, to supplement instruction provided to the whole group (i.e., Tier 1). In an RTI model, Tier 2 instruction is characterized by small group instruction that occurs several days a week. Despite growing evidence of interventions designed to support young children’s early literacy needs, many programs’ results are inconclusive or they were designed to be delivered to large groups of children or individual children. The current PA intervention was designed as a Tier 2 intervention with the anticipated outcome of supporting their early literacy skills before Kindergarten to prevent future reading difficulty.
A trained interventionist delivered instruction daily, which focused on blending, segmenting, first part and sound identification, and alphabet knowledge. The lessons emphasized an interactive approach with frequent opportunities for children to respond and gain feedback from the interventionist. Effects of the intervention were evaluated using a multiple-baseline design across training triads. Children’s progress was monitored approximately once a week using measures of word parts fluency, first sound fluency, and letter-naming fluency as well as several pre- and post-test measures of general early literacy skills. Participants were seven children who attended three Head Start classrooms and were selected because they demonstrated consistent deficits in PA skills. The groups participated in 28 to 36 lessons.

The results of this study add to the evidence of how to develop interventions in an RTI model and how to promote the early literacy skills of preschoolers with observed deficits. Our intervention targets children who need additional support beyond the general classroom instruction (Tier 1) for developing PA skills with the goal of preventing future reading difficulties. The results of this study suggest that our intervention is an effective way to promote PA skills of preschoolers. This is part of the first step toward developing early literacy curricula that fit into a RTI model. The next step is to train and support teachers in the implementation of such interventions in their classrooms. We are optimistic that our intervention can be effectively used by preschool teachers because it is scripted, lessons are brief, and the instructional content is relevant to Kindergarten preparation.
References


Education, New Orleans, LA.


Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to


Appendix A: Institutional Review Board Approval

October 4, 2012

Protocol Number: 2008R0145
Protocol Title: CENTER FOR RESPONSE TO INTERVENTION IN EARLY CHILDHOOD [USD, IEPS, NCSER R214(C089011), Howard Goldstein, Human Development and Family Science

Request to amend the protocol dated 09/11/12–Add Columbus Urban Learning Site

Type of Review: Amendment #12—Expedited
Approval Date: September 23, 2012
IRB Staff Contact: Shannon Ryan
Phone: 614-292-9569
Email: ryan.1146@osu.edu

Dear Dr. Goldstein,

The Behavioral and Social Sciences IRB APPROVED the above referenced research.

Note that if applicable, informed consent (and HIPAA research authorizations) must be obtained from subjects or their legally authorized representatives and documented prior to research involvement. The IRB-approved consent form and process must be used. Changes in the research (e.g., recruitment procedures, advertisements, enrollment numbers, etc.) or informed consent process must be approved by the IRB before they are implemented (except when necessary to eliminate or minimize immediate hazards to subjects).

It is the responsibility of all investigators and research staff to promptly report to the IRB any serious, unexpected and related adverse events and potential unanticipated problems involving risks to subjects or others.

This approval is issued under The Ohio State University’s OHRP Federations Assurance #00005178. All forms and procedures can be found on the OERF website – www.orc.edu. Please feel free to contact the IRB staff contact listed above with any questions or concerns.

[Signature]

Steve Beck, PhD, Co-Chair
Behavioral and Social Sciences Institutional Review Board
Appendix B: Family Survey

Child ID: 

Today’s Date: 

CRTIEC Family Survey

Dear Parent: These questions will help us learn about the children in the classroom and the concerns of parents. All of this information will be kept confidential. Thank you very much for your time and your help.

Part A

If you have more than one child in this study, please fill out a separate survey for each child.

