

What Works Clearinghouse



Phonological Awareness Training

Program Description¹

Phonological awareness, or the ability to detect or manipulate the sounds in words independent of meaning, has been identified as a key early literacy skill and precursor to reading. For the purposes of this review, *phonological awareness training* refers to any practice targeting young children’s phonological awareness abilities.

Phonological awareness training can involve various activities that focus on teaching children to identify, detect, delete, segment, or blend segments of spoken words (i.e., words, syllables, onsets and rimes, phonemes) or to identify, detect, or produce rhyme or alliteration. *Phonologic awareness training* can occur in both regular and special education classrooms. Various curricula are available to support this training.

Research²

Four studies of *phonological awareness training* that fall within the scope of the Early Childhood Education Interventions for Children with Disabilities review protocol meet What Works Clearinghouse (WWC) evidence standards without reservations. The four studies included 78 children with disabilities or developmental delays attending preschool in four locations across the United States. Based on these four studies, the WWC considers the extent of evidence of *phonological awareness training* on children with learning disabilities in early education settings to be small for one domain: communication/language competencies. Six other domains are not reported in this intervention report. (See the Effectiveness Summary for further description of all domains.)

Effectiveness

Phonological awareness training was found to have potentially positive effects on communication/language competencies for children with learning disabilities in early education settings.

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Table 1. Summary of findings³

| Outcome domain | Rating of effectiveness | Improvement index (percentile points) | | Number of studies | Number of students | Extent of evidence |
|-------------------------------------|------------------------------|---------------------------------------|------------|-------------------|--------------------|--------------------|
| | | Average | Range | | | |
| Communication/language competencies | Potentially positive effects | +13 | -16 to +46 | 4 | 78 | Small |

Program Information

Background

Phonological awareness training does not have a single developer responsible for providing information or materials. The interventions described in this report were developed by the study authors and are not available for distribution through a common developer. However, many online resources are available for readers interested in using *phonological awareness training* practices. A list of examples follows, although these sources have not been reviewed or endorsed by the WWC:

- Florida Center for Reading Research: <http://www.fcrr.org>
- Foundations of Reading: Effective Phonological Awareness Instruction and Progress Monitoring: http://www.meadowscenter.org/vgc/materials/primary_phono_awareness.asp
- Ideas and Activities for Developing Phonological Awareness Skills: A Teacher Resource Supplement to the Virginia Early Intervention Reading Initiative: http://www.doe.virginia.gov/instruction/response_intervention/resources/ideas_activities_develop_phonological.pdf
- Improving Reading Fluency: Phonological Awareness Training: http://www.speechpathology.com/Articles/article_detail.asp?article_id=68
- National Reading Panel: <http://www.nationalreadingpanel.org>
- Phonological Awareness: Instructional and Assessment Guidelines: <http://www.idonline.org/article/6254>
- Phonological Awareness Skills and Spelling Skills: <http://cla.calpoly.edu/~jrubba/phon/phonaware.html>
- Reading Recovery Council of North America: Phonics: http://www.readingrecovery.org/reading_recovery/phonics/index.asp
- Reading Rockets: Teacher Toolbox—Phonological Awareness: The Phive Phones of Reading: <http://www.readingrockets.org/firstyear/fyt.php?SUB=33>
- Target the Problem! Phonological and Phonemic Awareness: <http://www.readingrockets.org/helping/target/phonologicalphonemic>
- University of Oregon—Center on Teaching and Learning: Big Ideas in Beginning Reading: <http://reading.uoregon.edu/>

Program details

Phonological awareness training practices vary in their scope and may include a variety of activities that are intended to enable children to detect and understand sounds in language.⁴ In particular, *phonological awareness training* practices tend to focus on teaching children to rhyme or to detect alliteration in language. Examples of these activities include:

- rhyme detection training (e.g., teachers engage children in a game involving rhyming words and questions about which word in a series of three does not sound like the others),
- blending training (e.g., teachers say three sounds and teach children how to blend the sounds together to make a word), and
- segmentation training (e.g., teachers say a short word such as “cat” and teach children how to separate the word into the three sounds that make up the word) at the phoneme, syllable, or word level.

Phonological awareness training practices can be used by teachers or practitioners with children individually, in pairs, or in small groups. These practices may be part of the core curriculum or used as a supplement to the regular classroom curriculum, and they have been used with specific subpopulations of children, such as those with developmental delays and speech/language or learning disabilities.

Cost

Information is not available about the costs of teacher or practitioner training and implementation of *phonological awareness training* practices.

Research Summary

Two hundred twenty-five studies reviewed by the WWC investigated the effects of *phonological awareness training* on children with learning disabilities in early education settings. Four studies (O’Connor, Jenkins, Leicester, & Slocum, 1993; Sweat, 2003; Tyler, Lewis, Haskill, & Tolbert, 2003; Tyler, Gillon, Macrae, & Johnson, 2011) are randomized controlled trials that meet WWC evidence standards without reservations. Those four studies are summarized in this report. The remaining 221 studies do not meet either WWC eligibility screens or evidence standards. (See references beginning on p. 6 for citations for all 225 studies.)

Table 2. Scope of reviewed research

| | |
|---|------------------------|
| Grade | Pre-kindergarten |
| Delivery method | Individual/Small group |
| Program type | Practice/Curriculum |
| Studies reviewed | 225 |
| Meets WWC standards without reservations | 4 studies |
| Meets WWC standards with reservations | 0 studies |

Four additional studies were reviewed against the pilot Single-Case Design standards. One study met the pilot Single-Case Design standards without reservations, no studies met the pilot Single-Case Design standards with reservations, and three did not meet pilot Single-Case Design standards. Studies reviewed against pilot Single-Case Design standards are listed in Appendix E and do not contribute to the intervention’s rating of effectiveness.

Summary of studies meeting WWC evidence standards without reservations

O’Connor et al. (1993) examined the effects of *phonological awareness training* on 22 children ages 4 to 6 with developmental delays in a university preschool. The study used a randomized block design, stratifying children by age and whether they were in a morning or afternoon class, and ranking them by a cognitive pretest. Children were assigned to one of three types of *phonological awareness training* or a no-treatment comparison group, but only one set of contrasts across the groups met WWC standards: *phonological awareness training with a blending focus* versus the comparison group.⁵ Children in the *phonological awareness training with a blending focus* group participated in small groups (three to five children) for 10 minutes a day, four times a week, for seven weeks.

Sweat (2003) randomly assigned 20 children ages 3 to 5 with morphological and phonological impairments to one of two groups. Children in the intervention group received *phonological awareness training*, and children in the comparison group participated in a morphosyntactic intervention, which focused on finite morphemes (e.g., /s/ as in “sleeps” or /d/ as in “happened”). Both interventions included weekly individual and group sessions over a 12-week period. The children in the sample attended one of four preschools.

Tyler et al. (2003) examined the effects of *phonological awareness training* (relative to a morphosyntactic intervention) in a sample of 20 children ages 3 to 5 with co-occurring speech and language impairments. Children in the intervention group received *phonological awareness training*, which included goal attack strategies related to awareness of target sounds, differences and similarities between target sounds, and production practice. Children in the comparison group received a morphosyntactic intervention, which included goal attack strategies related to awareness of morphosyntactic targets in the context of children’s books and songs, focused stimulation, and elicited production of target morphemes. Both of the interventions included weekly individual and group sessions over a 12-week period.

Tyler et al. (2011) randomly assigned children ages 3 to 5 with co-occurring speech and language impairments, using a matched pairs design. The children attended preschool in one of two sites, either the United States or New Zealand; this WWC review includes 16 children attending the US site.⁶ Children in the intervention group received a phonemic awareness intervention, with an integrated direct speech focus. Children in the comparison group received a morphosyntactic intervention, focusing on morphophonemic interactions and finite morphemes. Each

group received its assigned intervention in a small-group setting, with instruction totaling 24 hours administered over 12 weeks separated into two blocks.

Summary of studies meeting WWC evidence standards with reservations

No studies of *phonological awareness training* meet WWC evidence standards with reservations.

Effectiveness Summary

The WWC review of interventions for Early Childhood Education Interventions for Children with Disabilities addresses student outcomes in seven domains: cognitive development, communication/language competencies, literacy, math achievement, social-emotional development and behavior, functional abilities, and physical well-being. The four studies that contribute to the effectiveness rating in this report cover one domain: communication/language competencies. The findings below present the authors’ estimates and WWC-calculated estimates of the size and statistical significance of the effects of *phonological awareness training* on children with learning disabilities in early education settings. For a more detailed description of the rating of effectiveness and extent of evidence criteria, see the WWC Rating Criteria on p. 41.

Summary of effectiveness for the communication/language competencies domain

Four studies reported findings in the communication/language competencies domain.

O’Connor et al. (1993) found, and the WWC confirmed, three statistically significant positive differences between the intervention (*phonological awareness training with a blending focus*) and comparison groups on outcomes targeting “blending” knowledge in the communication/language competencies domain. Because there were three statistically significant positive impacts and no statistically significant negative impacts, this study is characterized as having statistically significant positive effects.

Sweat (2003) found two statistically significant differences between the intervention and comparison groups.⁷ However, according to WWC calculations, neither of these differences was statistically significant. The average effect size across all findings is large enough to be considered substantively important. Therefore, the study is characterized as having substantively important positive effects according to WWC criteria (that is, at least 0.25 standard deviation).

Tyler et al. (2003) found, and the WWC confirmed, no statistically significant differences between the intervention and comparison groups. According to WWC criteria, this study is characterized as having an indeterminate effect.

Tyler et al. (2011) found, and the WWC confirmed, no statistically significant differences between the intervention and comparison groups. According to WWC criteria, this study is characterized as having an indeterminate effect.

Thus, for the communication/language competencies domain, one study showed a statistically significant positive effect, one study showed a substantively important positive effect, no studies showed a statistically significant or substantively important negative effect, and two studies showed an indeterminate effect. This results in a rating of potentially positive effects, with a small extent of evidence.

Table 3. Rating of effectiveness and extent of evidence for the communication/language competencies domain

| Rating of effectiveness | Criteria met |
|--|---|
| <p>Potentially positive effects <i>Evidence of a positive effect with no overriding contrary evidence.</i></p> | <p>The review of <i>phonological awareness training</i> in the communication/language competencies domain had one study showing a statistically significant positive effect, one study showing a substantively important positive effect, no studies showing a statistically significant or substantively important negative effect, and two studies showing an indeterminate effect.</p> |
| Extent of evidence | Criteria met |
| <p>Small</p> | <p>The review of <i>phonological awareness training</i> in the communication/language competencies domain was based on four studies that included 10 locations and 78 children.</p> |

References

Studies that meet WWC evidence standards without reservations

- O'Connor, R. E., Jenkins, J. R., Leicester, N., & Slocum, T. A. (1993). Teaching phonological awareness to young children with learning disabilities. *Exceptional Children*, 59(6), 532–546.
- Sweat, L. M. (2003). Comparing the effects of morphosyntax and phonology intervention on final consonant clusters in finite morphemes and final consonant inventories. *Masters Abstracts International*, 42(01), 31–231.
- Tyler, A. A., Gillon, G., Macrae, T., & Johnson, R. L. (2011). Direct and indirect effects of stimulating phoneme awareness vs. other linguistic skills in preschoolers with co-occurring speech and language impairments. *Topics in Language Disorders*, 31(2), 128–144.
- Tyler, A. A., Lewis, K. E., Haskill, A., & Tolbert, L. C. (2003). Outcomes of different speech and language goal attack strategies. *Journal of Speech, Language, and Hearing Research*, 46(5), 1077–1094.

Studies that do not meet WWC evidence standards

- Klein, E. S. (1996). Phonological/traditional approaches to articulation therapy: A retrospective group comparison. *Language, Speech, and Hearing Services in Schools*, 27(4), 314–323. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.
- Laing, S. P., & Espeland, W. (2005). Low intensity phonological awareness training in a preschool classroom for children with communication impairments. *Journal of Communication Disorders*, 38(1), 65–82. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.
- Tyler, A. A., Lewis, K. E., Haskill, A., & Tolbert, L. C. (2002). Efficacy and cross-domain effects of a morphosyntax and a phonology intervention. *Language, Speech, and Hearing Services in Schools*, 33(1), 52–66. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.
- Tyler, A. A., & Watterson, K. H. (1991). Effects of phonological versus language intervention in preschoolers with both phonological and language impairment. *Child Language Teaching and Therapy*, 7(2), 141. The study does not meet WWC evidence standards because it is a randomized controlled trial in which the combination of overall and differential attrition rates exceeds WWC standards for this area, and the subsequent analytic intervention and comparison groups are not shown to be equivalent.
- Van Kleeck, A., Gillam, R. B., & McFadden, T. U. (1998). A study of classroom-based phonological awareness training for preschoolers with speech and/or language disorders. *American Journal of Speech-Language Pathology*, 7(3), 65–76. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.
- Wolfe, V., Presley, C., & Mesaris, J. (2003). The importance of sound identification training in phonological intervention. *American Journal of Speech-Language Pathology*, 12(3), 282–288. The study does not meet WWC evidence standards because the measures of effectiveness cannot be attributed solely to the intervention—there was only one unit assigned to one or both conditions.

