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PHONEMIC AWARENESS INSTRUCTION FOR
PRESCHOOLERS: THE EVIDENCE FOR
PRE-PHONEMIC VERSUS PHONEMIC TASKS

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Phonemic Awareness Instruction for Preschoolers: The Evidence for Pre-Phonemic versus Phonemic Tasks

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Clinical Scenario

Aimee is a speech-language pathologist (SLP) working in a developmental preschool program in Wyoming. Aimee was asked by her supervisor to offer small group phonemic awareness instruction to children in the program who had done poorly on a fall screening of letter knowledge and phonemic awareness. Aimee was not sure what to target in these sessions: Should she focus on general phonological awareness skills, such as awareness of syllables and rhymes? Or, could she start immediately with phonemic awareness skills, such as awareness of the first sounds in words and segmentation of words into individual sounds? With its focus on phonemic-level skills, phonemic awareness instruction focuses on building children's sensitivities to the phonemes that make up words, such as the initial and final sounds in words, through such tasks as segmenting and blending.

Aimee wanted to use an instructional approach that was both effective and efficient, and she was inclined to focus on instruction at the phonemic level. In writing her master's thesis a few years prior, she had discovered that this level of awareness was most closely linked to reading success (Kysar, 1999). Furthermore, she had been successful in teaching a mix of kindergartners and preschoolers at the phonemic level in a program she had recently led at another center. However, one of her colleagues criticized the idea, saying that phonemic-level skills are not developmentally appropriate with children who are only 4 and 5 years old, and that such an approach did not follow conventional programs for young children, such as the curriculum developed by Adams, Foorman, Lundberg, and Beeler (1998). Aimee did not know the best route to take, so she decided to conduct a search for research literature regarding how instruction at the phoneme level compares to instruction that started at the pre-phonemic level (e.g., words, syllables, and rhymes) in terms of child outcomes.

The Clinical Question

To start her search, Aimee had to define specific terms she would enter into search databases. She considered "phonemic awareness" to be the understanding that words are made up of minimal sounds that are separable and manipulable (i.e., phonemes). She knew that phonemic awareness comprised tasks that varied in difficulty and included easier tasks, such as isolating (e.g., What is the first sound in *bad*?) and matching (e.g., What word starts the same as *book*?), and harder tasks, such as blending (e.g., What word is this, /b-ae-d/?) and segmenting (e.g., Tell me all the sounds in *bad*). Aimee knew that there were several skills focused on larger units of sound that were considered preparation for phonemic-level tasks and were included under the umbrella of phonological awareness. She called these skills and tasks "pre-phonemic," which included identifying familiar environmental sounds (e.g., a dog barking versus a bell ringing), dividing sentences into words, dividing compound words into root words (e.g., sunshine consists of two words: *sun* and *shine*), and dividing multi-syllabic words into discrete syllables (/ba/-/na/-/na/). Aimee viewed segmenting words into the onset-rime division (e.g., /m/-/aed/, /b/-/aed/, /gl/-/aed/) as pre-phonemic, but recognized that this was a borderline task because it often involved segmenting a single phoneme from the rest of the word.

For preschoolers, it was unclear whether to provide instruction at the pre-phonemic or phonemic level.

Aimee reflected on the fact that, in kindergarten, attention is typically focused on the phonemic level, especially in settings where pupil progress is tracked with subtests of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002). For preschoolers, she recognized that there was considerably less agreement as to whether it was acceptable to provide instruction at the pre-phonemic versus phonemic level.

Aimee used the PICO framework recommended in evidence-based practice (EBP) literature to pose the specific research question for which she sought an answer: Will preschoolers show greater improvement in phonemic awareness during pre-phonemic or phonemic awareness instruction? Her PICO decision-making framework is presented in Table 1.