1. Your child’s birth date: __ __/ __/ __

2. Your child’s gender: Boy [ ] Girl [ ]

3. How would you describe your child’s ethnicity? Please check all that apply:
   [ ] Black / African-American
   [ ] Asian / Asian-American
   [ ] White / Caucasian
   [ ] Hispanic / Latino
   [ ] Native American
   [ ] Other – Please describe: ____________________________________________

4. Please indicate your relationship to the child:
   [ ] Mother / Father
   [ ] Grandparent
   [ ] Foster parent
   [ ] Other – Please describe: ____________________________________________

5. During the past week, how many times have you (or someone in your family) read to your child?
   [ ] Not at all
   [ ] Once or twice
   [ ] 3 or more times
   [ ] Every day

6. Does your child have any children’s books at home? [ ] Yes [ ] No

6a. If YES, what languages are your child’s books written in?
   Check all that apply: [ ] English [ ] Spanish [ ] Other

7. During the past week, how often have you (or someone in your family) done any of the following things with your child?

   Please check one column for every question:

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>1 or 2 Times</th>
<th>3 or More Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>7a. Told your child a story</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7b. Taught or practiced letters, words, or numbers with your child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7c. Taught your child songs or music, or sang songs with your child</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. What languages do you use when you talk to your child? (Check all that apply)
   [ ] English [ ] Spanish [ ] Other language – please specify ________________________________________________
9. What languages do other people at home use with your child? (Check all that apply)
   □ English  □ Spanish  □ Other language – please specify ______________________

10. What language does your child use when talking at home? (Check all that apply)
    □ English  □ Spanish  □ Other language – please specify ______________________

11. What language do you think your child is most comfortable with now? (Check one)
    □ English  □ Spanish  □ Other language – please specify ______________________

12. Have you ever had a concern about delays or differences in your child’s development?
    □ Yes  □ No

13. Has a care provider or teacher stated concerns about delays or differences in your child’s development?
    □ Yes  □ No

14. Has your child been identified as having developmental delays or special needs?
    □ Yes  □ No

15. Does your child have an IEP (Individualized Education Plan)?
    □ Yes  □ No

Part B
If you have already answered these questions for another child in this study, you may skip this part.

16. What is the highest level of education that you have completed? (Check one)
    □ Grade less than high school  □ Some education after high school
    □ Some high school  □ Associate degree (AA)
    □ GED  □ College degree (BA/BS)
    □ High school diploma  □ Graduate degree

17. Please describe your marital status:
    □ Single
    □ Engaged or with partner
    □ Married

18. How many times has your family moved during the past year? ______

19. Please indicate the number of people who live in your home:
    Number of children (under the age of 18) ______
    Number of adults (18 or older) ______

20. Please check the amount that best describes your family’s current monthly income. This would include salaries of any people in your household who work.
    □ Less than $850  □ $850 – $1099
    □ $1100 – $1349  □ $1350 – $1599
    □ $1600 – $1849  □ $1850 – $2099
    □ $2100 – $2349  □ $2350 – $2599
    □ $2600 – $2849  □ $2850 – $3099
    □ $3100 – $3349  □ $3350 or more

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Appendix C: Teacher Survey

If you teach two half-day classrooms, with different children in the AM and PM, please fill out a separate survey for each classroom. All of this information will be kept confidential. We thank you for your time and assistance!

Date: _______________

PART A

1. Please check the appropriate category for this classroom:
   - ☐ Full-day
   - ☐ Half-day AM
   - ☐ Half-day PM

2. On average, how many children attend this classroom? _______

3. How many children in this classroom have qualified for special education services and have an IEP (Individualized Education Plan)? _______

4. Please check any of these categories that apply to this classroom: (Check all that apply.)
   - ☐ State-funded pre-kindergarten
   - ☐ Head Start
   - ☐ Title 1
   - ☐ Private tuition

5. On average, how many hours per day do children attend this classroom? _______

6. On average, how many days per week do children attend this classroom? _______

7. How many adults are present in this classroom at any given time?
   - 7a. Number of teachers and assistant teachers _______
   - 7b. Number of aides and paraprofessionals _______
   - 7c. Number of volunteers _______

8. Does your classroom include any children who come from homes where English is not the primary language? ☐ Yes ☐ No
9. Please check one of the following sentences that best describes the language of instruction in your classroom:
   ☐ All of the instruction in this classroom is in English.
   ☐ The majority of instruction is in English, but some is in another language.
   ☐ We use an even mix of English and other language(s) for instruction.
   ☐ We use mostly languages other than English for instruction.