Studies that are ineligible for review using the Early Childhood Education Interventions for Children with Disabilities Evidence Review Protocol

- Abadzi, H. (2003). *Teaching adults to read better and faster: Results from an experiment in Burkina Faso* (Policy Research Working Paper Series: 3057). Washington, DC: The World Bank. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Abshire, S. A. (2006). *Exploring implicit versus explicit methods of teaching phonemic awareness instruction to kindergarten students* (Unpublished doctoral dissertation). Louisiana State University, Baton Rouge. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Adema, S. S. (1998). *An examination of phonological awareness training and kindergarten children's spelling* (Unpublished master's thesis). Calvin College, Grand Rapids, MI. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Alexander, A. W., Andersen, H. G., Heilman, P. C., & Voeller, K. K. (1991). Phonological awareness training and remediation of analytic decoding deficits in a group of severe dyslexics. *Annals of Dyslexia*, 41, 193–206. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Almost, D., & Rosenbaum, P. (1998). Effectiveness of speech intervention for phonological disorders: A randomized controlled trial. *Developmental Medicine and Child Neurology*, 40(5), 319–325. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Al Otaiba, S., Puranik, C. S., Ziolkowski, R. A., & Montgomery, T. M. (2009). Effectiveness of early phonological awareness interventions for students with speech or language impairments. *Journal of Special Education*, 43(2), 107–128. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Aoyama, K., Peters, A. M., & Winchester, K. S. (2010). Phonological changes during the transition from one-word to productive word combination. *Journal of Child Language*, 37(1), 145–157. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Arrow, A. W. (2007). *Potential precursors to the development of phonological awareness in preschool children* (Unpublished doctoral dissertation). University of Auckland, New Zealand. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Asfendis, G. (2009). Phonemic awareness and early intervention: An evaluation of a pilot phonemic awareness program. *Dissertation Abstracts International*, 69(8-A), 3027. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Atwill, K., Blanchard, J., Christie, J., Gorin, J. S., & Garcia, H. S. (2010). English-language learners: Implications of limited vocabulary for cross-language transfer of phonemic awareness with kindergartners. *Journal of Hispanic Higher Education*, 9(2), 104–129. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Barker, T., & Torgesen, J. K. (1995). An evaluation of computer-assisted instruction in phonological awareness with below average readers. *Journal of Educational Computing Research*, 13(1), 89–103. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Barron, R. W., Golden, J. O., Seldon, D. M., & Tait, C. F. (1992). Teaching prereading skills with a talking computer: Letter-sound knowledge and print feedback facilitate nonreaders' phonological awareness training. *Reading and Writing*, 4(2), 179–204. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Beach, D. W. (2004). *The effects of a school district's kindergarten readiness summer program on phonological awareness skills of at-risk prekindergarten students: A regression discontinuity analysis* (Unpublished doctoral dissertation). Utah State University, Logan. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Bennett, L. S. M. (1998). Teaching phonological awareness with an emphasis on linkage to reading. *Dissertation Abstracts International*, 60(06A), 211-1962. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Bentin, S., & Leshem, H. (1993). On the interaction between phonological awareness and reading acquisition: It's a two-way street. *Annals of Dyslexia*, 43, 125–148. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Berninger, V. W., Vaughan, K. B., Abbott, R. D., Abbott, S. P., Rogan, L. W., Brooks, A.,...Graham, S. (1997). Treatment of handwriting problems in beginning writers: Transfer from handwriting to composition. *Journal of Educational Psychology*, 89(4), 652–666. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Bianco, M., Bressoux, P., Doyen, A., Lambert, E., Lima, L., Pellenq, C., & Zorman, M. (2010). Early training in oral comprehension and phonological skills: Results of a three-year longitudinal study. *Scientific Studies of Reading*, 14(3), 211–246. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Biwer, D. L. (2002). Effects of three phonological awareness programs on kindergarten students identified as at risk for reading failure. *Dissertation Abstracts International*, 63(06A), 140-2106. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Blachman, B. A. (1991). Early intervention for children's reading problems: Clinical applications of the research in phonological awareness. *Topics in Language Disorders*, 12(1), 51–65. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Blachman, B. A. (1994). What we have learned from longitudinal studies of phonological processing and reading, and some unanswered questions: A response to Torgesen, Wagner, and Roshotte. *Journal of Learning Disabilities*, 27(5), 287–291. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Blachman, B. A., Tangel, D. M., Ball, E. W., Black, R., & McGraw, C. K. (1999). Developing phonological awareness and word recognition skills: A two-year intervention with low-income, inner-city children. *Reading and Writing: An Interdisciplinary Journal*, 11(3), 239–273. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Blumsack, J. B. (1998). Teaching phonological awareness to children with language impairments. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 58(7-A), 2587. The study is ineligible for review because it does not disaggregate findings for the age or grade range specified in the protocol.
- Bodé, S., & Content, A. (2011). Phonological awareness in kindergarten: A field study in Luxembourgish schools. *European Journal of Psychology of Education*, 26(1), 109–128. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Bowers, P. N., Kirby, J. R., & Deacon, S. H. (2010). The effects of morphological instruction on literacy skills: A systematic review of the literature. *Review of Educational Research*, 80(2), 144–179. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Bowyer-Crane, C., Snowling, M. J., Duff, F. J., Fieldsend, E., Carroll, J. M., Miles, J....Hulme, C. (2008). Improving early language and literacy skills: Differential effects of an oral language versus a phonology with reading intervention. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 49(4), 422–432. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Brady, S., Fowler, A., Stone, B., & Winbury, N. (1994). Training phonological awareness: A study with inner-city kindergarten children. *Annals of Dyslexia*, 44, 26–59. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Brennan, F., & Ireson, J. (1997). Training phonological awareness: A study to evaluate the effects of a program of metalinguistic games in kindergarten. *Reading and Writing*, 9(4), 241–263. The study is ineligible for review

because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Brooks, G. (1999). What works for slow readers? *Support for Learning*, 14(1), 27. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Burrows, C., Marinac, J. V., & Pitty, K. (2009). *Phonological awareness training for high schools (PATHS)*. San Diego, CA: Plural Publishing. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Bus, A. G., & van Ijzendoorn, M. H. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Educational Psychology*, 91(3), 403–414. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Butler, K. G. (1999). From oracy to literacy: Changing clinical perceptions. *Topics in Language Disorders*, 20(1), 14–32. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Cardoso-Martins, C., Mesquita, T. C. L., & Ehri, L. (2011). Letter names and phonological awareness help children to learn letter-sound relations. *Journal of Experimental Child Psychology*, 109(1), 25–38. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Casalis, S., & Cole, P. (2009). On the relationship between morphological and phonological awareness: Effects of training in kindergarten and in first-grade reading. *First Language*, 29(1), 113–142. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Chen, S. (2004). *Identifying reading disabilities in Taiwanese aboriginal students* (Unpublished doctoral dissertation). National Taiwan Normal University, Taipei. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Chen, Y. (2005). The role of phonological and morphological awareness in early Chinese reading of young children who are deaf or hard of hearing in Taiwan. *Dissertation Abstracts International*, 66(05A), 152-1712. The study is ineligible for review because it does not examine an intervention conducted in English.
- Chera, P., & Wood, C. (2003). Animated multimedia “talking books” can promote phonological awareness in children beginning to read. *Learning and Instruction*, 13(1), 33–52. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Chih-Hsin, L. (2006). *The role of phonological awareness in Taiwanese students’ English reading and pronunciation acquisition* (Unpublished master’s thesis). National Tsing Hua University, Hsinchu City, Taiwan. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Claessen, M., Heath, S., Fletcher, J., Hogben, J., & Leitao, S. (2009). Quality of phonological representations: A window into the lexicon? *International Journal of Language & Communication Disorders*, 44(2), 121–144. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Cologon, K., Cupples, L., & Wyver, S. R. (2006). *Phonological awareness and “silent reading”: The benefits of intervention and early intervention in reading for children who have Down syndrome* (Unpublished doctoral dissertation). Macquarie University, Sydney, Australia. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Colon, E. P. (2006). Utility of the Lindamood Phoneme Sequencing Program (LiPS) for classroom-based reading instruction. *Dissertation Abstracts International*, 67(1-A), 131. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Constantine, J. L. (2001). Integrating thematic-fantasy play and phonological awareness activities in a speech-language preschool environment. *Journal of Instructional Psychology*, 28(1), 9–14. The study is ineligible for review because it does not use a comparison group design or a single-case design.

- Conway, T. W. (2003). *Measuring phonological processing and phonological working memory in adults with developmental dyslexia: A functional magnetic resonance imaging study* (Unpublished doctoral dissertation). University of Florida, Gainesville. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Cooke, N. L., Galloway, T. W., Kretlow, A. G., & Helf, S. (2011). Impact of the script in a supplemental reading program on instructional opportunities for student practice of specified skills. *The Journal of Special Education, 45*(1), 28–42. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Dahlen, K. (2008). Aptitude, rehearsal, and skin conductance response in foreign vocabulary learning. *Dissertation Abstracts International, 69*(01A), 177-199. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Davis, C. A., Lane, K. L., Sutherland, K., Gunter, P. L., Denny, R. K., Pickens, P., & Wehby, J. (2004). *Differentiating curriculum and instruction on behalf of students with emotional and behavioral disorders within general education settings*. Arlington, VA: Council for Exceptional Children. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- de Jong, P. F. (2007). Phonological awareness and the use of phonological similarity in letter-sound learning. *Journal of Experimental Child Psychology, 98*(3), 131–152. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Denne, M., Langdown, N., Pring, T., & Roy, P. (2005). Treating children with expressive phonological disorders: Does phonological awareness therapy work in the clinic? *International Journal of Language & Communication Disorders, 40*(4), 493–504. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Desmond, S. K. (2008). The effects of rhyme on phonological sensitivities. *Dissertation Abstracts International, 69*(08A), 108. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Dodd, B., & Gillon, G. (2001). Exploring the relationship between phonological awareness, speech impairment, and literacy. *Advances in Speech Language Pathology, 3*(2), 139–147. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Dodd, B., McCormack, P., & Woodyatt, G. (1993). Evaluation of an intervention program: Relation between children's phonology and parents' communicative behavior. *American Journal on Mental Retardation, 98*(5), 632–645. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Dwyer, J. E., & Rule, D. L. (1997). *The effects of a kindergarten prevention program on special education referrals, classifications and retentions* (ERIC Document Reproduction Service No. ED 406 806). The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Edwards, L. L. (2000). The role of spelling and handwriting in kindergarten instruction: An examination of the effects of two beginning reading instructional interventions on the reading and spelling achievement of kindergarten students at-risk of reading disabilities. *Dissertation Abstracts International, 61*(09A), 223-3512. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Elbert, M., Dinnsen, D., Swartzlander, P., & Chin, S. (1990). Generalization to conversational speech. *Journal of Speech and Hearing Disorders, 55*(4), 694–699. The study is ineligible for review because it does not use a comparison group design or a single-case design.

- Elbert, M., Powell, T., & Swartzlander, P. (1991). Toward a technology of generalization: How many exemplars are sufficient? *Journal of Speech and Hearing Research, 34*(1), 81–87. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Elbro, C., & Petersen, D. K. (2004). Long-term effects of phoneme awareness and letter sound training: An intervention study with children at risk for dyslexia. *Journal of Educational Psychology, 96*(4), 660–670. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Ennemoser, M., Kuspert, P., Roth, E., & Schneider, W. (1999). Kindergarten prevention of dyslexia: Does training in phonological awareness work for everybody? *Journal of Learning Disabilities, 32*(5), 429–436. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Epstein, J. N. (1995). Accelerating the literacy development of disadvantaged preschool children: An experimental evaluation of a Head Start emergent literacy curriculum. *Dissertation Abstracts International, 55*(11-B), 5065. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Fisher Modin, N. G. (1991). The effect of extended-day and phonological awareness training on reading readiness skills of kindergarten children in at-risk schools. *Dissertation Abstracts International, 53*(02A), 93-453. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Floyd, S. W. (1999). Does phonological awareness predict reading acquisition? A comparison of scores on auditory subtests of the “Phonological Awareness Test” to scores on the “Slosson Oral Reading Test” and the grade 2 “Scott Foresman Class Placement Test: Comprehension Subtest.” *Dissertation Abstracts International, 60*(04B), 111-1568. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Foster, K. C., Erickson, G. C., Foster, D. F., & Brinkman, D. (1994). Computer administered instruction in phonological awareness: Evaluation of the Daisy Quest program. *Journal of Research & Development in Education, 27*(2), 126–137. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Fowler, A., Stone, B., & Winbury, N. (1994). Training phonological awareness: A study with inner-city kindergarten children. *Annals of Dyslexia, 44*(1), 26–59. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Frederickson, N., & Wilson, J. (1996). Phonological awareness training: A new approach to phonics teaching. *Dyslexia, 2*(2), 101–120. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Fuchs, D., Fuchs, L. S., Thompson, A., Al Otaiba, S., Yen, L., Yang, N. J., & O’Connor, R. E. (2001). Is reading important in reading-readiness programs? A randomized field trial with teachers as program implementers. *Journal of Educational Psychology, 93*(2), 251–267. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Fuchs, D., Fuchs, L. S., Thompson, A., Al Otaiba, S., Yen, L., Yang, N. J.,...O’Connor, R. E. (2002). Exploring the importance of reading programs for kindergartners with disabilities in mainstream classrooms. *Exceptional Children, 68*(3), 295–311. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Gabig, C. S. (2010). Phonological awareness and word recognition in reading by children with autism. *Communication Disorders Quarterly, 31*(2), 67–85. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Gierut, J. A., & Morrisette, M. L. (2010). Phonological learning and lexicality of treated stimuli. *Clinical Linguistics & Phonetics*, 24(2), 122–140. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Gillam, R. B., & Butler, K. G. (1996). *Working memory and language impairment: New perspectives*. Frederick, MD: Aspen Publishers. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Gillam, R. B., & van Kleeck, A. (1996). Phonological awareness training and short-term working memory: Clinical implications. *Topics in Language Disorders*, 17(1), 72–81. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Gillam, S. L., Fargo, J., Foley, B., & Olszewski, A. (2011). A nonverbal phoneme deletion task administered in a dynamic assessment format. *Journal of Communication Disorders*, 44(2), 236–245. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Gillon, G. T. (2005). Facilitating phoneme awareness development in 3- and 4-year-old children with speech impairment. *Language, Speech, and Hearing Services in Schools*, 36(4), 308–324. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Gillon, G. T. (2007). *Phonological awareness: From research to practice*. New York: Guilford Publications. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Girbau, D., & Schwartz, R. G. (2007). Non-word repetition in Spanish-speaking children with specific language impairment (SLI). *International Journal of Language & Communication Disorders*, 42(1), 59–75. The study is ineligible for review because it does not examine an intervention conducted in English.
- Glaspey, A. M., & Stoel-Gammon, C. (2005). Dynamic assessment in phonological disorders: The scaffolding scale of stimulability. *Topics in Language Disorders*, 25(3), 220–230. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Goldstein, B., & Iglesias, A. (1991, November). *The development and treatment of phonological processes in Spanish speaking children*. Paper presented at the annual convention of the American Speech-Language-Hearing Association, Atlanta, GA. The study is ineligible for review because it does not examine an intervention conducted in English.
- Goldsworthy, C. L. (2003). *Developmental reading disabilities: A language based treatment approach* (2nd ed.). Clifton Park, NY: Thomas Delmar Learning. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Additional source:**
- Goldsworthy, C. L. (1996). *Developmental reading disabilities: A language based treatment approach*. San Diego, CA: Singular Publishing Group.
- Gonzalez, J. E., & Nelson, J. R. (2003). Stepping stones to literacy: A prevention-oriented phonological awareness training program. *Reading & Writing Quarterly: Overcoming Learning Difficulties*, 19(4), 393–398. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Gorman, B. K. (2006). *The relationships between working memory, language, and phonological processing: Evidence from cross-language transfer in bilinguals* (Unpublished doctoral dissertation). University of Texas at Austin. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Gross, J., & Garnett, J. (1994). Preventing reading difficulties: Rhyme and alliteration in the real world. *Association of Educational Psychologists Journal*, 9(4), 235–240. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