Background

The evidence for phonemic awareness instruction. Phonemic awareness is one of the few areas of language intervention in which there is an abundance of research studies. There are two comprehensive meta-analyses on the general question of whether phonological awareness instruction works, with the term “phonological awareness” representing an umbrella term that includes phonemic awareness instruction. Meta-analysis is a type of research that conducts statistical comparisons of the magnitude of changes as averaged across controlled group studies. Bus and van Ijzendoorn (1999) and Ehri et al. (2001, summarized in the National Reading Panel Report, 2000) each examined more than 60 studies of the effects of phonological awareness instruction. The meta-analyses showed that the impact of phonological awareness instruction was moderate to large on phonological awareness outcomes, moderate on short-term reading and spelling outcomes, and small for long-term reading outcomes. Programs combining phonemic awareness and letter training were found to be more beneficial than those only providing phonemic awareness instruction. According to Ehri et al., typical learners made larger gains relative to atypical learners, but all types of readers made progress. Additional findings in these meta-analyses included showing that small group instruction was superior to classroom or individual instruction, and that instruction for 5 to 18 hours was superior to shorter or longer periods of instruction. These meta-analyses showed that phonological awareness is an important part of early reading instruction.

Pre-phonemic versus phonemic instruction. Aimee considered these two meta-analyses concerning the overall effectiveness of phonological awareness for insights into the question of whether she should focus instruction on pre-phonemic or phonemic-level skills. She noted that in their meta-analysis, Ehri et al. reported that phonological awareness instruction focused on one to two phonemic skills produced better results than more global instruction focused on three or more skills. However, it was unclear

whether the skills involved only phonemic units or whether pre-phonemic skills were also addressed. Aimee concluded that these meta-analyses were not useful in answering the pre-phonemic versus phonemic question.

Aimee therefore decided that she would look at two contrastive, quality studies she had seen cited as research support for two popular commercial programs. The first study, conducted by Lundberg, Frost, and Peterson (1988), examined teaching pre-phonemic skills in a phonological awareness training program. This study served as the basis for *Phonemic Awareness for Children* (Adams et al., 1998), a popular classroom curriculum that focuses almost exclusively on teaching pre-phonemic skills to children. Lundberg et al. implemented their training program with 235 Danish children and compared performance to 155 children in a no-treatment group. The participants were referred to as “preschoolers,” but their mean age was 6:0 and they attended first grade the year after the study was completed. The training program comprised daily 15-minute whole-class sessions for 8 months that addressed a full array of sound units: identifying nonverbal sounds, completing rhyming activities, segmenting sentences, segmenting syllables, isolating phonemes, and blending and segmenting phonemes. Children in the training group showed significant improvements in phonemic-level skills compared to the no-treatment group. Phonemic gains were maintained over time, and word reading and spelling outcomes were improved in a first grade follow-up.

The other study Aimee reviewed was by Ball and Blachman (1988) and provided the basis for another popular phonological awareness curriculum, *Road to the Code* (Blachman, Ball, Black, & Tangel, 2000). Ball and Blachman randomly assigned 89 kindergartners (mean = 5:8 years) to one of three conditions: phoneme segmentation plus letter-sound intervention, semantic knowledge plus letter-sound intervention, and no-treatment control. In the first condition, groups of five children were taught phoneme segmentation in four 20-minute sessions per week for 7 weeks using a say-it-and-move it method with letter tiles. The segmentation group showed significantly better phoneme segmentation and word recognition skills compared to children in the other two conditions.

The two studies provide an interesting comparison, as the Lundberg et al. (1988) study focused on pre-phonemic

The two meta-analyses were not useful in answering the pre-phonemic versus phonemic question.

skills, whereas the Ball and Blachman (1988) study focused on phonemic skills. Which study had stronger results? Both studies obtained statistical significance. Statistical significance means that children's gains were greater than could be expected by chance alone. Another important statistic is effect size. Effect size provides a sense of practical or clinical significance: Were children's gains big enough to matter? Looking specifically at phoneme segmentation performance after instruction, Lundberg et al. (1988) reported a moderate effect size ($d = 0.69$), whereas Ball and Blachman (1988) reported very large effect sizes compared to both the no-treatment control and to the language/letter treatment ($d = 1.85$, $d = 1.67$). It appeared that, for kindergartners, focusing on advanced phonemic skills combined with letters, even for just seven weeks, produced larger gains than teaching an array of skills over an extended period of time.