10. Are you currently using a curriculum or curricula to teach early literacy?
    ☐ Yes ☐ No

10a. If Yes, are you using a published curriculum? ☐ Yes ☐ No

10b. Name of curriculum and publisher:

10c. How many days per week do you use this curriculum? __________

11. If you do not use a curriculum to teach early literacy or you supplement the curriculum, briefly describe or list strategies you use to teach early literacy.

12. About how many minutes a day would you say you spend teaching early literacy skills? __________

12a. Approximately what percent of the instruction occurs in a large group? __________

12b. Approximately what percent of the instruction occurs in small groups? __________

12c. Approximately what percent of the instruction occurs individually? __________

13. Please list the early literacy skills that you teach.

14. Do you currently use any strategies to identify children who may need more support in early literacy than what is provided to all children in the class?
    ☐ Yes ☐ No

14a. If Yes, please describe the strategies you use to identify these children:

14b. Please indicate how children receive any additional instruction in early literacy beyond what is provided in class for all children.
    Tutoring
    □□ Additional time in small groups
    □□ Additional instructional opportunities embedded across the day
    □□ Referred out to special education
    □□ Other (please describe):
PART B
If you have already completed this section for another classroom, you may skip this section.

15. How long have you worked in early childhood programs, including both current and previous employment? ___________ Years ___________ Months

16. Your date of birth ____________________________

17. Please check the highest level of education you have completed:
   - High school:
     - [ ] Some high school
     - [ ] High school diploma
     - [ ] GED
   - After high school:
     - [ ] Some college, but no degree
     - [ ] Associates degree
     - Major: __________________________
     - [ ] 4-year degree (B.A., B.S.)
     - Major: __________________________
     - [ ] Graduate degree (M.A., Ph.D.)
     - Field of study: __________________________

18. Have you completed a CDA (Child Development Associate)?
   - [ ] Yes  [ ] No

16a. If no, are you currently working on a CDA?
   - [ ] Yes  [ ] No
Appendix D: Consumer Satisfaction and Social Validity Survey for the Phonological Awareness Intervention
Please mark an (X) in the column that best describes your responses to the following items. Please provide any relevant comments.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The children benefited from participating in the intervention.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I observed improvements in the children’s early literacy skills during classroom activities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I observed improvements in the children’s early literacy skills during classroom assessments.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>The children seemed to enjoy the intervention activities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The length of the intervention was appropriate for use with the children.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please provide any additional comments.

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________
Appendix E: Testing Modifications Made for First Sound Fluency (FSF) and Word Parts Fluency (WPF)
<table>
<thead>
<tr>
<th>Materials</th>
<th>Original FSF and WPF</th>
<th>Modifications at the start of the study</th>
<th>Modifications midway (i.e., week 8 of treatment for Group A)</th>
<th>Modifications for Eva and Teshawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample items</td>
<td>WPF: supplemental pictures</td>
<td>- 2 sample items with no practice or feedback</td>
<td>- 3 sample items (words drawn from previous lesson) with 1 round of minimal feedback (i.e., “Yes” or correct answer); (e.g., “What’s the first sound you hear in __?”); administered first</td>
<td>- Correct answer stated after sample word (e.g., “Listen: sailboat, sail.”) on sample items</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 2 sample items with no practice or feedback; 3 sets of sample words, alternated between progress monitoring sessions (to reduce familiarity)</td>
<td>- 3 familiar items (see previous column) administered immediately before testing</td>
</tr>
<tr>
<td>Testing instructions</td>
<td>WPF: “I will show you more pictures and say the word. You tell me the first part of the word.” - FSF: “Now I’m going to say more words. You tell me the first sound you hear in the word.”</td>
<td>WPF: “Now I will say more words. You tell me the first part of the word.”</td>
<td>WPF: “What’s the first part of the word __?” - FSF: “What’s the first sound you hear in __?” - Instructions faded as quickly as possible.</td>
<td></td>
</tr>
<tr>
<td>Prompt</td>
<td>WPF: “Remember to tell me the first part of the word.” - FSF: “Remember to tell me the first sound that you hear in the word.”</td>
<td>n/a</td>
<td>WPF: “You said the whole word. What’s the first part of __?” - FSF: “You said the whole word. What’s the first sound in __?” - Used only once per word.</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix F: Scope and Sequence for the Phonological Awareness Intervention Lessons