- Gruba, G. G. (1997). Evaluating dynamic and static measurement sensitivity to the effects of a phonological awareness intervention for kindergarten children. *Dissertation Abstracts International*, 58(07A), 122-2530. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Guidry, L. O. (2003). *A phonological awareness intervention for at-risk preschoolers: The effects of supplemental, intensive, small-group instruction* (Unpublished doctoral dissertation). Louisiana State University, Baton Rouge. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Gustafson, S., Samuelsson, S., & Rönnerberg, J. (2000). Why do some resist phonological intervention? A Swedish longitudinal study of poor readers in grade 4. *Scandinavian Journal of Educational Research*, 44(2), 145–162. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Hamre, B. K., Justice, L. M., Pianta, R. C., Kilday, C., Sweeney, B., Downer, J. T., & Leach, A. (2010). Implementation fidelity of My Teaching Partner literacy and language activities: Association with preschoolers' language and literacy growth. *Early Childhood Research Quarterly*, 25(3), 329–347. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Harbers, H. M., Paden, E. P., & Halle, J. W. (1999). Phonological awareness and production: Changes during intervention. *Language, Speech, and Hearing Services in Schools*, 30(1), 50–60. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Hatcher, P. J. (2000). Reading intervention need not be negligible: Response to Cossu (1999). *Reading and Writing*, 13(3–4), 349–355. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Hatcher, P. J. (2000). Sound links in reading and spelling with discrepancy-defined dyslexics and children with moderate learning difficulties. *Reading and Writing*, 13(3–4), 257–272. The study is ineligible for review because it does not disaggregate findings for the age or grade range specified in the protocol.
- Hatcher, P. J., & Hulme, C. (1999). Phonemes, rhymes, and intelligence as predictors of children's responsiveness to remedial reading instruction: Evidence from a longitudinal intervention study. *Journal of Experimental Child Psychology*, 72(2), 130. The study is ineligible for review because it does not disaggregate findings for the age or grade range specified in the protocol.
- Hatcher, P. J., Hulme, C., Miles, J. N., Carroll, J. M., Hatcher, J., Gibbs, S., & Snowling, M. J. (2006). Efficacy of small group reading intervention for beginning readers with reading-delay: A randomised controlled trial. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 47(8), 820–827. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Hatcher, P. J., Hulme, C., & Snowling, M. J. (2004). Explicit phoneme training combined with phonic reading instruction helps young children at risk of reading failure. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 45(2), 338–358. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Hatfield, R. L. (2003). *Comparisons of reading scores in two Tennessee elementary schools between students receiving and not receiving specialized training in phonemic awareness* (Unpublished doctoral dissertation). East Tennessee State University, Johnson City. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Hesketh, A., Adams, C., Nightingale, C., & Hall, R. (2000). Phonological awareness therapy and articulatory training approaches for children with phonological disorders: A comparative outcome study. *International Journal of Language & Communication Disorders*, 35(3), 337–354. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

- Hesketh, A., Dima, E., & Nelson, V. (2007). Teaching phoneme awareness to pre-literate children with speech disorder: A randomized controlled trial. *International Journal of Language & Communication Disorders, 42*(3), 251–271. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Hjelmquist, E., & von Euler, C. (2002). *Dyslexia and literacy*. London: Whurr Publishers. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Hoffman, P. R., Norris, J. A., & Monjure, J. (1990). Comparison of process targeting and whole language treatments for phonologically delayed preschool children. *Language, Speech, and Hearing Services in Schools, 21*(2), 102–109. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Hogan, T. P., Catts, H. W., & Little, T. D. (2005). The relationship between phonological awareness and reading: Implications for the assessment of phonological awareness. *Language, Speech, and Hearing Services in Schools, 36*(4), 285–293. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Høien-Tengesdal, I. (2010). Is the simple view of reading too simple? *Scandinavian Journal of Educational Research, 54*(5), 451–469. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Hsin, Y. (2007). Effects of phonological awareness instruction on pre-reading skills of preschool children at risk for reading disabilities. *Dissertation Abstracts International, 68*(08A), 249-3344. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Hurry, J., & Sylva, K. (2007). Long-term outcomes of early reading intervention. *Journal of Research in Reading, 30*(3), 227–248. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Jerger, M. A. (1996). Phoneme awareness and the role of the educator. *Intervention in School and Clinic, 32*(1), 5–13. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Johnson-Davis, C. (1993). The determinants of response to phonological awareness training. *Dissertation Abstracts International, 55*(02A), 107-246. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Johnston, R. S., & Watson, J. E. (2004). Accelerating the development of reading, spelling and phonemic awareness skills in initial readers. *Reading and Writing, 17*(4), 327–357. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Justice, L. M., Kaderavek, J., Bowles, R., & Grimm, K. (2005). Language impairment, parent-child shared reading, and phonological awareness: A feasibility study. *Topics in Early Childhood Special Education, 25*(3), 143–156. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Keilmann, A., & Wintermeyer, M. (2008). Is a specialised training of phonological awareness indicated in every preschool child? *Folia Phoniatica Et Logopaedica: Official Organ of the International Association of Logopedics and Phoniatrics (IALP), 60*(2), 73–79. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Kennedy, E. J., & Flynn, M. C. (2003). Early phonological awareness and reading skills in children with Down syndrome. *Down's Syndrome, Research and Practice: The Journal of the Sarah Duffen Centre, 8*(3), 100–109. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Kerr, J. M. (2001). The development of phonological awareness in African American inner-city kindergarten students. *Dissertation Abstracts International*, 62(03A), 232-962. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Kerstholt, M. T., Van Bon, W. H. J., & Schreuder, R. (1997). Using visual support in preschool phonemic segmentation training. *Reading and Writing: An Interdisciplinary Journal*, 9(4), 265–283. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Kjeldsen, A. C., Niemi, P., & Oloffson, A. (2003). Training phonological awareness in kindergarten level children: Consistency is more important than quantity. *Learning and Instruction*, 13(4), 349–365. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Kourea, L. (2007). Effects of a supplemental reading intervention package on the reading skills of English speakers and English language learners in three urban elementary schools: A follow-up investigation. *Dissertation Abstracts International*, 68(06A), 327-2405. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Kozminsky, L., & Kozminsky, E. (1995). The effects of early phonological awareness training on reading success. *Learning & Instruction*, 5(3), 187–201. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Lachney, R. P. (2002). *Adult-mediated reading instruction for third through fifth grade children with reading difficulties* (Unpublished doctoral dissertation). Louisiana State University, Baton Rouge. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Lane, K. L., Fletcher, T., Carter, E. W., Dejud, C., & DeLorenzo, J. (2007). Paraprofessional-led phonological awareness training with youngsters at risk for reading and behavioral concerns. *Remedial and Special Education*, 28(5), 266–276. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Lane, K. L., O’Shaughnessy, T. E., Lambros, K. M., Gresham, F. M., & Beebe-Frankenberger, M. E. (2001). The efficacy of phonological awareness training with first-grade students who have behavior problems and reading difficulties. *Journal of Emotional and Behavioral Disorders*, 9(4), 219–231. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Lang, K. B. (2008). Curbing the Matthew effect: A group-based intervention for improving rapid automatic naming skills. *Dissertation Abstracts International*, 68(11B), 249-7690. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Layton, L., Deeny, K., Upton, G., & Tall, G. (1998). A pre-school training programme for children with poor phonological awareness: Effects on reading and spelling. *Journal of Research in Reading*, 21(1), 36–52. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Le Roux, S. G., Hugo, A. J., Muller, H., & Nel, N. M. (2007). Phonological awareness among grade 0 learners as predictor of future reading success [Afrikaans]. Fonologiese bewustheid by graad 0-leerders as voorspeller van latere lees, sukses. *Tydskrif Vir Geesteswetenskappe*, 47(3), 373–385. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Leafstedt, J. M., Richards, C. R., & Gerber, M. M. (2004). Effectiveness of explicit phonological-awareness instruction for at-risk English learners. *Learning Disabilities Research & Practice*, 19(4), 252–261. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- League, M. B. (2001). The effects of the intensity of phonological awareness instruction on the acquisition of literacy skills. *Dissertation Abstracts International*, 62(10A), 196-3299. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Leask, A., & Hinchliffe, F. (2007). The effect of phonological awareness intervention on non-word spelling ability in school-aged children: An analysis of qualitative change. *Advances in Speech Language Pathology*, 9(3), 226–241. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Leitao, S., & Fletcher, J. (2004). Literacy outcomes for students with speech impairment: Long-term follow-up. *International Journal of Language & Communication Disorders*, 39(2), 245–256. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Lemons, C. J. (2010). Exploring the effectiveness of phonics-based instruction for children with Down syndrome. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 70(7-A), 2459. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Longwell, J. L. K. (2009). *Effects of three early literacy interventions in the preschool classroom comparing phonological awareness training, dialogic reading, and a combination condition in small groups* (Unpublished doctoral dissertation). Louisiana State University, Baton Rouge. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Lonigan, C. J. (2006). Development, assessment, and promotion of preliteracy skills. *Early Education and Development*, 17(1), 91–114. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Lonigan, C. J., Driscoll, K., Phillips, B., Cantor, B., Anthony, J., & Goldstein, H. (2003). A computer-assisted instruction phonological sensitivity program for preschool children at-risk for reading problems. *Journal of Early Intervention*, 25(4), 248–262. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Lundberg, I. (1988). Preschool prevention of reading failures: Does training in phonological awareness work? In R. Masland & M. Masland (Eds.), *Preschool prevention of reading failure* (pp. 163–176). Parkton, MD: York Press. The study is ineligible for review because it does not occur within the time frame specified in the protocol.
- Lyster, S. H. (1998). Preventing reading failure: A follow-up study. *Dyslexia*, 4(3), 132–144. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Lyster, S. H. (2002). The effects of morphological versus phonological awareness training in kindergarten on reading development. *Reading and Writing*, 15(3–4), 261–294. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Macaruso, P., & Rodman, A. (2011). Efficacy of computer-assisted instruction for the development of early literacy skills in young children. *Reading Psychology*, 32(2), 172–196. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- MacRoy-Higgins, M. (2009). Word learning and phonological representations in children who are late talkers. *Dissertation Abstracts International*, 70(02B), 116-977. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Majsterek, D. J., Shorr, D. N., & Erion, V. L. (2000). Promoting early literacy through rhyme detection activities during Head Start circle-time. *Child Study Journal*, 30(3), 143. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Martin, M. E., & Byrne, B. (2002). Teaching children to recognize rhyme does not directly promote phonemic awareness. *British Journal of Educational Psychology*, 72(4), 561–572. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

- Marvel, R. (2005). *The utility of rhythmic and lyrical song structure in the phonological awareness training of children with reading disability*. Philadelphia, PA: Drexel University, College of Nursing and Health Professions, Creative Arts in Therapy Program. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Maslanka, P., & Joseph, L. (2002). A comparison of two phonological awareness techniques between samples of preschool children. *Reading Psychology, 23*(4), 271–288. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Maynard, K. L., Pullen, P. C., & Coyne, M. D. (2010). Teaching vocabulary to first-grade students through repeated shared storybook reading: A comparison of rich and basic instruction to incidental exposure. *Literacy Research and Instruction, 49*(3), 209–242. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- McDowell, K. D. (2004). *Examining relations among expressive phonology, phonological processing, and early decoding skills in children* (Unpublished doctoral dissertation). Florida State University, Tallahassee. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- McNeill, B. C., Gillon, G. T., & Dodd, B. (2009). Effectiveness of an integrated phonological awareness approach for children with childhood apraxia of speech (CAS). *Child Language Teaching and Therapy, 25*(3), 341–366. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Morgan, S. T. (1991). The effects of two types of phonological awareness training on word learning in kindergarten children. *Dissertation Abstracts International, 52*(09A), 132-3226. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Moxley, R. A., & Warash, B. (1989). *Some spelling strategies of young children on the microcomputer*. Morgantown: West Virginia University. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Munro, N., Lee, K., & Baker, E. (2008). Building vocabulary knowledge and phonological awareness skills in children with specific language impairment through hybrid language intervention: A feasibility study. *International Journal of Language & Communication Disorders, 43*(6), 662–682. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Musti-Rao, S. (2005). *The effects of a supplemental early reading intervention with urban kindergarten and first-grade students: A preventive approach* (Unpublished doctoral dissertation). Ohio State University, Columbus. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Nancollis, A., Lawrie, B., & Dodd, B. (2005). Phonological awareness intervention and the acquisition of literacy skills in children from deprived social backgrounds. *Language, Speech, and Hearing Services in Schools, 36*(4), 325–335. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Nelson, J. R., Lane, K. L., Benner, G. J., & Kim, O. (2011). A best evidence synthesis of literacy instruction on the social adjustment of students with or at-risk for behavior disorders. *Education & Treatment of Children, 34*(1), 141–162. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- O'Brien, A. G. (2006). Parent-delivered instruction in phoneme identification: Effects on phonemic awareness and letter knowledge of preschool-aged children. *Dissertation Abstracts International, 67*(04A), 176-1224. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.