The Search for Evidence

Aimee used several search strategies to identify research articles that would provide guidance on pre-phonemic versus phonemic instruction for preschoolers. She re-examined the set of articles she had gathered for her thesis back in 1999. In addition, she examined Gillon's (2004) recent book on phonemic awareness. Also, with guidance from a university librarian, she looked for articles published since 2000 using five search engines (concurrently) with the search terms "phonological awareness," "phonemic awareness," "treatment," "instruction," and "training." The searches revealed thousands of references. Aimee scanned the titles of these articles for treatment studies published in peer-reviewed journals, rather than review articles or other

Aimee identified 10 applicable studies that included preschoolers.

types of reports, and obtained abstracts for 62 articles. From those abstracts, she obtained full texts for controlled group treatment studies. From this search, Aimee identified 22 studies to evaluate more closely.

These 22 studies had to be examined carefully to find those teaching preschoolers due to several factors: formal schooling starts later in some countries than in the United States; the year before first grade may be called preschool (instead of kindergarten, as in the United States); the age of the children was sometimes not provided; some studies pre-tested in preschool but taught in kindergarten; and finally, some studies involved a mix of preschoolers and kindergartners. Of the 22 studies, Aimee located 10 in

which the samples clearly consisted of preschoolers.

Evaluating the Evidence

Aimee read the 10 preschool studies carefully. She noted the research question, research design, participants, instruction provided, and outcomes, as shown in Table 2. She calculated effect sizes if they were not reported by the authors, using the calculator offered by Thalheimer and Cook (2003). She differentiated the studies based on the target of instruction: that is, in terms of whether they targeted (a) pre-phonemic tasks (focused on rhymes and syllables), (b) basic phonemic tasks (focused on first/beginning sounds and final sounds in words), or (c) advanced phonemic tasks (focused on blending, segmenting, and deleting sounds in words and syllables). Aimee also examined each study in terms of its overall quality, as presented in Table 3. She decided that, although all the studies missed some elements of high-quality studies, they were of sufficient quality to be informative.

Aimee had observed in her clinical experience that many speech-language pathologists and teachers teach pre-phonemic tasks to preschool children. It seemed that children at this age find it easy and fun to identify bird tweets and doorbell rings, clap and march to the syllables in words, and recite nursery rhymes. To Aimee's surprise, the 10 preschool studies included no such activities and did not include tasks focused on syllable, word, or auditory awareness. Rather, most of the attention in these 10 studies was on whether or not to teach a task combination that included rhyme. Specifically, five studies examined teaching some kind of pre-phonemic skills: van Kleeck, Gillam, and McFadden (1998) taught rhyme and first phonemes (i.e., initial sounds); Martin and Byrne (2002) taught rhyme; Nancollis, Lawri, and Dodd (2005) taught rhyme, plus syllables, plus first phonemes; Gillon (2005) taught phonemic matching, plus onset-rime segmentation; and, most recently, DeBaryshe and Gorecki (2007) taught syllable, rhyme, and first sound tasks.

So what could be determined from these five studies? The van Kleeck et al. (1998) study showed that preschoolers with language impairment can make large gains in basic phonemic awareness from a rhyme and phoneme curriculum. From Martin and Byrne (2002) and Nancollis et al. (2005), it appeared, not surprisingly, that children learn what they are taught; if children are not taught at the phonemic level, they do not show significant gains on phonemic tasks. The DeBaryshe and Gorecki (2007)

study showed that a syllable, rhyme, and basic phoneme package resulted in significant gains but did not reveal which skills are most important. The Gillon (2004) study suggested that onset-rime segmentation, along with basic phonemic tasks, could provide a helpful foundation for reading and spelling. Gillon obtained a large effect, while DeBaryshe and Gorecki, with a larger sample size, obtained a moderate effect.

Two studies focused on teaching children basic phonemic tasks. First-sound isolation, generation, and matching are basic phoneme tasks that should be within the attainment of preschoolers, as studied in Byrne and Fielding-Barnsley (1991, 1993) and Hindson et al. (2005). These studies showed that instruction in basic phonemic awareness produced immediate large to extremely large benefits to children's phonemic awareness. Coupling basic phonemic-level instruction with attention to language and print concepts through shared book-reading produced gains for children of a range of abilities, moving them beyond the letter knowledge that regular preschool instruction already provides. However, it appeared that the maintained effects of instruction were less apparent: by kindergarten, typically achieving children gained phonemic awareness and word reading/spelling skills without direct instruction in phonemic awareness.