<table>
<thead>
<tr>
<th>Unit</th>
<th>Skill(s) taught</th>
<th>Letter taught</th>
<th>Instructional language example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blending compound words, blending 2-syllable words</td>
<td>n/a</td>
<td>Let’s say the parts of the word elbow: el (1) bow. Now you say the word.</td>
</tr>
<tr>
<td>2</td>
<td>Blending compound words, blending 2-syllable words, segmenting compound words</td>
<td>P</td>
<td>Listen to me say a word: rainbow. (Put hands together as if you just clapped.) Now listen to me say the parts of the word: rain (1) bow. (Stretch out a hand one at a time.) Say the word rainbow with me: rainbow. (Put hands together as if you just clapped.) Now let’s say the parts of the word: rain (1) bow.</td>
</tr>
<tr>
<td>3</td>
<td>Blending 2-syllable words, segmenting compound words, segmenting 2-syllable words</td>
<td>M</td>
<td>Listen: bubble. Now you say the parts of the word.</td>
</tr>
<tr>
<td>4</td>
<td>Segmenting 2-syllable words</td>
<td>B</td>
<td>Now look at the marble. Let’s say the word marble and jump. The word: marble! (Jump.) Now let’s say the parts of the word and stomp: mar (1) ble. (Stomp.)</td>
</tr>
<tr>
<td>5</td>
<td>Concept of first, identification of first part of 2-syllable words</td>
<td>S</td>
<td>Watch my fingers and listen to the parts of the word: side (1) walk. (Hold up one finger then a second finger.) Say the parts of the word sidewalk with me and hold up your fingers: Side (1) walk. (Hold up one finger then a second finger.) Now, you say the first part of the word and hold up one finger. (2)</td>
</tr>
<tr>
<td>6</td>
<td>Concept of sound, identification of little parts of compound and 2-syllable words, identification of first sound in 1-syllable words</td>
<td>C</td>
<td>The word sunflower has two big parts: sun and flower. (Pull strips apart.) Words also have little parts. Like the word sun. (Put flower strip aside.) The little parts of the word sun are /s/ /un/. (Pull apart word strip cut into the two parts and when put together there is a complete picture of a sun.) The word: sun (Put word strips together.) The little parts of the word: /s/ /un/.</td>
</tr>
</tbody>
</table>

81
<table>
<thead>
<tr>
<th></th>
<th>Identification of first sounds (simple) in 1-syllable segmented words</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Listen: /m/. Now you point to the one that starts with /m/. Listen: /m/ /ud/. What’s the first sound /m/ /ud/?</td>
<td>D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Identification of first sounds (complex) in 1- and 2-syllable segmented words</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Listen: /tr/. Now you point to the one that starts with /tr/. Listen: /tr/ /ain/. What’s the first sound /tr/ /ain/?</td>
<td>L</td>
</tr>
</tbody>
</table>

|   | Look at these pictures and words: cat, hat, bat. These words sound the same but they have different first sounds. Listen: cat, hat, bat (emphasize first sound). I need you to help me figure out the first sounds. | H |