- O'Connor, R. E., Bocian, K., Beebe-Frankenberger, M., & Linklater, D. L. (2010). Responsiveness of students with language difficulties to early intervention in reading. *The Journal of Special Education, 43*(4), 220–235. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- O'Connor, R. E., Fulmer, D., Harty, K., & Bell, K. (2001, April). *Total awareness: Reducing the severity of reading disability*. Paper presented at the annual meeting of the American Educational Research Association, Seattle, WA. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- O'Shaughnessy, T. E. (1997). A comparison of two reading interventions for children with or at-risk for reading disabilities. *Dissertation Abstracts International, 58*(11A), 104-4187. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- O'Shaughnessy, T. E., & Swanson, H. L. (2000). A comparison of two reading interventions for children with reading disabilities. *Journal of Learning Disabilities, 33*(3), 257–277. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Oudeans, M. K. (2000). Integration of letter-sound correspondences and phonological awareness skills of blending and segmenting: An examination of the effects of instructional sequence on word reading for kindergarten children with low phonological awareness. *Dissertation Abstracts International, 61*(09A), 163-3505. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Oudeans, M. K. (2003). Integration of letter-sound correspondences and phonological awareness skills of blending and segmenting: A pilot study examining the effects of instructional sequence on word reading for kindergarten children with low phonological awareness. *Learning Disability Quarterly, 26*(4), 258–280. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Pascoe, M., Stackhouse, J., & Wells, B. (2005). Phonological therapy within a psycholinguistic framework: Promoting change in a child with persisting speech difficulties. *International Journal of Language & Communication Disorders, 40*(2), 189–220. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Phillips, B. M., Clancy-Menchetti, J., & Lonigan, C. J. (2008). Successful phonological awareness instruction with preschool children: Lessons from the classroom. *Topics in Early Childhood Special Education, 28*(1), 3–17. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Pianta, R. C., Hamre, B. K., & Downer, J. (2011). Aligning measures of quality with professional development goals and goals for children's development. In M. Zaslow, I. Martinez-Beck, K. Tout, & T. Halle (Eds.), *Quality measurement in early childhood settings* (pp. 297–315). Baltimore, MD: Paul H. Brookes Publishing. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Pogorzelski, S., & Wheldall, K. (2002). Do differences in phonological processing performance predict gains made by older low-progress readers following intensive literacy intervention? *Educational Psychology, 22*(4), 413–427. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Qi, X. (1997). Effectiveness of phonological awareness training for low-skilled kindergartners: A comparison of two different phonological training approaches. *Dissertation Abstracts International, 59*(01A), 118-79. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Quiroga, T., LemosBritton, Z., Mostafapour, E., Abbott, R. D., & Berninger, V. W. (2002). Phonological awareness and beginning reading in Spanish-speaking ESL first graders: Research into practice. *Journal of School Psychology, 40*(1), 85–111. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Robertson, K. L. (1998). Phonological awareness and reading achievement of children from differing socio-economic status backgrounds. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 58*(8-A), 3066. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Robinson, S. (2011). *The effects of embedded phonological awareness training on the reading and spelling skills of kindergarten students* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3435015). The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Royer, J. M., Abadzi, H., & Kinda, J. (2004). The impact of phonological-awareness and rapid-reading training on the reading skills of adolescent and adult neoliterates. *International Review of Education, 50*(1), 53–71. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Rvachew, S., & Nowak, M. (2001). The effect of target-selection strategy on phonological learning. *Journal of Speech, Language, and Hearing Research, 44*(3), 610–623. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Savage, R., Carless, S., & Erten, O. (2009). The longer-term effects of reading interventions delivered by experienced teaching assistants. *Support for Learning, 24*(2), 95–100. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Schneider, W., Ennemoser, M., Roth, E., & Kuspert, P. (1999). Kindergarten prevention of dyslexia: Does training in phonological awareness work for everybody? *Journal of Learning Disabilities, 32*(5), 429–436. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Schneider, W., Kuspert, P., Roth, E., & Vise, M. (1997). Short- and long-term effects of training phonological awareness in kindergarten: Evidence from two German studies. *Journal of Experimental Child Psychology, 66*(3), 311–340. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Schneider, W., Roth, E., & Ennemoser, M. (2000). Training phonological skills and letter knowledge in children at risk for dyslexia: A comparison of three kindergarten intervention programs. *Journal of Educational Psychology, 92*(2), 284–295. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Scholes, R. J. (1997, March). *The case against phonemic awareness*. Paper presented at the annual meeting of the Society for the Scientific Study of Reading, Chicago, IL. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Schuster, B. V. (2000). *The role of phonological memory in vocabulary development in ESL children* (Unpublished doctoral dissertation). University of Toronto, Canada. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Scott, V. J. G. (1995). The effects of phonological awareness training on word recognition and decoding skills of students with a reading disability. *Dissertation Abstracts International, 56*(11A), 119-4355. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Segers, E., & Verhoeven, L. (2004). Computer-supported phonological awareness intervention for kindergarten children with specific language impairment. *Language, Speech, and Hearing Services in Schools, 35*(3), 229–239. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Segers, E., & Verhoeven, L. (2005). Long-term effects of computer training of phonological awareness in kindergarten. *Journal of Computer Assisted Learning*, 21(1), 17–27. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Segers, P. C. J. (2003). *Multimedia support of language learning in kindergarten* (Unpublished doctoral dissertation). University of Nijmegen, Netherlands. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Shepard, M. J., & Uhry, J. K. (1997). Teaching phonological recoding to young children with phonological processing deficits: The effect on sight-vocabulary acquisition. *Learning Disability Quarterly*, 20(2), 104–125. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Skelton, S. L. (2004). Concurrent task sequencing in single-phoneme phonologic treatment and generalization. *Journal of Communication Disorders*, 37(2), 131–155. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Skibbe, L., Behnke, M., & Justice, L. M. (2005). Parental scaffolding of children’s phonological awareness skills: Interactions between mothers and their preschoolers with language difficulties. *Communication Disorders Quarterly*, 25(4), 189–203. The study is ineligible for review because it does not include a student outcome.
- Slocum, T. A., & O’Connor, R. E. (1993). Transfer among phonological manipulation skills. *Journal of Educational Psychology*, 85(4), 618. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Smith, J., Downs, M., & Mogford-Bevan, K. (1998). Can phonological awareness training facilitate minimal pair therapy? *International Journal of Language & Communication Disorders*, 33(1), 463–468. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Smith, S. B. (1996). *An examination of the efficacy and the efficiency of phonological awareness instruction for pre-readers at-risk of reading failure* (Unpublished doctoral dissertation). University of Oregon, Eugene. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Snowling, M. J. (1996). Contemporary approaches to the teaching of reading. *Journal of Child Psychology and Psychiatry*, 37(2), 139–148. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Sodoro, J., Allinder, R. M., & Rankin-Erickson, J. L. (2002). Assessment of phonological awareness: Review of methods and tools. *Educational Psychology Review*, 14(3), 223–260. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Sodoro, J. L. (2000). Effects of phonological awareness training upon onset rime and phoneme segmentation ability of kindergarten children. *Dissertation Abstracts International*, 61(07A), 261-2661. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Solari, E. J. (2006). Effects of listening comprehension versus phonological awareness interventions for kindergarten English learners. *Dissertation Abstracts International*, 67(12A), 199-4513. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Soriano, M., Miranda, A., Soriano, E., Nievas, F., & Felix, V. (2011). Examining the efficacy of an intervention to improve fluency and reading comprehension in Spanish children with reading disabilities. *International Journal of Disability, Development and Education*, 58(1), 47–59. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Suggate, S. P. (2010). Why what we teach depends on when: Grade and reading intervention modality moderate effect size. *Developmental Psychology, 46*(6), 1556–1579. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Sun, K. K., & Kemp, C. (2006). The acquisition of phonological awareness and its relationship to reading in individuals with intellectual disabilities. *Australasian Journal of Special Education, 30*(1), 86–99. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Swanson, H. L. (1999). Has the importance of phonological awareness training been greatly overstated? *Issues in Education, 5*(1), 125. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Thatcher, K. L. (2010). The development of phonological awareness with specific language-impaired and typical children. *Psychology in the Schools, 47*(5), 467–480. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Tobin, K. G. (2003). The effects of the “Horizons” reading program and prior phonological awareness training on the reading skills of first graders. *Journal of Direct Instruction, 3*(1), 1–16. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Torgesen, J. K., & Davis, C. (1996). Individual difference variables that predict response to training in phonological awareness. *Journal of Experimental Child Psychology, 63*(1), 1–21. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Torgesen, J. K., Morgan, S. T., & Davis, C. (1992). Effects of two types of phonological awareness training on word learning in kindergarten children. *Journal of Educational Psychology, 84*(3), 364–370. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (1994). Longitudinal studies of phonological processing and reading. *Journal of Learning Disabilities, 27*(5), 276–286. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (1997). Prevention and remediation of severe reading disabilities: Keeping the end in mind. *Scientific Studies of Reading, 1*(3), 217–234. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Rose, E., Lindamood, P., Conway, T., & Garvan, C. (1999). Preventing reading failure in young children with phonological processing disabilities: Group and individual responses to instruction. *Journal of Educational Psychology, 91*(4), 579–593. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Treutlein, A., Zöller, I., Roos, J., & Schöler, H. (2008). Effects of phonological awareness training on reading achievement. *Written Language & Literacy, 11*(2), 147–166. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Troia, G. A. (1999). Phonological awareness intervention research: A critical review of the experimental methodology. *Reading Research Quarterly, 34*(1), 28–52. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Tyler, A. A., Lewis, K. E., & Welch, C. M. (2003). Predictors of phonological change following intervention. *American Journal of Speech-Language Pathology, 12*(3), 289–298. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Uhry, J. K., & Shepherd, M. J. (1997). Teaching phonological recoding to young children with phonological processing deficits: The effect on sight-vocabulary acquisition. *Learning Disability Quarterly, 20*(2), 104–125. The study

is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- University of Queensland. (2010). *Phonological awareness training for high schools (PATHS)*. San Diego, CA: Plural Publishing. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Valliath, S. C. (2002). An evaluation of a computer-based phonological awareness training program: Effects on phonological awareness, reading and spelling. *Dissertation Abstracts International*, 63(04A), 152-1291. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Van Bysterveldt, A. K., Gillon, G. T., & Moran, C. (2006). Enhancing phonological awareness and letter knowledge in preschool children with Down syndrome. *International Journal of Disability, Development and Education*, 53(3), 301–329. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- VanDerHeyden, A. M., Snyder, P. A., Broussard, C., & Ramsdell, K. (2008). Measuring response to early literacy intervention with preschoolers at risk. *Topics in Early Childhood Special Education*, 27(4), 232–249. The study is ineligible for review because it does not use a comparison group design or a single-case design.
- Verhoeven, L., Reitsma, P., & Siegel, L. S. (2011). Cognitive and linguistic factors in reading acquisition. *Reading and Writing*, 24(4), 387–394. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Wanzek, J., Dickson, S., Bursuck, W. D., & White, J. M. (2000). Teaching phonological awareness to students at risk for reading failure: An analysis of four instructional programs. *Learning Disabilities Research & Practice*, 15(4), 226–239. The study is ineligible for review because it does not include an outcome within a domain specified in the protocol.
- Watts, J. L. (2002). The structure and development of phonological awareness: A guide for finding more effective training methods. *Dissertation Abstracts International*, 64(11A), 167-3996. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Weaver, C. (1998). *Reconsidering a balanced approach to reading*. Urbana, IL: National Council of Teachers of English. The study is ineligible for review because it is a secondary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Wehby, J. H., Lane, K. L., & Falk, K. B. (2005). An inclusive approach to improving early literacy skills of students with emotional and behavioral disorders. *Behavioral Disorders*, 30(2), 155–169. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Wei, Y. (2005). *The relationship between phonological awareness and reading ability of Thai students in English and Thai in primary schools of Thailand* (Unpublished doctoral dissertation). University of Maryland, College Park. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Weiss, S., Grabner, R. H., Kargl, R., Purgstaller, C., & Fink, A. (2010). Behavioral and neurophysiological effects of morphological awareness training on spelling and reading. *Reading and Writing*, 23(6), 645–671. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Wilson, J., & Frederickson, N. (1995). Phonological awareness training: An evaluation. *Educational and Child Psychology*, 12(1), 68–79. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