An additional set of studies considered whether more advanced tasks, such as phoneme segmentation and blending, could or should be included in instruction. These tasks may be considered by some to be developmentally inappropriate, because preschool children do not show this level of skill without either explicit instruction or knowing how to read. The van Kleeck et al. (1998) study included phoneme blending and segmenting in the instruction but did not test whether the children learned those tasks specifically. Three studies tested the effect of teaching advanced phonemic tasks to preschoolers: Yeh (2003), Hesketh, Dima, and Nelson (2007), and Hatcher, Hulme, and Snowling (2004). Collectively, these three studies showed that preschoolers could learn advanced phonemic skills, with some tasks seemingly more attainable for children, particularly when coupled with letter-sound instruction. Hesketh et al. did not report enough data to allow calculation of effect sizes, but the effects did not appear large. Yeh (2003) and Hatcher et al. (2004) reported large effect sizes, with the latter study involving a large sample size. Consistent with Byrne and Fielding-Barnsley's (1993) follow-up findings, Hatcher et al. found that typically

developing preschoolers developed advanced phonemic awareness skills implicitly from a phonics-based reading program, while preschoolers with lower language abilities needed explicit attention to phonemic tasks to do so.

The Evidence-Based Decision

What can be determined about preschool phonemic awareness instruction from this collection of treatment studies? Aimee knew that decisions should not be made on a single study but rather on the overall evidence gained from a variety of empirical works. Aimee had conducted a careful analysis of two meta-analyses as well as a set of 10 experimental and quasi-experimental studies that were of at least reasonable quality, and the findings produced a reasonably consistent picture. Specifically, findings suggested that, as with kindergartners, preschoolers can learn phonemic-level skills and these appear to be beneficial for literacy acquisition. Findings also suggested that children with relatively low language and cognitive skills may take longer to learn such skills or may accomplish less compared to their peers, but they can make substantial gains in phonemic awareness. However, it was also apparent that not all children need to have direct phonemic instruction: while treatment groups showed immediate large advantages, follow-ups in kindergarten showed less advantage for typically developing children. To go beyond these global findings required very careful reading. There were a lot of different terms used, tasks taught, conditions compared, and outcomes measured.

The pre-phonemic versus phoneme decision. Aimee drew several conclusions based on her review of the literature. First, for preschoolers, there was no evidence supporting the use of such phonological awareness tasks as identifying familiar sounds (e.g., doorbell rings), and kindergarten follow-up studies suggested that such tasks were less influential to later literacy achievements compared to providing phonemic-level instruction. Second, although segmenting sentences into words and words into syllables were shown to be effective in some comprehensive packages of instruction (DeBaryshe & Gorecki, 2007; Hatcher et al., 2004), there was no specific evidence supporting teaching those particular tasks. In fact, studies of kindergartners showed it possible to teach phoneme segmentation without first teaching syllable segmentation. Moreover, Nancollis et al. (2005) indicated that syllable segmentation instruction alone could be detrimental to later phoneme segmentation.

The evidence suggested that valuable time should not be spent on pre-phonemic sound, word, or syllable tasks.

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Rhyme results were not as clear. Instruction in rhyme identification and generation was

not sufficient to improve children's phonemic performance (Martin & Byrne, 2002) and might not even result in better rhyme performance (van Kleeck et al., 1998). Combining rhyme and initial sound tasks (alliteration) might not be as powerful as providing advanced phonemic tasks (Yeh, 2003). However, teaching preschoolers to segment words into onset-rime divisions, combined with exercises of substituting initial phonemes and letters, appeared to be a useful exercise for transitioning children into phoneme segmentation (Gillon, 2005; Yeh, 2003).