<table>
<thead>
<tr>
<th></th>
<th>Identification of first sounds in whole words</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Some words have the same first sound. The words bat, bike, and ball all start with /b/. The first sound you hear in bat, bike, and ball is /b/. What’s the first sound you hear in bat? (2) Is it /b/ or /m/?</td>
<td>R</td>
</tr>
</tbody>
</table>

|   | This time, let’s see how fast you can tell me your answers. I’m going to say some words. You tell me the first sound you hear in the words. Ready? Sled. | N |

*Note. Each unit is comprised of three lessons.*
Appendix G: Example Phonological Awareness Intervention Lesson

PA Lesson 6a
“First,” first sound ID in compound & 2 syllable words; Letter C introduced; sound matching

<table>
<thead>
<tr>
<th>Script</th>
<th>Feedback</th>
<th>Song (Instructions for interventionist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reminder: Always give feedback twice, as needed (i.e., if any child does not respond or gives an incorrect response after the first round of feedback). Always give the correct response if any child does not respond or gives an incorrect response after the second round of feedback.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Are you ready for a game? I'm going to show you two pictures. (Prepare pictures of apple, shoe.) Tell me what picture you see first. Wait until you see both pictures. Ready? (Show apple for 2 seconds, then shoe for two seconds.) Which picture did you see first? (2) The apple! Remember? (Show apple then shoe.) You saw the apple first!

This time, I'm going to say two words. I want you to tell me what word you hear first. Wait until you hear both words. Ready? Bread (1) Milk. What word did you hear first? (2)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! Bread!</th>
</tr>
</thead>
<tbody>
<tr>
<td>-/NR</td>
<td>Bread! Listen again. Bread (1) Milk. What word did you hear first?</td>
</tr>
</tbody>
</table>
Now, I’m going to say two letters. Listen for the first one. Wait until you hear both letters. Ready? T (1) F. What letter did you hear first? (2)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! T!</th>
</tr>
</thead>
<tbody>
<tr>
<td>-/NR</td>
<td>Ti! Listen again. T (1) F. What letter did you hear first? (2)</td>
</tr>
</tbody>
</table>

Now, I’m going to say two sounds. I want you to tell me what sound you hear first. Wait until you hear both sounds. Ready? /b/ (1) /s/. What sound did you hear first? (2)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! /b/!</th>
</tr>
</thead>
<tbody>
<tr>
<td>-/NR</td>
<td>/b!/ Listen again. /b/ (1) /s/.. I What sound did you hear first?</td>
</tr>
</tbody>
</table>

Let’s play another game! Listen to me say a word: birdhouse. Say birdhouse. (1) Now, look at the word birdhouse. (Show two word strips with pictures together.) It has two parts: bird (1) house. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (Point to bird; cover house.)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! Bird!</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>Bird. Let’s try it again. The parts of the word: bird (1) house. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (Point to bird; cover house.)</td>
</tr>
<tr>
<td>-</td>
<td>Bird. Let’s try it again. The parts of the word: bird (1) house. (Pull strips apart and point to words/pictures as you say each part.) The first part: bird. (Point to bird; cover house.) Tell me, what is the first part of the word? (Point to bird; cover house.)</td>
</tr>
</tbody>
</table>

Listen to me say a word: paintbrush. Say paintbrush. (1) Now, look at the word paintbrush. (Show two word strips with pictures together.) It has two parts: paint (1) brush. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (DO NOT point and cover.)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! Paint!</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>Paint. Let’s try it again. The parts of the word: paint (1) brush. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (DO NOT point and cover.)</td>
</tr>
<tr>
<td>-</td>
<td>Paint. Let’s try it again. The parts of the word: paint (1) brush. (Pull strips apart and</td>
</tr>
</tbody>
</table>
Listen: bookshelf. Say bookshelf. (1) Now, look at the word bookshelf. (Show two word strips with pictures together.) It has two parts: book (1) shelf. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (DO NOT point and cover.)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! Book!</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>Book. Let's try it again. The parts of the word: book (1) shelf. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (DO NOT point and cover.)</td>
</tr>
<tr>
<td>-</td>
<td>Book. Let's try it again. The parts of the word: book (1) shelf. (Pull strips apart and point to words/pictures as you say each part.) Tell me, what is the first part of the word? (DO NOT point and cover.)</td>
</tr>
</tbody>
</table>