- Wise, B. W., & Olson, R. K. (1998). Studies of computer-aided remediation for reading disabilities. In C. Hulme & M. Joshi (Eds.), *Reading and spelling: Development and disorders* (pp. 473–487). Mahwah, NJ: Lawrence Erlbaum Associates. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Wise, B. W., Ring, J., & Olson, R. K. (1999). Training phonological awareness with and without explicit attention to articulation. *Journal of Experimental Child Psychology*, 72(4), 271–304. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Wise, B. W., Ring, J., Sessions, L., & Olson, R. K. (1997). Phonological awareness with and without articulation: A preliminary study. *Learning Disability Quarterly*, 20(3), 211–225. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Wise, J. C. (2005). The growth of phonological awareness: Response to reading intervention by children with reading disabilities who exhibit typical or below-average language skills. *Dissertation Abstracts International Section B: The Sciences and Engineering*, 66(6-B), 3447. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Wolz, J. M. (1999). Reading recovery and a developmental approach to phonological processing. *Dissertation Abstracts International*, 60(04A), 191-1084. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Yazejian, N., & Peisner-Feinberg, E. (2009). Effects of a preschool music and movement curriculum on children's language skills. *NHSA Dialog: A Research-to-Practice Journal for the Early Intervention Field*, 12(4), 327–341. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.
- Yeh, S. S. (2003). An evaluation of two approaches for teaching phonemic awareness to children in Head Start. *Early Childhood Research Quarterly*, 18(4), 513. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Yeung, L. L. M. (2007). On the effect of Cantonese (L1) phonological awareness on the acquisition of English (L2) phonology among primary students in Hong Kong. *Dissertation Abstracts International*, 69(10A), 1-3886. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Young, R. M. (1999). The impact of concrete phonemic representations on phonological awareness acquisition of at-risk kindergarteners. *Dissertation Abstracts International*, 60(12A), 216-4367. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Zeuschner, M. S. (2005). *Phonemic awareness through fluent auditory discrimination and the effects on decoding skills of learning disabled student* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 0808602). The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Ziolkowski, R. A., & Goldstein, H. (2008). Effects of an embedded phonological awareness intervention during repeated book reading on preschool children with language delays. *Journal of Early Intervention*, 31(1), 67–90. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample either includes less than 50% students with identified disabilities or more than 50% students with autism.

Appendix A.1: Research details for O'Connor et al., 1993

O'Connor, R. E., Jenkins, J. R., Leicester, N., & Slocum, T. A. (1993). Teaching phonological awareness to young children with learning disabilities. *Exceptional Children, 59*(6), 532–546.

Table A1. Summary of findings

Meets WWC evidence standards without reservations

| Outcome domain | Sample size | Study findings | |
|-------------------------------------|----------------------|---|---------------------------|
| | | Average improvement index (percentile points) | Statistically significant |
| Communication/language competencies | 1 school/22 children | +20 | Yes |

Setting The study was conducted in six preschool classrooms in the Experimental Education Unit at the University of Washington.

Study sample Fifty-five children aged 4–6 with developmental delays were pretested for the study. The authors excluded four children who scored 30% or better on a phonological pretest and one child with autism, who was nonverbal.⁸ Children were stratified by class (morning or afternoon), age, and the results of the cognitive ability pretest. Within strata, children were randomly assigned to either one of three *phonological awareness training* conditions or a comparison group. Only one comparison, *phonological awareness training with a blending focus* versus the comparison group, meets WWC standards and is included in this report.⁹ Twelve children were randomly assigned to the *phonological awareness training with a blending focus* condition and 13 to the comparison group, but three children left the program before the completion of the study, leaving an analytic sample of 22 children (11 each in the intervention and comparison groups). For the whole sample (including all three *phonological awareness training* conditions), 80% of the children had significant language delays and some physical handicaps, behavioral disorders, or an intellectual disability.

Intervention group Children met in groups of three to five for 10-minute sessions, four times a week. Instruction lasted seven weeks. In the first three weeks, children in the blending focused (intervention) condition practiced blending two to three phonemes in elongated words with continuous sounds. For example, “I’ll say words the slow way. You’ll say them fast. Ssseeeeeennnn. What word?” (p. 536). At the end of the three weeks, children were tested on the set of phonological skills that was taught and one that was not taught (e.g., blending and segmentation). During the last four weeks, the skills were reviewed and instruction was extended to other tasks. Children were taught to blend words beginning with stop sounds, all sounds separated, and onset-rime.

Comparison group Children participated in routine preschool activities, such as listening to stories read by the teacher or “circle time” oral language activities. The authors were concerned that children in the intervention group would have more experience with “sounds in isolation” than children in the comparison group, which could result in the outcome measures favoring the intervention groups. To address this, the researchers met with each comparison group child twice during the implementation period to practice the isolated sounds used in training. For example, the researcher would say, “Today we’re going to practice saying sounds. Say this sound.” The researcher would model, and the children would then repeat the sounds.

Outcomes and measurement

Nine subtests of auditory phonological skills (three each for rhyming, blending, and segmenting) were developed by the study team. The blending outcomes were continuous phonemes, onset-rime, and separate sounds. The segmenting outcomes were all sounds, onset-rime, and first sound. The rhyming outcomes were production, oddity, and recognition. Children were tested in the week prior to the start of the study and directly after the cessation of instruction for the intervention groups. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

The intervention was conducted by three graduate students, all of whom had teaching experience. Each graduate student teacher led all three interventions to minimize potential teacher effects. Each Monday, the three teachers practiced the formats to be used for the week with the first author. The teachers met daily to discuss and resolve problems. In addition, the teachers were randomly audiotaped to ensure that protocols were being implemented as designed.

Appendix A.2: Research details for Sweat, 2003

Sweat, L. M. (2003). Comparing the effects of morphosyntax and phonology intervention on final consonant clusters in finite morphemes and final consonant inventories. *Masters Abstracts International*, 42(01), 31-231.

Table A2. Summary of findings

Meets WWC evidence standards without reservations

| Outcome domain | Sample size | Study findings | |
|-------------------------------------|-----------------------|---|---------------------------|
| | | Average improvement index (percentile points) | Statistically significant |
| Communication/language competencies | 4 schools/20 children | +28 | No |

Setting

The study was conducted in early childhood programs in four elementary schools in the Washoe County School District in Reno, Nevada.

Study sample

The study included 3- to 5-year-old children with morphosyntax and phonological impairments. To be eligible, the children had to meet the following criteria:

- (a) speech performance at least one standard deviation below the mean on the Bankson-Bernthal Test of Phonology;
- (b) expressive language scores at least one standard deviation below the mean on the Preschool Language Scale 3 or the Clinical Evaluation of Language Fundamentals–Preschool, or a score for mean length of utterances in morphemes greater than one and one-half standard deviations below the mean;
- (c) nonverbal cognitive functioning within one and one-half standard deviations from the mean on the Columbia Mental Maturity Scale;
- (d) normal functioning on oral motor assessment; and
- (e) normal functioning on neurological, behavioral, hearing, and motor skills.¹⁰

Twenty children (18 boys and two girls) were randomly assigned to either *phonological awareness training* or a morphosyntactic intervention.

Intervention group

Children in the intervention group received *phonological awareness training* in weekly 30-minute individual and 45-minute group sessions with clinicians over a 12-week period. Children were given four goals based on their initial speech and language results (e.g., phonetic inventory, sound classes affected). The goals were rotated and targeted three times over the 12-week period. The intervention included auditory awareness activities (such as listening to word lists and books that frequently used a targeted sound), conceptual activities (contrasting and classifying sounds), production practice (drills and imitation of phonetic placement), and phonological awareness activities (rhyme, sound identification). The intervention also included “naturalistic” activities, in which the clinician provided the child with opportunities to produce targeted sounds during conversations. The information in this report examined the children at the end of the 12-week block. As part of a larger study, children were then given the opposite intervention for another 12-week period (i.e., children receiving the *phonological awareness training* program in the first 12 weeks received the morphosyntactic intervention in the second 12-week period). The information for this additional contrast is not reported in this report, as this would only demonstrate intervention *ordering* effects. That is, the assessment at the 24-week period would only illustrate the effects of receiving the *phonological awareness training* first and then the morphosyntactic intervention second, relative to receiving morphosyntactic training first and then *phonological awareness training* second, and would only illustrate the effectiveness of the ordering of the interventions, not the independent effects of the interventions themselves.

Comparison group

Children in the comparison group received the morphosyntactic intervention over the same 12-week period, with weekly 30-minute individual and 45-minute group sessions with clinicians. As with the intervention condition, children were given four goals, which were rotated and targeted three times during the 12-week period. For the morphosyntactic intervention, the goals were based on morphemes that the child produced with less than 50% accuracy during pretest. However, preference was given to goals that were similar for all children in the group, so the 50% accuracy rule was not always followed. The comparison group program used themes of food, animals, and water. The comparison condition included auditory awareness activities (books and songs with opportunities to produce the target sounds), focused stimulation activities (expansions of the children’s utterances), and elicited production activities (to encourage the use of target morphemes). Clinicians decreased their support over the 12-week period.

Outcomes and measurement

Three eligible outcomes of children’s language were used. Two of the measures were based on the final consonant clusters: regular past tense and contractible copula. The third measure was an inventory of final consonants. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

Both the *phonological awareness training* and morphosyntactic interventions were led by four graduate student interns and four certified speech-language pathologists. No other information is provided.

Appendix A.3: Research details for Tyler et al., 2003

Tyler, A. A., Lewis, K. E., Haskill, A., & Tolbert, L. C. (2003). Outcomes of different speech and language goal attack strategies. *Journal of Speech, Language, and Hearing Research, 46*(5), 1077–1094.

Table A3. Summary of findings

Meets WWC evidence standards without reservations

| Outcome domain | Sample size | Study findings | |
|-------------------------------------|---------------------|---|---------------------------|
| | | Average improvement index (percentile points) | Statistically significant |
| Communication/language competencies | 4 sites/20 children | -8 | No |

Setting The study was conducted in early childhood programs in four elementary schools in the Washoe County School District in Reno, Nevada, and in an early education clinic at the University of Nevada, Reno. Participants in the two groups included in the WWC review were located in four of these five sites.¹¹

Study sample The study sample included 47 preschoolers between ages 3 years and 5 years 11 months who had received speech-language evaluations and were identified as eligible for speech-language services by the speech-language pathologist.

Eligibility criteria included:

- (a) documentation of expressive language scores at least one standard deviation below the mean on the Preschool Language Scale–3 (PLS-3) or the Clinical Evaluation of Language Fundamentals–Preschool (CELF-P) or mean length of utterance in morphemes (MLUm) greater than one and one-half standard deviations below the mean based on Leadholm and Miller’s normative data;
- (b) documentation of speech performance at least one standard deviation below the mean on the Bankson-Bernthal Test of Phonology (BBTOP);
- (c) documentation of nonverbal cognitive functioning within one and one-half standard deviations of the mean on the Columbia Mental Maturity Scale (CMMS);
- (d) normal hearing, as indicated by pure-tone screening;
- (e) normal functioning on oral motor assessment; and
- (f) neurological, behavioral, and motor skills reported within normal limits in assessment results.¹⁰

Forty children were randomly assigned to four intervention groups, and the remaining seven children were placed in a no-treatment comparison group.

The four interventions being compared were:

- (a) phonology instruction for 12 weeks, followed by morphosyntactic instruction for 12 weeks;
- (b) morphosyntactic instruction for 12 weeks, followed by phonology instruction for 12 weeks;
- (c) instruction in phonology and morphosyntactic goals that alternated from one topic to the other on a weekly basis for 24 weeks; and
- (d) simultaneous instruction in both phonology and morphosyntactic goals, whereby both types of instruction occurred each day for the 24-week period.

For the purposes of this review, the only comparisons that were considered eligible were between the phonology first condition (Group A) and the morphosyntax first condition (Group B), for which assessment occurred at the 12-week midpoint (before the experiences of the groups changed).¹² These groups are referred to as the “intervention group” and the “comparison group” in the remainder of this appendix.

Intervention group

The phonological intervention was a 12-week program designed for this study that addressed both segmental and syllable structure forms. It focused on four goals for phonology for each child; one goal was targeted during each week in a four-week cycle, and then the sequence (cycle) was repeated twice.

The intervention included four components:

- (a) auditory awareness activities designed to heighten children's awareness of target sounds and direct their attention to the sounds' auditory-acoustic attributes;
- (b) conceptual activities designed to develop children's awareness of the difference and similarities between target sounds and their contrasts;
- (c) production practice activities, both drill play and naturalistic, designed to help establish production of a new sound, to facilitate practice of that sound in communicative contexts, and to increase awareness of the success-failure in communicating an intended message; and
- (d) one phonological awareness activity designed to stimulate preliteracy skills by increasing awareness of the speech sound system.

Children received these services in one 30-minute individual session and one 45-minute group session per week.

Comparison group

Children in the comparison condition were assigned to the morphosyntax-first group. They participated in a program that addressed finite morphemes and focused on four goals for morphology for each child. One goal was targeted during each week in a four-week cycle. Then the sequence (cycle) was repeated twice.