Taken together, the evidence strongly supported starting preschoolers at the phonemic level in phonemic awareness instruction. There were a number of studies showing statistically and practically significant outcomes, with generally larger effect sizes in less time reported for phonemic-level instruction compared to pre-phonemic instruction. A packet of basic phonemic-level skills (first and last sound generation, isolation, and categorization) coupled with letter-sound instruction was shown to be appropriate and effective in several studies of young

The evidence supported starting preschoolers at the phonemic level in phonemic awareness instruction.

children (Byrne & Fielding-Barnsley, 1991; Hindson et al., 2005), with gains obtained in phonemic awareness, letter-sound knowledge, word reading, and spelling. The evidence showed that advanced phonemic awareness tasks could be taught

to preschoolers (Hesketh et al., 2007; Hindson et al., 2005; Yeh, 2003). However, these tasks were challenging for this age group; some children showed learning immediately after instruction, and some did not.

Conclusion

From this systematic review of the evidence, Aimee made the following conclusions. Preschoolers can benefit from phonemic awareness instruction, and benefits appear to endure into kindergarten. Delivering instruction that involves pre-phonemic tasks focused on sounds, sentences, and syllables is not supported by the evidence.

Basic phonemic tasks, such as generating, isolating, and matching first sounds, accompanied with letters are helpful for later word reading. The advanced tasks of attending to last phonemes and engaging in phoneme deletion, segmentation, and blending can be introduced in preschool, but they will be challenging for some children. Onset-rime segmentation may be a helpful preparation for phoneme segmentation. As a result of this review, Aimee concluded that she would teach basic phonemic awareness tasks and introduce advanced phonemic tasks, in combination with letter instruction, during small-group phonemic awareness instruction. Although Aimee's review raised a series of questions in her mind (e.g., What combination of phonemic tasks showed better sustained benefits later in kindergarten?), she recognized that those questions were as yet unanswerable based on the available evidence. For now, Aimee felt confident that the available evidence had given her a direction to take in identifying what to target when delivering phonemic awareness instruction to preschool children.

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Table 1. Research Question in PICO Format

Will preschoolers show greater improvement in phonemic awareness during pre-phonemic or phonemic awareness instruction?			
Population	Intervention	Comparison	Outcome
Children, 4–5 years of age, in the year preceding kindergarten, of a range of abilities and family backgrounds	Phonemic Awareness: 1. Simple phoneme tasks: isolate, match, generate 2. Advanced phoneme tasks: segment, blend, delete, substitute With or without sound-letter instruction	Pre-Phonemic Awareness: 1. Nonspeech task: identify familiar sounds 2. Word tasks: segment sentences and compound words into words 3. Syllable tasks: segment and blend 4. Rhyme tasks: generate, identify, blend, segment onset-rime With or without phoneme tasks and sound-letter instruction	1. Short- or long-term phonemic awareness 2. Short- or long-term word reading or spelling

Table 2. Description of Preschool Treatment Studies in Review Corpus

Study <i>Who did it when?</i>	Sample <i>How many, what age, what ability?</i>	Conditions <i>What was compared to what?</i>	Schedule <i>How many, how often, and how long?</i>	Intervention/ Comparison <i>What was taught in each condition?</i>	Results <i>Were the results statistically and clinically significant?</i>
Pre-Phonemic Tasks Present					
van Kleeck, Gillam, & McFadden (1998)	N=24 8 PS* (3:9–4:4); 8 PK (4:9–5:6); 8 K/1 (5:0–7:11) Lang impaired	1. TX: phonemic, PS/PK 2. Control: no TX K/1 *TX spring scores vs. K/1 fall scores, so ages closer at testing	Grps of 3–4, daily 10–15min for 12wks of rhyme then 12wks of phoneme	TX: Rhyme TX: rhyme books, ID, judge, generate Then phoneme TX: first phoneme isolate, match, generate, phoneme blend, segment Cont: reg curric	Improvement on rhyme and first sound and no diff PS vs. PK PS/PK TX vs. K/1 control, not different on rhyme, better on basic phoneme with a very large effect ($d=1.67$)
Martin & Byrne (2002)	N=72 3:9–4:11 (mn=4:3) Low literacy	1. TX: rhyme 2. Cont: No TX	Indiv, 1x15min once	TX: rhyme id Cont: coloring activity on same schedule	After 1 session, better rhyme matching with a large effect ($d=1.27$), no better first phoneme matching at post-test nor 1 month later
Nancollis, Lawri, & Dodd, (2005)	N=213 4:0–5:0 (4:6) Low SES	1. TX: phonemic, n=99 2. Cont: No TX, n=114	Class, 1x45min for 9wks	TX: rhyme id, syllable segment, first phoneme isolate Cont: reg curric	Post-test: Only rhyme tested; rhyme > control but small effect ($\eta^2=.05$) 2yr F/U had moderate effects: rhyme ($\eta^2=.17$) and nonword spell better ($\eta^2=.08$), phoneme segment worse ($\eta^2=.18$)