I'm going to try to trick you now. Listen to a word: farmer. Listen to the parts of the word: far (1) mer. (Hold up one finger then a second finger.) Now, I'm going to say only the first part of the word: far. (Hold up one.) Say the parts of the word farmer with me and hold up your fingers: far (1) mer. (Hold up one finger then a second finger.) Now, let's say the first part of the word and hold up one finger: far. (Hold up one finger)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! Far! (or FARM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-/NR</td>
<td>Far! Listen again. Far (1) mer. (Hold up one finger then a second finger.) Now, let's say the first part of the word farmer and hold up one finger: far. (Hold up one finger.)</td>
</tr>
</tbody>
</table>

Let's try another one! Listen to the parts of the word picnic: pic (1) nic. (Hold up one finger then a second finger.) What's the first part of the word picnic? (2)

<table>
<thead>
<tr>
<th>+</th>
<th>Yes! Pic!</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>Pic. Let's try it again. Listen: pic (1) nic. (Hold up one finger then a second finger.) What's the first part of the word picnic? (2)</td>
</tr>
<tr>
<td>-</td>
<td>Pic. Let's try it again. Listen: pic (1) nic. (Hold up one finger.) Listen again: pic (1) nic. (Hold up one finger then a second finger.) What's the first part of the word picnic? (2)</td>
</tr>
</tbody>
</table>
Listen: row (1) bot. (Hold up one finger then a second finger.) What’s the first part of the word robot? (2)

+ Yes! Row! (or ROBE)
- Mess. Let’s try it again. Listen: row (1) bot. (Hold up one finger then a second finger.) What’s the first part of the word robot? (2)

This time sit on your hands. (Put your hands under you.) Keep them there while we play this game. Listen: purple. The first part of purple is pur. Now I want you to tell me the first part of the word. Listen: purple. (2)

+ Yes! Pur! (or PURP)
- Pur. Let’s try it again. Now I want you to tell me the first part of the word. Purple. (2)

Still sitting on your hands? (Put your hands under you.) I want you to tell me the first part of the word. Listen: party. (2)

+ Yes! Par! (or PART)
- Par. Let’s try it again. Now I want you to tell me the first part of the word. Party. (2)

Are you still sitting on your hands? (Put your hands under you.) Last one. Remember, I want you to tell me the first part of the word. Listen: cricket. (2)

+ Yes! Cri! (or CRICK)
- Cri. Let’s try it again. Now I want you to tell me the first part of the word. Cricket. (2)
Now I want to see if you can remember what you learned. I’m going to say a word; you tell me the first part of the word.

(1st Child’s name), it’s your turn first. Listen: boil. (Now, you say the first part.) (Yes OR boy.) (2nd Child’s name), it’s your turn next. Listen: sister. (Now, you say the first part.) (Yes OR /sis/) (3rd Child’s name), it’s your turn next. Listen: number. (Now, you say the first part.) (Yes OR /num/)

(1st Child’s name), listen: freezer. (Now, you say the first part.) (Yes OR free.) (2nd Child’s name), it’s your turn next. Listen: little. (Now, you say the first part.) (Yes OR /li/) (3rd Child’s name), it’s your turn next. Listen: shower. (Now, you say the first part.) (Yes OR /show/)

What letter is this? (Point to C.) (1) C! What sound does the letter C make? (1) /k/. Thanks for playing games with me today. I had fun saying the first parts of words with you. We’ll play some more games tomorrow!