Morphosyntax activities included:

- (a) auditory awareness activities, to increase children's awareness of the morphosyntactic targets in the context of children's books and songs that were read and sung in each session;
- (b) focused stimulation activities, designed to provide children with multiple models of target structures in naturalistic communicative context; and
- (c) elicited production activities, with the goal of eliciting 20 to 30 productions of each targeted morpheme.

Children received these services in one 30-minute individual session and one 45-minute group session per week.

Outcomes and measurement

The study includes two outcomes obtained from analysis of a spontaneous language sample and a single word citation sample obtained from the BBTOP. This was supplemented with 15 additional words to ensure that the 24 consonants occurred a minimum of three times each in initial and final word positions. These outcomes include the finite morpheme composite (FMC) and the target generalization composite (TGC). For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

Sessions for both the intervention and comparison groups were provided by graduate students under the supervision of the early childhood or university program's speech-language pathologists. Interns attended a training session in which they viewed videotapes of intervention procedures and were provided with a comprehensive manual explaining the procedures and containing instructions for their implementation.

Appendix A.4: Research details for Tyler et al., 2011

Tyler, A. A., Gillon, G., Macrae, T., & Johnson, R. L. (2011). Direct and indirect effects of stimulating phoneme awareness vs. other linguistic skills in preschoolers with co-occurring speech and language impairments. *Topics in Language Disorders, 31(2)*, 128–144.

Table A4. Summary of findings

Meets WWC evidence standards without reservations

| Outcome domain | Sample size | Study findings | |
|-------------------------------------|----------------------|---|---------------------------|
| | | Average improvement index (percentile points) | Statistically significant |
| Communication/language competencies | 1 school/16 children | +9 | No |

Setting The study was conducted in two preschools in the United States and New Zealand. This WWC review includes only children attending the US site. The authors do not describe the location or setting of the US preschool site.

Study sample The children participating in the study were between 3.1 and 5.2 years of age and all displayed co-occurring speech and language impairments, including:

- (a) a speech sound disorder (SSD) confirmed by a score of at least one standard deviation below the mean on the Goldman-Fristoe Test of Articulation–Second Edition (GFTA-2);
- (b) documentation of an expressive language score of at least one standard deviation below the mean on the Structured Photographic Expressive Language Test–Preschool 2 (SPELT-P2) and/or one and one-half standard deviations below the mean MLU for the child’s age based on Miller and Chapman’s (2000) normative data;
- (c) age-appropriate receptive vocabulary, as confirmed by a score within one and one-half standard deviations of the mean on the Peabody Picture Vocabulary Test–Third Edition (PPVT-III);
- (d) normal functioning on oral motor assessment; and
- (e) neurological, behavioral, hearing, and motor skills reported within normal limits.¹³

Children in each geographic location were matched in pairs based on age and severity of speech disorder (receptive vocabulary and gender also were considered). One child in each pair was assigned to the intervention group, and the other was assigned to the comparison group. One pair that spanned two cohorts was excluded from this review because the children in this pair were not randomly assigned to conditions.

Intervention group Children assigned to a phonemic awareness intervention participated in two six-week blocks of instruction, separated by a six- to seven-week break from the intervention. The intervention included twice-weekly 60-minute instructional sessions in small-group settings, for a total of 24 hours of instruction. The intervention involved phoneme awareness and letter/sound knowledge, integrated with speech sound production. The intervention embedded phoneme awareness and letter knowledge activities into clinician-directed play activities. Intervention materials included an instructional manual, scripted lessons, material lists and patterns, stimulus pictures, and activity books.

Comparison group

Children in the comparison group received a morphosyntactic intervention and a speech sound intervention provided in alternate weeks. The morphosyntactic intervention included auditory awareness activities, focused stimulation activities, and elicited production activities. The speech sound intervention included auditory awareness activities and production practice in drill play and naturalistic activities. It did not target phoneme awareness or letter/sound production directly. The time frame, time of instruction, and instructional setting were identical to those in the intervention group. Intervention materials included an instructional manual, scripted lessons, material lists and patterns, stimulus pictures, and activity books.

Outcomes and measurement

There were six outcomes used in the study:

- (a) finite morpheme composite (FMC),
- (b) letter name (LN),
- (c) mean length of utterance in morphemes (MLUm),
- (d) percent consonant correct (PCC),
- (e) phoneme identity (PID), and
- (f) /s/-cluster accuracy.

Baseline data were collected two weeks prior to the start of the interventions, and outcome data were collected within two weeks following the conclusion of the second instructional block. Data also were collected during the break period between the two instructional blocks, but these intermediate outcomes are not considered in this review, since the full intervention had not been implemented. For a more detailed description of these outcome measures, see Appendix B.

Support for implementation

The instructional sessions for both intervention and comparison students were taught by undergraduate senior or master's-level speech-language pathology students. They were supervised by certified doctoral students or professional speech-language pathologists. The study authors trained staff to implement and supervise the interventions through reviews of instructional manuals and videotaped examples of instructional sessions.

Appendix B: Outcome measures for each domain¹⁴

| Communication/language competencies | |
|---|--|
| <i>Blending: Continuous phonemes</i> | This author-developed subtest measured children’s ability to blend stretched sounds; for example, “Sssssaaamm.” Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O’Connor et al., 1993). |
| <i>Blending: Onset-rime</i> | This author-developed subtest measured children’s ability to blend onset-rime; for example, “S (pause) -am.” Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O’Connor et al., 1993). |
| <i>Blending: Separate sounds</i> | This author-developed subtest measured children’s ability to blend separated sounds; for example, “S (pause) -a (pause) -m.” Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O’Connor et al., 1993). |
| <i>Final consonant clusters: Contractible copula</i> | This measure indicates the difference in the percentage correct at pre- and posttest of contractible copula consonant clusters at the end of words. The outcomes are based on spontaneous language samples of at least 200 utterances, collected during a conversation between the child and researcher, while the child was playing with a toy house or looking at pictures in a book. Samples were transcribed and coded according to the guidelines of the Kansas Language Transcription Database manual and analyzed with the SALT program (as cited in Sweat, 2003). |
| <i>Final consonant clusters: Regular past tense</i> | This measure indicates the difference in the percentage correct at pre- and posttest of past tense consonant clusters at the end of words. The outcomes are based on spontaneous language samples of at least 200 utterances, collected during a conversation between the child and researcher, while the child was playing with a toy house or looking at pictures in a book. Samples were transcribed and coded according to the guidelines of the Kansas Language Transcription Database manual and analyzed with the Systematic Analysis of Language Transcripts (SALT) program (as cited in Sweat, 2003). |
| <i>Finite morpheme composite</i> | Spontaneous language samples of at least 200 utterances were obtained from conversations between a research assistant and child. The utterances were transcribed and coded using guidelines from the Kansas Language Transcription Database manual to enable subsequent analysis with the SALT program. A finite morpheme composite was calculated by determining the percentage of correct usage of the following finite morphemes: regular past tense –ed, third person singular regular –s, contractible and uncontractible copula <i>be</i> verbs, and uncontractible and contractible auxiliary <i>be</i> verbs (as cited in Tyler et al., 2003; Tyler et al., 2011). |
| <i>Letter name</i> | Letter name knowledge refers to a child’s ability to differentiate between letters and to identify letters. Child performance in letter name knowledge was measured using a 12-item assessment (as cited in Tyler et al., 2011). |
| <i>Mean length of utterance in morphemes (MLUm)</i> | The data for the MLUm outcome were obtained from spontaneous language samples that were collected during an interactive narrative retelling of the wordless picture book <i>Carl Goes Shopping</i> (<i>Carl</i> series by Alexandra Day, 1995). The script that was used during the retelling of the book provided opportunities for children to produce morphemes of interest, and these utterances were coded using the SALT program described earlier (as cited in Tyler et al., 2011). |
| <i>Percent consonants correct</i> | Participant responses from the Goldman-Fristoe Test of Articulation—Second Edition (a speech assessment used to screen children in the study for speech sound disorder) and 25 additional words were transcribed and then analyzed via computer and assessed for the percentage of consonants spoken correctly (as cited in Tyler et al., 2011). |
| <i>Percentage added sounds to the final consonant inventory</i> | The inventory of sounds was based on spontaneous language samples described earlier and the Bankson-Bernthal Test of Phonology (BBTOP), supplemented with 15 additional words so that all 24 consonants occurred at least three times both in the initial and final positions of words. The number of final consonants the child uttered in the spontaneous language and the BBTOP was divided by the total number of final consonants in the English language. The reported outcome is the difference in the pre- and posttest percentages (as cited in Sweat, 2003). |
| <i>Phoneme identity</i> | Phoneme identity is determined by having children identify similar sounds across words. This skill was measured using a 10-item assessment that included tasks both with and without printed words (as cited in Tyler et al., 2011). |
| <i>Rhyming: Oddity</i> | This author-developed subtest measured children’s ability to identify words that do not rhyme; for example, “cat, hat, bell.” Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O’Connor et al., 1993). |

| | |
|--|---|
| <i>Rhyming: Production</i> | This author-developed subtest measured children's ability to recognize rhyme; for example, "dime/time: do these words rhyme?" Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O'Connor et al., 1993). |
| <i>Rhyming: Recognition</i> | This author-developed subtest measured children's ability to produce rhyme; for example, "tell me a word that rhymes with land." Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O'Connor et al., 1993). |
| <i>/s/-cluster accuracy</i> | Participants were administered a cluster probe consisting of 15 single words selected to provide five opportunities each for production of initial /sp-, st-, sl-/ clusters (as cited in Tyler et al., 2011). |
| <i>Segmenting: All sounds</i> | This author-developed subtest measured children's ability to segment phoneme words; for example, "say all the bits of mob." Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O'Connor et al., 1993). |
| <i>Segmenting: First sound</i> | This author-developed subtest measured children's ability to identify the first sound in a word; for example, "say the first sound in mob." Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O'Connor et al., 1993). |
| <i>Segmenting: Onset-rime</i> | This author-developed subtest measured children's ability to separate words into onset-rime; for example, "M -ob." Each subtest began with three non-scored examples on which subjects were given corrective feedback and 10 scored items on which no feedback was provided beyond encouragement to continue the test. None of the items on the subtests was used during training, although the formats were similar (as cited in O'Connor et al., 1993). |
| <i>Target generalization composite</i> | The BBTOP was used to elicit a sample of single words in which each of the 24 consonants occurred at least three times in the initial and final word positions. Broad transcriptions were made online during administration of the BBTOP and then checked from audiotape replay. Transcriptions were entered into the Interactive System for Phonological Analysis (ISPA). The target generalization composite was a percentage reflecting the accuracy of target and generalization sounds selected for each child from the total number of opportunities for these sounds, in the positions targeted on the BBTOP (as cited in Tyler et al., 2003). |

Appendix C: Findings included in the rating for the communication/language competencies domain

| Outcome measure | Study sample | Sample size | Mean (standard deviation) | | WWC calculations | | | p-value |
|---|-------------------|------------------------|---------------------------|------------------|------------------|--------------|-------------------|--------------------------------------|
| | | | Intervention group | Comparison group | Mean difference | Effect size | Improvement index | |
| O'Connor et al., 1993^a | | | | | | | | |
| <i>Blending: Continuous phonemes</i> | 4- to 6-year-olds | 1 school/ 22 children | 6.60 (2.80) | 2.40 (3.70) | 4.20 | 1.23 | +39 | < 0.05 |
| <i>Blending: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 22 children | 4.70 (3.40) | 0.80 (2.10) | 3.90 | 1.33 | +41 | < 0.05 |
| <i>Blending: Separate sounds</i> | 4- to 6-year-olds | 1 school/ 22 children | 4.80 (3.20) | 0.70 (0.60) | 4.10 | 1.71 | +46 | < 0.05 |
| <i>Rhyming: Oddity</i> | 4- to 6-year-olds | 1 school/ 22 children | 1.90 (2.50) | 1.50 (3.00) | 0.40 | 0.14 | +6 | nr |
| <i>Rhyming: Production</i> | 4- to 6-year-olds | 1 school/ 22 children | 2.70 (4.20) | 1.80 (4.00) | 0.90 | 0.21 | +8 | nr |
| <i>Rhyming: Recognition</i> | 4- to 6-year-olds | 1 school/ 22 children | 5.40 (2.20) | 5.20 (2.30) | 0.20 | 0.09 | +3 | > 0.05 |
| <i>Segmenting: All sounds</i> | 4- to 6-year-olds | 1 school/ 22 children | 0.00 (0.00) | 0.00 (0.00) | 0.00 | 0.00 | 0 | nr |
| <i>Segmenting: First sound</i> | 4- to 6-year-olds | 1 school/ 22 children | 0.00 (0.00) | 0.00 (0.00) | 0.00 | 0.00 | 0 | nr |
| <i>Segmenting: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 22 children | 0.10 (0.00) | 0.00 (0.00) | 0.10 | 0.00 | 0 | nr |
| Domain average for communication/language competencies (O'Connor et al., 1993) | | | | | | 0.52 | +20 | Statistically significant |
| Sweat, 2003^b | | | | | | | | |
| <i>Final consonant clusters: Contractible copula</i> | 3- to 5-year-olds | 4 schools/ 20 children | nr | nr | nr | 0.93 | +32 | 0.04 |
| <i>Final consonant clusters: Regular past tense</i> | 3- to 5-year-olds | 4 schools/ 20 children | nr | nr | nr | 1.03 | +35 | 0.04 |
| <i>Percentage added sounds to the final consonant inventory</i> | 3- to 5-year-olds | 4 schools/ 20 children | nr | nr | nr | 0.39 | +15 | > 0.05 |
| Domain average for communication/language competencies (Sweat, 2003) | | | | | | 0.78 | +28 | Not statistically significant |
| Tyler et al., 2003^c | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 4 schools/ 20 children | 53.20 (28.87) | 62.10 (15.39) | -8.90 | -0.37 | -14 | > 0.05 |
| <i>Target generalization composite</i> | 3- to 5-year-olds | 4 schools/ 20 children | 44.20 (30.33) | 44.80 (17.21) | -0.60 | -0.02 | -1 | > 0.05 |
| Domain average for communication/language competencies (Tyler et al., 2003) | | | | | | -0.20 | -8 | Not statistically significant |