continued

Table 2., continued

Study <i>Who did it when?</i>	Sample <i>How many, what age, what ability?</i>	Conditions <i>What was compared to what?</i>	Schedule <i>How many, how often, and how long?</i>	Intervention/ Comparison <i>What was taught in each condition?</i>	Results <i>Were the results statistically and clinically significant?</i>
Pre-Phonemic Tasks Present					
Gillon (2005)	N=41 3:0–3:11 (mn=3:3) Speech impaired and typical	1. TX: phonemic for SI, n=12 2. Cont: no TX for typical, n=19 3. Cont2: no TX for matched SI, n=10, retrospectively examined	Grps of 2–3 & indiv, 2x45min/wk for 2–3 4–6wk blocks for 20 sessions over 2 yrs	TX: First phoneme isolate, matching, onset-rime segment and blend, letter-name, letter-sound, along with artic TX Cont: reg curric	Post-test: Rhyme oddity, phoneme matching, and letter recog improved for both, but TX showed greater gain in phoneme matching ($d=1.2$) F/Us at 5 and 6yrs for 10 TX SI and 10 matched controls: no difference on rhyme, alliterate, syllable, isolate, segment and letter-sound F/U at 6yr for 10 TX ch > 10 cont SI on word read and spell
DeBaryshe & Gorecki (2007)	N=126 2:7–4:8 (mn=3:11) Normative	1. TX: literacy, n=51 2. TX: math, n=44 3. Cont: no TX, n=30	Daily class, grp, & home activities for 7mos	Literacy: vocabulary, conversation, letter and print concepts, syllable segment, rhyme id and generate, first sound isolate and generate	No diff on vocab or emergent reading Literacy TX better than math TX or control on phonemic awareness ($d=.50$, $d=.60$) and emergent writing ($d=.47$, $d=.31$).

continued

Table 2., continued

Study Who did it when?	Sample How many, what age, what ability?	Conditions What was compared to what?	Schedule How many, how often, and how long?	Intervention/ Comparison What was taught in each condition?	Results Were the results statistically and clinically significant?
Basic Phonemic Awareness Tasks					
Byrne & Fielding-Barnsley (1991, 1993)	N=126 4:0–5:2 (mn=4:7) Normative	1. TX: phonemic, n=64 2. Cont: vocabulary, n=62	Grps of 4–6, 1x25–30min/wk for 12wks	TX: first, last phoneme isolate and match Cont: vocabulary activities	TX better forced choice phoneme matching ($d=5.2$) and nonword reading ($d=1.8$) than control with very large effects. K F/U: TX better on final phoneme matching, nonword reading, not on first matching, deletion, real word reading or spelling
Hindson et al. (2005)	N=134 No range (mn=4:7) Familial at-risk for reading (FAR) and typical (nonFAR)	1. TX: FAR, n=69 2. TX: nonFAR, n=65 3. Cont: No TX FAR, n=17	Indiv 2–3 x30min/wk for 11–17 sessions, to criterion or maximum	TX: alliterate, first, last sound match; shared book-reading Cont: waitlist for TX, in preschool	Pre-test: FAR < nonFAR on lang and cog, incl phonemic awareness Post-test: FAR and nonFAR improved; nonFAR improved more; TX FAR > Cont FAR on phoneme matching ($d=1.17$), rhyme ($d=.84$), recog naming ($d=.57$), print concepts ($d=.72$) but not letter knowledge K F/U: FAR < nonFAR in word ID, nonword ID, and spell; but FAR in average range