| Outcome measure | Study sample | Sample size | Mean (standard deviation) | | WWC calculations | | | p-value |
|--|-------------------|-----------------------|---------------------------|------------------|------------------|-------------|-------------------|--------------------------------------|
| | | | Intervention group | Comparison group | Mean difference | Effect size | Improvement index | |
| Tyler et al., 2011^d | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 1 school/ 16 children | 23.75 (34.52) | 32.00 (23.00) | -8.25 | -0.27 | -10 | > 0.05 |
| <i>Letter name</i> | 3- to 5-year-olds | 1 school/ 16 children | 79.38 (23.70) | 54.13 (38.23) | 25.25 | 0.75 | +27 | > 0.05 |
| <i>Mean length of utterance in morphemes (MLUm)</i> | 3- to 5-year-olds | 1 school/ 16 children | 3.13 (1.66) | 3.69 (0.83) | -0.56 | -0.40 | -16 | > 0.05 |
| <i>Percent consonants correct</i> | 3- to 5-year-olds | 1 school/ 16 children | 57.76 (19.40) | 56.24 (10.49) | 1.52 | 0.09 | +4 | > 0.05 |
| <i>Phoneme identity</i> | 3- to 5-year-olds | 1 school/ 16 children | 72.50 (31.37) | 53.75 (24.46) | 18.75 | 0.63 | +24 | > 0.05 |
| <i>/s/-cluster accuracy</i> | 3- to 5-year-olds | 1 school/ 16 children | 46.38 (38.51) | 25.00 (35.40) | 21.38 | 0.55 | +21 | > 0.05 |
| Domain average for communication/language competencies (Tyler et al., 2011) | | | | | | 0.23 | +9 | Not statistically significant |
| Domain average for communication/language competencies across all studies | | | | | | 0.33 | +13 | na |

Table Notes: Positive results for mean difference, effect size, and improvement index favor the intervention group; negative results favor the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the change (measured in standard deviations) in an average student’s outcome that can be expected if the student is given the intervention. The improvement index is an alternate presentation of the effect size, reflecting the change in an average student’s percentile rank that can be expected if the student is given the intervention. The WWC-computed average effect size is a simple average rounded to two decimal places; the average improvement index is calculated from the average effect size. The statistical significance of the study’s domain average was determined by the WWC. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the communication/language competencies domain. na = not applicable. nr = not reported.

^a Comparisons of the three phonological awareness training conditions to one another from O’Connor et al. (1993) are not included in these ratings but are reported in Appendix D. For O’Connor et al. (1993), a correction for multiple comparisons was needed but did not affect significance levels. The p-values presented here were reported in the original study. The WWC calculated the program group mean using a difference-in-differences approach (see the WWC Procedures and Standards Handbook, Appendix B) by adding the impact of the program (i.e., difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. The WWC did not find that any of the “nr” contrasts were statistically significant. The article presents slightly different baseline results for the groups in Table 1 (p. 535) and Figures 2–4 (pp. 539–541). We have used the results from Figures 2–4 in these calculations since they also included the posttest results.

^b For Sweat (2003), a correction for multiple comparisons was needed and results in significance levels that differ from those in the original study. The p-values presented here were reported in the original study. Due to the multiple comparisons adjustment, the p-values of 0.04 for *Final consonant clusters: Regular past tense* and 0.04 for *Final consonant clusters: Contractible copula* were higher than the critical p-values for statistical significance; therefore, the WWC does not find these results to be statistically significant. The author compares the difference in change scores in the percentage correct between pre- and posttest. The WWC effect size is calculated from a t-statistic that compares the means of the intervention and comparison groups.

^c For Tyler et al. (2003), no corrections for clustering or multiple comparisons were needed. The authors appear to have only presented statistically significant findings in the prose of the article, and these contrasts were not mentioned as statistically significant. The WWC confirmed that the groups were not significantly different on either outcome. The WWC calculated the program group mean using a difference-in-differences approach (see the WWC Procedures and Standards Handbook, Appendix B) by adding the impact of the program (i.e., difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. The study reported gain scores and gain score standard deviations. In order to properly calculate effect sizes, the WWC obtained raw means and standard deviations from the study authors, which are reported here.

^d For Tyler et al. (2011), no corrections for clustering or multiple comparisons were needed. The p-values presented here were reported in the original study. The statistical tests reported by the author used the full sample for the *Letter name*, *Percent consonants correct*, *Phoneme identity*, and */s/ cluster accuracy*, and only the US sample for the *Mean length of utterance in morphemes* and *Finite morpheme composite*. The WWC calculated the program group mean using a difference-in-differences approach (see the WWC Procedures and Standards Handbook, Appendix B) by adding the impact of the program (i.e., difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. The WWC obtained raw means and standard deviations from the study authors for the 16 children that had an appropriate random assignment process (see endnote 6) and used those data for WWC calculations.

Appendix D: Summary of findings comparing different types of phonological awareness training for the communication/language competencies domain

| Outcome measure | Study sample | Sample size | Mean (standard deviation) | | WWC calculations | | | p-value |
|---|-------------------|-----------------------|---------------------------|------------------|------------------|-------------|-------------------|---------|
| | | | Intervention group | Comparison group | Mean difference | Effect size | Improvement index | |
| O'Connor et al., 1993 (Blending versus Rhyming)^a | | | | | | | | |
| <i>Blending: Continuous phonemes</i> | 4- to 6-year-olds | 1 school/ 23 children | 8.50 (2.80) | 4.70 (3.30) | 3.80 | 1.19 | +38 | < 0.05 |
| <i>Blending: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 23 children | 5.20 (3.40) | 2.00 (2.90) | 3.20 | 0.98 | +34 | < 0.05 |
| <i>Blending: Separate sounds</i> | 4- to 6-year-olds | 1 school/ 23 children | 5.20 (3.20) | 2.30 (2.20) | 2.90 | 1.03 | +35 | < 0.05 |
| <i>Rhyming: Oddity</i> | 4- to 6-year-olds | 1 school/ 23 children | 2.00 (2.50) | 4.30 (3.40) | -2.30 | -0.74 | -27 | < 0.05 |
| <i>Rhyming: Production</i> | 4- to 6-year-olds | 1 school/ 23 children | 2.20 (4.20) | 6.40 (3.80) | -4.20 | -1.01 | -34 | < 0.05 |
| <i>Rhyming: Recognition</i> | 4- to 6-year-olds | 1 school/ 23 children | 5.90 (2.20) | 7.10 (1.90) | -1.20 | -0.56 | -21 | > 0.05 |
| <i>Segmenting: All sounds</i> | 4- to 6-year-olds | 1 school/ 23 children | 0.00 (0.00) | 0.20 (0.40) | -0.20 | -0.67 | -25 | nr |
| <i>Segmenting: First sound</i> | 4- to 6-year-olds | 1 school/ 23 children | 0.00 (0.00) | 0.40 (1.40) | -0.40 | -0.38 | -15 | nr |
| <i>Segmenting: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 23 children | 0.00 (0.00) | 0.10 (0.30) | -0.10 | -0.44 | -17 | nr |
| O'Connor et al., 1993 (Blending versus Segmenting)^a | | | | | | | | |
| <i>Blending: Continuous phonemes</i> | 4- to 6-year-olds | 1 school/ 24 children | 9.10 (2.80) | 6.90 (3.80) | 2.20 | 0.63 | +24 | > 0.05 |
| <i>Blending: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 24 children | 4.90 (3.40) | 0.80 (1.50) | 4.10 | 1.55 | +44 | < 0.05 |
| <i>Blending: Separate sounds</i> | 4- to 6-year-olds | 1 school/ 24 children | 4.60 (3.20) | 1.60 (1.30) | 3.00 | 1.23 | +39 | < 0.05 |
| <i>Rhyming: Oddity</i> | 4- to 6-year-olds | 1 school/ 24 children | 1.10 (2.50) | 1.70 (2.20) | -0.60 | -0.25 | -10 | nr |
| <i>Rhyming: Production</i> | 4- to 6-year-olds | 1 school/ 24 children | 2.60 (4.20) | 2.80 (3.80) | -0.20 | -0.05 | -2 | nr |
| <i>Rhyming: Recognition</i> | 4- to 6-year-olds | 1 school/ 24 children | 5.70 (2.20) | 5.50 (2.20) | 0.20 | 0.09 | +3 | > 0.05 |
| <i>Segmenting: All sounds</i> | 4- to 6-year-olds | 1 school/ 24 children | 0.00 (0.00) | 3.70 (3.60) | -3.70 | -1.34 | -41 | < 0.05 |
| <i>Segmenting: First sound</i> | 4- to 6-year-olds | 1 school/ 24 children | 0.10 (0.00) | 2.10 (3.70) | -2.00 | -0.71 | -26 | < 0.05 |
| <i>Segmenting: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 24 children | 0.00 (0.00) | 2.40 (2.80) | -2.40 | -1.12 | -37 | < 0.05 |

| Outcome measure | Study sample | Sample size | Mean (standard deviation) | | WWC calculations | | | p-value |
|---|-------------------|------------------------|---------------------------|------------------|------------------|-------------|-------------------|---------|
| | | | Intervention group | Comparison group | Mean difference | Effect size | Improvement index | |
| O'Connor et al., 1993 (Rhyming versus Segmenting)^a | | | | | | | | |
| <i>Blending: Continuous phonemes</i> | 4- to 6-year-olds | 1 school/ 25 children | 5.30 (3.30) | 6.90 (3.80) | -1.60 | -0.43 | -17 | < 0.05 |
| <i>Blending: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 25 children | 1.70 (2.90) | 0.80 (1.50) | 0.90 | 0.38 | +15 | nr |
| <i>Blending: Separate sounds</i> | 4- to 6-year-olds | 1 school/ 25 children | 1.70 (2.20) | 1.60 (1.30) | 0.10 | 0.05 | +2 | nr |
| <i>Rhyming: Oddity</i> | 4- to 6-year-olds | 1 school/ 25 children | 3.40 (3.40) | 1.70 (2.20) | 1.70 | 0.58 | +22 | < 0.05 |
| <i>Rhyming: Production</i> | 4- to 6-year-olds | 1 school/ 25 children | 6.80 (3.80) | 2.80 (3.80) | 4.00 | 1.02 | +35 | < 0.05 |
| <i>Rhyming: Recognition</i> | 4- to 6-year-olds | 1 school/ 25 children | 6.90 (1.90) | 5.50 (2.20) | 1.40 | 0.66 | +24 | > 0.05 |
| <i>Segmenting: All sounds</i> | 4- to 6-year-olds | 1 school/ 25 children | 0.20 (0.40) | 3.70 (3.60) | -3.50 | -1.29 | -40 | < 0.05 |
| <i>Segmenting: First sound</i> | 4- to 6-year-olds | 1 school/ 25 children | 0.50 (1.40) | 2.10 (3.70) | -1.60 | -0.54 | -21 | < 0.05 |
| <i>Segmenting: Onset-rime</i> | 4- to 6-year-olds | 1 school/ 25 children | 0.10 (0.30) | 2.40 (2.80) | -2.30 | -1.09 | -36 | < 0.05 |
| Tyler et al., 2003 (Phonology first versus Alternating)^b | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 4 schools/ 21 children | 50.10 (28.87) | 67.36 (16.58) | -17.26 | -0.71 | -26 | > 0.05 |
| <i>Target generalization composite</i> | 3- to 5-year-olds | 4 schools/ 21 children | 48.30 (30.33) | 50.82 (28.53) | -2.52 | -0.08 | -3 | > 0.05 |
| Tyler et al., 2003 (Phonology first versus Simultaneous)^b | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 4 schools/ 19 children | 37.50 (28.87) | 39.78 (29.99) | -2.28 | -0.07 | -3 | > 0.05 |
| <i>Target generalization composite</i> | 3- to 5-year-olds | 4 schools/ 19 children | 41.50 (30.33) | 49.22 (34.43) | -7.72 | -0.23 | -9 | > 0.05 |
| Tyler et al., 2003 (Morphological first versus Alternating)^b | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 4 schools/ 21 children | 59.00 (15.39) | 67.36 (16.58) | -8.36 | -0.50 | -19 | > 0.05 |
| <i>Target generalization composite</i> | 3- to 5-year-olds | 4 schools/ 21 children | 48.90 (17.21) | 50.82 (28.53) | -1.92 | -0.08 | -3 | > 0.05 |
| Tyler et al., 2003 (Morphological first versus Simultaneous)^b | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 4 schools/ 19 children | 46.40 (15.39) | 39.78 (29.99) | 6.62 | 0.27 | +11 | > 0.05 |
| <i>Target generalization composite</i> | 3- to 5-year-olds | 4 schools/ 19 children | 42.10 (17.21) | 49.22 (34.43) | -7.12 | -0.25 | -10 | > 0.05 |

| Outcome measure | Study sample | Sample size | Mean (standard deviation) | | WWC calculations | | | p-value |
|---|-------------------|------------------------|---------------------------|------------------|------------------|-------------|-------------------|---------|
| | | | Intervention group | Comparison group | Mean difference | Effect size | Improvement index | |
| Tyler et al., 2003 (Alternating versus Simultaneous)^b | | | | | | | | |
| <i>Finite morpheme composite</i> | 3- to 5-year-olds | 4 schools/ 20 children | 54.76 (16.58) | 39.78 (29.99) | 14.98 | 0.61 | +23 | > 0.05 |
| <i>Target generalization composite</i> | 3- to 5-year-olds | 4 schools/ 20 children | 44.02 (28.53) | 49.22 (34.43) | -5.20 | -0.16 | -6 | > 0.05 |

Table Notes: The supplemental findings presented in this table are additional findings from the studies in this report that do not factor into the determination of the intervention rating. Positive results for mean difference, effect size, and improvement index favor the intervention group; negative results favor the comparison group. The effect size is a standardized measure of the effect of an intervention on student outcomes, representing the change (measured in standard deviations) in an average student’s outcome that can be expected if the student is given the intervention. The improvement index is an alternate presentation of the effect size, reflecting the change in an average student’s percentile rank that can be expected if the student is given the intervention. nr = not reported.