continued

Table 2., continued

Study <i>Who did it when?</i>	Sample <i>How many, what age, what ability?</i>	Conditions <i>What was compared to what?</i>	Schedule <i>How many, how often, and how long?</i>	Intervention/ Comparison <i>What was taught in each condition?</i>	Results <i>Were the results statistically and clinically significant?</i>
Advanced Phonemic Awareness Tasks					
Yeh (2003)	N=44 4:7–5:6 (mn=5:1) Normative	1. TX: rhyme, n=22 2. TX: segment, n=22	Grps of 3–5 2x20—25min for 9wks	Rhyme TX: rhyme and phoneme alliterate and generate Segment TX: blend, segment, substitute and letter-sound	Better for segment TX, esp if attn skills taught with large effects; better on composite phoneme ($\eta^2=.29$), substitution ($\eta^2=.20$), and letter-sound ($\eta^2=.21$)
Hesketh, Dima, & Nelson (2007)	N=42 4:0–4:6 (mn=4:3) Speech impaired	1. \TX: phonemic, n=22 2. Cont: lang stim, n=20	Indiv 2–3 x30min/wk for 20 sessions	TX: Phoneme alliterate, isolate, segment, add/delete Cont: Vocabulary, narrative, print awareness	No diff for alliterate TX better on isolate, segment, add/delete, but only a few ch improved on segment, add/delete
Hatcher, Hulme, & Snowling (2004)	N=410 4–5yrs (mn=4:7) At-risk, n=137; Typical, n=273	1. TX: read/ rhym/ phon, n=102 2. TX: read/ rhym, n=106 3. TX: read/ phon, n=113 4. Cont: read only, n=89	Grps of 10–15 3x10min/wk of phono aware plus “equal” time on reading for 14.5mths over 2yrs	Rhyme: rhyme supply, onset-rime segment Phoneme: sentence segment, syllable segment, phoneme isolate, blend, segment, delete, substitute, transpose Read: phonics, spell words, read text	For typical, no differences among conditions For at-risk, better on phoneme delete & word reading for conds w/ phoneme element; largest effect for read and phoneme condition: phoneme ($d=.76$), nonword reading ($d=1.06$)

PS = Preschool; PK= Pre-Kindergarten; TX= Therapy/Intervention condition; Cont= Control condition; Effect size is reported as a Cohen's d or an eta (η^2). A large effect is $d > 1.0$ or $\eta^2 > .138$ (Meline & Schmitt, 1997).

Table 3. Evaluation of Quality for Review Corpus of Preschool Instruction Studies

	Appropriate and focused question	Participants randomized	Testers blind to group assignment	Groups similar at start of study	Treatment well described	Treatment fidelity reported	Outcomes measures appropriate	Effect size or other clinical significance
van Kleeck, Gillam, & McFadden (1998)	Yes	No	No	No	Yes	No	Yes	Yes
Martin & Byrne (2002)	Yes	Yes	Unclear	Yes	Yes	No	Yes	No
Nancollis, Lawri, & Dodd (2005)	Yes	No	No	Yes	Yes	No	Mostly	Yes
DeBaryshe & Gorecki (2007)	Yes	Yes, by class	Unclear	Yes	No	Yes	Yes	Yes
Byrne & Fielding-Barnsley (1991)	Yes	Yes	Unclear	Yes	Yes	No	Yes	No
Hindson et al. (2005)	Yes	No	Unclear	No	Yes	No	Yes	Descriptive
Gillon (2005)	Yes	No	Unclear	No	Yes	Yes	Yes	Yes
Hesketh, Dima, & Nelson (2007)	Yes	Yes	Yes	Yes	Yes	No	Yes	Descriptive but not calculable
Yeh (2003)	Yes	No	Unclear	Yes	Yes	Yes	Yes	Yes
Hatcher, Hulme, & Snowling, (2004)	Yes	Yes, by class	Unclear	Yes	Yes	Yes	Yes	Yes

Notes: All studies were group experimental or quasi-experimental and published in peer-reviewed journals; quality indicators derived from Scottish Intercollegiate Guidelines Network's Methodology Checklist for Randomized Clinical Trials (sign.ac.uk/methodology/checklists.html) and National Reading Panel (2000).