^a For O’Connor et al. (1993), a correction for multiple comparisons was needed and results in significance levels that differ from those in the original study. The p-values presented here were reported in the original study. In the comparison of the Blending group against the Rhyming group, none of the contrasts that were reported as statistically significant by the authors was found to be statistically significant by the WWC due to a multiple comparison adjustment. In the comparison of the Blending group against the Segmenting group, the contrast of *Segmenting: First sound* was not found to be statistically significant by the WWC due to a multiple comparison adjustment. In the comparison of the Rhyming group against the Segmenting group, the following contrasts were not found to be significant by the WWC due to a multiple comparison adjustment: *Segmenting: All sounds*, *Segmenting: Onset-rime*, *Segmenting: First sound*, *Rhyming: Production*, *Rhyming: Oddity*. The WWC calculated the program group mean using a difference-in-differences approach (see the WWC Procedures and Standards Handbook, Appendix B) by adding the impact of the program (i.e., difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. The WWC did not find that any of the “nr” contrasts were statistically significant. The article presents slightly different baseline results for the groups in Table 1 (p. 535) and Figures 2–4 (pp. 539–541). We have used the results from Figures 2–4 in these calculations since they also included the posttest results.

^b For Tyler et al. (2003), no corrections for clustering or multiple comparisons were needed. The authors appear to have only presented statistically significant findings in the prose of the article, and these contrasts were not mentioned as statistically significant. The WWC confirmed that the groups were not significantly different on either outcome. The WWC calculated the program group mean using a difference-in-differences approach (see the WWC Procedures and Standards Handbook, Appendix B) by adding the impact of the program (i.e., difference in mean gains between the intervention and comparison groups) to the unadjusted comparison group posttest means. The study reported gain scores and gain score standard deviations. In order to properly calculate effect sizes, the WWC obtained raw means and standard deviations from the study authors, which are reported here.

Appendix E: Single-case design studies reviewed for this intervention

| Study citation | Study disposition |
|---|--|
| Gierut, J. A. (1990). Differential learning of phonological oppositions. <i>Journal of Speech and Hearing Research</i> , 33(3), 540–549. | Meets WWC pilot Single-Case Design standards |
| Gierut, J. A., Morrisette, M. L., & Champion, A. H. (1999). Lexical constraints in phonological acquisition. <i>Journal of Child Language</i> , 26(2), 261–294. | The study does not meet WWC pilot Single-Case Design standards because inter-assessor agreement was not measured at least once in each phase and on at least 20% of the data points in each condition. |
| Tyler, A. A., & Sandoval, K. T. (1994). Preschoolers with phonological and language disorders: Treating different linguistic domains. <i>Language, Speech, and Hearing Services in Schools</i> , 25(4), 215–234. | The study does not meet WWC pilot Single-Case Design standards because it does not have at least three attempts to demonstrate an intervention effect at three different points in time. |
| Ziolkowski, R. A. (2004). <i>Effects of an emergent literacy intervention for children with language impairments from low income environments</i> (Unpublished doctoral dissertation). Florida State University, Tallahassee. | The study does not meet WWC pilot Single-Case Design standards because inter-assessor agreement was not measured at least once in each phase and on at least 20% of the data points in each condition. |

Table Notes: The supplemental studies presented in this table do not factor in the determination of the intervention rating.

Endnotes

¹ *Phonological awareness training* does not have a single developer or official description. The descriptive information for this program was adapted from publicly available sources: descriptions of this practice (see the websites listed under Program Information) and research articles (O'Connor et al., 1993; Sweat, 2003; Tyler et al., 2003; Tyler et al., 2011). Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review. The literature search for this report includes group design and single-case design studies publicly available by September 2011.

² The studies in this report were reviewed using WWC Evidence Standards, version 2.1, as described in the Early Childhood Education Interventions for Children with Disabilities review protocol, version 2.0. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available. Four WWC intervention reports in the Early Childhood Education topic area review *phonological awareness training* alone or in combination with other practices, as well as two curricula that focus on phonological awareness: *Daisy Quest* and *Sound Foundations*.

³ For criteria used in the determination of the rating of effectiveness and extent of evidence, see the WWC Rating Criteria on p. 41. These improvement index numbers show the average and range of student-level improvement indices for all findings across the studies.

⁴ Readers who are unfamiliar with the terminology related to *phonological awareness training* and the development of reading may find it helpful to consult the glossary of terms available from the National Literacy Information and Communication System (<http://lincs.ed.gov/research/researchdef.html>) and the definitions of outcome measures in Appendix B.

⁵ The other intervention groups had high differential attrition when compared to the comparison group and were not equivalent to the comparison group at baseline. This report includes the comparison of the three *phonological awareness training* conditions to one another in Appendix D.

⁶ There were a total of 30 children randomly assigned to intervention or comparison groups; 18 were from the United States and 12 were from New Zealand (and were therefore not included in this review). Random assignment in the study was conducted using a matched pairs design, which occurred on a rolling basis. In one case in the United States sample, the random assignment process spanned two cohorts, because there were an odd number of children in the first cohort of the study. In this instance, one child in the first cohort was randomly assigned to a group, and when a match was identified in the next cohort, that matched child was assigned to the opposite condition. The WWC determined that this process did not constitute random assignment in accordance with the matched pair design, and as such, only the data from the remaining 16 children in the eight uncompromised pairs were included in this review. Specifically, the issue flagged by the WWC was that the child in the second cohort was selected into a pair and thus was assigned to a condition based on their demographic similarity to the child in the first cohort, and not based on a random process.

⁷ One outcome from Sweat (2003)—final consonant clusters, third person singular—was excluded because of high attrition and lack of established baseline equivalence.

⁸ Information provided by the study author at the WWC's request.

⁹ The other intervention groups were excluded because of high differential attrition when compared to the comparison group and lack of baseline equivalence. This report includes the comparison of the three *phonological awareness training* conditions to one another in Appendix D.

¹⁰ The observed scores on the Bankson-Bernthal Test of Phonology at baseline demonstrated that the sample was eligible for the Early Childhood Education Interventions for Children with Disabilities review.

¹¹ The information that the two groups of children included in this intervention report came from four of the five sites was obtained through an author query.

¹² Comparisons of all four intervention groups against the comparison group did not meet evidence standards because of a lack of baseline equivalence. Although the comparisons of the four intervention groups against one another meet WWC standards, it was determined that the most meaningful and interpretable contrast for the purposes of this report was to compare phonological instruction against morphosyntax instruction. This contrast could be accomplished by comparing Group A and Group B at 12 weeks and is the only contrast included as providing evidence of the effect of *phonological awareness training* in Appendix C. The other five contrasts that met WWC evidence standards are included in Appendix D for transparency.

¹³ The observed scores on the Goldman-Fristoe Test of Articulation and Structured Photographic Expressive Language Test at baseline demonstrated that the sample was eligible for the Early Childhood Education Interventions for Children with Disabilities review.

¹⁴ All of the eligible outcomes measured in the four studies that meet WWC evidence standards have been included, even though some outcomes might appear to be overaligned to the interventions being delivered. With interventions that are practices targeted at young populations (as is the case in this report), researchers will commonly measure outcomes that are directly being taught during

the intervention (e.g., when teaching young children to count to 10, assessing their ability to count to 10 can be considered a reasonable outcome). In this report, a consistent approach of including all eligible outcomes was applied, given the type of intervention being examined and the age of the population of interest.

Recommended Citation

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2012, June). *Early Childhood Education Interventions for Children with Disabilities intervention report: Phonological awareness training*. Retrieved from <http://whatworks.ed.gov>.

WWC Rating Criteria

Criteria used to determine the rating of a study

| Study rating | Criteria |
|--|--|
| Meets WWC evidence standards without reservations | A study that provides strong evidence for an intervention's effectiveness, such as a well-implemented RCT. |
| Meets WWC evidence standards with reservations | A study that provides weaker evidence for an intervention's effectiveness, such as a QED or an RCT with high attrition that has established equivalence of the analytic samples. |

Criteria used to determine the rating of effectiveness for an intervention

| Rating of effectiveness | Criteria |
|-------------------------------------|--|
| Positive effects | Two or more studies show statistically significant positive effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important negative effects. |
| Potentially positive effects | At least one study shows a statistically significant or substantively important positive effect, AND No studies show a statistically significant or substantively important negative effect AND fewer or the same number of studies show indeterminate effects than show statistically significant or substantively important positive effects. |
| Mixed effects | At least one study shows a statistically significant or substantively important positive effect AND at least one study shows a statistically significant or substantively important negative effect, but no more such studies than the number showing a statistically significant or substantively important positive effect, OR At least one study shows a statistically significant or substantively important effect AND more studies show an indeterminate effect than show a statistically significant or substantively important effect. |
| Potentially negative effects | One study shows a statistically significant or substantively important negative effect and no studies show a statistically significant or substantively important positive effect, OR Two or more studies show statistically significant or substantively important negative effects, at least one study shows a statistically significant or substantively important positive effect, and more studies show statistically significant or substantively important negative effects than show statistically significant or substantively important positive effects. |
| Negative effects | Two or more studies show statistically significant negative effects, at least one of which met WWC evidence standards for a strong design, AND No studies show statistically significant or substantively important positive effects. |
| No discernible effects | None of the studies shows a statistically significant or substantively important effect, either positive or negative. |

Criteria used to determine the extent of evidence for an intervention

| Extent of evidence | Criteria |
|------------------------|--|
| Medium to large | The domain includes more than one study, AND The domain includes more than one school, AND The domain findings are based on a total sample size of at least 350 students, OR, assuming 25 students in a class, a total of at least 14 classrooms across studies. |
| Small | The domain includes only one study, OR The domain includes only one school, OR The domain findings are based on a total sample size of fewer than 350 students, AND, assuming 25 students in a class, a total of fewer than 14 classrooms across studies. |

Glossary of Terms

| | |
|--|--|
| Attrition | Attrition occurs when an outcome variable is not available for all participants initially assigned to the intervention and comparison groups. The WWC considers the total attrition rate and the difference in attrition rates across groups within a study. |
| Clustering adjustment | If intervention assignment is made at a cluster level and the analysis is conducted at the student level, the WWC will adjust the statistical significance to account for this mismatch, if necessary. |
| Confounding factor | A confounding factor is a component of a study that is completely aligned with one of the study conditions, making it impossible to separate how much of the observed effect was due to the intervention and how much was due to the factor. |
| Design | The design of a study is the method by which intervention and comparison groups were assigned. |
| Domain | A domain is a group of closely related outcomes. |
| Effect size | The effect size is a measure of the magnitude of an effect. The WWC uses a standardized measure to facilitate comparisons across studies and outcomes. |
| Eligibility | A study is eligible for review and inclusion in this report if it falls within the scope of the review protocol and uses either an experimental or matched comparison group design. |
| Equivalence | A demonstration that the analysis sample groups are similar on observed characteristics defined in the review area protocol. |
| Extent of evidence | An indication of how much evidence supports the findings. The criteria for the extent of evidence levels are given in the WWC Rating Criteria on p. 41. |
| Improvement index | Along a percentile distribution of students, the improvement index represents the gain or loss of the average student due to the intervention. As the average student starts at the 50th percentile, the measure ranges from -50 to +50. |
| Multiple comparison adjustment | When a study includes multiple outcomes or comparison groups, the WWC will adjust the statistical significance to account for the multiple comparisons, if necessary. |
| Quasi-experimental design (QED) | A quasi-experimental design (QED) is a research design in which subjects are assigned to intervention and comparison groups through a process that is not random. |
| Randomized controlled trial (RCT) | A randomized controlled trial (RCT) is an experiment in which investigators randomly assign eligible participants into intervention and comparison groups. |
| Rating of effectiveness | The WWC rates the effects of an intervention in each domain based on the quality of the research design and the magnitude, statistical significance, and consistency in findings. The criteria for the ratings of effectiveness are given in the WWC Rating Criteria on p. 41. |
| Single-case design | A research approach in which an outcome variable is measured repeatedly within and across different conditions that are defined by the presence or absence of an intervention. |
| Standard deviation | The standard deviation of a measure shows how much variation exists across observations in the sample. A low standard deviation indicates that the observations in the sample tend to be very close to the mean; a high standard deviation indicates that the observations in the sample tend to be spread out over a large range of values. |
| Statistical significance | Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups. The WWC labels a finding statistically significant if the likelihood that the difference is due to chance is less than 5% ($p < 0.05$). |
| Substantively important | A substantively important finding is one that has an effect size of 0.25 or greater, regardless of statistical significance. |

Please see the [WWC Procedures and Standards Handbook \(version 2.1\)](#) for additional details.