

What Works Clearinghouse



Lindamood Phoneme Sequencing[®] (LiPS[®])

Program Description¹

The *Lindamood Phoneme Sequencing*[®] (*LiPS*[®]) program (formerly called the *Auditory Discrimination in Depth*[®] [ADD] program) is designed to teach students the skills they need to decode words and to identify individual sounds and blends in words. Initial activities engage students in discovering the lip, tongue, and mouth actions needed to produce specific sounds. After students are able to produce, label, and organize the sounds with their mouths, subsequent activities in sequencing, reading, and spelling use the

oral aspects of sounds to identify and order them within words. The program also offers direct instruction in letter patterns, sight words, and context clues in reading. *LiPS*[®] is designed for emergent readers in kindergarten through grade 3 or for struggling, dyslexic readers. The program is individualized to meet students' needs and is often used with students who have learning disabilities or difficulties. The version of the program tested here involved computer-supported activities.

Research²

One study of *LiPS*[®] that falls within the scope of the Students with Learning Disabilities review protocol meets What Works Clearinghouse (WWC) evidence standards. The study included 50 students with learning disabilities from eight to ten years of age in three elementary schools in Florida.³

Based on this study, the WWC considers the extent of evidence for *LiPS*[®] on students with learning disabilities to be small

for alphabets, reading fluency, reading comprehension, writing, and math. No studies that meet WWC evidence standards with or without reservations examined the effectiveness of *LiPS*[®] on students with learning disabilities in the general reading achievement, science, social studies, or progressing in school domains.

Effectiveness

LiPS[®] was found to have potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities.

1. The descriptive information for this program was obtained from a publicly available source: the program's website (<http://www.lindamoodbell.com>, downloaded October 2009). The WWC requests developers to review the program description sections for accuracy from their perspective. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.
2. The studies in this report were reviewed using WWC Evidence Standards, Version 2.0 (see the WWC Procedures and Standards Handbook, Chapter III).
3. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

Effectiveness *(continued)*

	Alphabetics	Reading fluency	Reading comprehension	Writing	Math
Rating of effectiveness	Potentially positive effects	Potentially positive effects	No discernible effects	Potentially negative effects	Potentially positive effects
Improvement index⁴	Average: +9 percentile points Range: -4 to +34 percentile points	Average: +17 percentile points na	Average: +8 percentile points Range: -5 to +21 percentile points	Average: -22 percentile points na	Average: +12 percentile points na

na = not applicable

Additional program information

Developer and contact

Developed by Patricia Lindamood and Phyllis Lindamood, the *LiPS*[®] program is published by Pro-Ed and is available through a number of professional distributors and publishers. Address: 416 Higuera Street, San Luis Obispo, CA 93401. Web: <http://www.lindamoodbell.com>. Telephone: (800) 233-1819.

Scope of use

Auditory Discrimination in Depth[®] was developed in the late 1960s and early 1970s. It was revised and renamed the *Lindamood Phoneme Sequencing*[®] (*LiPS*[®]) program in 1998. The program is frequently offered at centers or clinics, including program-endorsed Lindamood-Bell Learning Centers, and is available for purchase by the public.

Teaching

Teachers work with students in whole class and small group activities or in small groups and one-on-one settings to help

them become aware of the mouth actions that produce speech sounds. Instructors help students verify sounds within words and teach them to self-correct in reading, spelling, and speech. The program developer recommends that instruction last four to six months for one hour a day, or four to six weeks for four hours a day. Computer-supported activities are available for the program. Lindamood Bell offers *LiPS*[®] workshops to train teachers, but teachers can also learn to administer the program from the *Lindamood Phoneme Sequencing*[®] *Teacher's Manual*.

Cost

A kit of materials designed for one-on-one or small-group instruction can be purchased for \$350. The classroom kit costs \$541. Kits include a trainer's manual and all student materials (tiles, blocks, colored felts, and picture cards). Some of these materials are also sold separately. Information is not available on the cost of training for instructors or on how much it costs for students to receive instruction at a licensed center.

Research

Thirty-one studies reviewed by the WWC investigated the effects of *LiPS*[®] on students with learning disabilities. One study (Torgesen et al., 2001) is a randomized controlled trial that meets WWC evidence standards. The remaining 30 studies do not meet either WWC evidence standards or eligibility screens.

Meets evidence standards

Torgesen et al. (2001) examined the effects of *LiPS*[®] using a randomized controlled trial involving students with learning disabilities between eight and ten years of age from three public elementary schools in Florida. All students in the study had been identified by school staff as having learning disabilities on

4. These numbers show the average and range of student-level improvement indices for all findings across the study.

Research (continued)

the basis of a discrepancy of at least one standard deviation between their scores on a standardized test of reading and their full-scale score on an intelligence test. Each year for three years, the researchers worked with staff from the three elementary schools to select a sample of students with learning disabilities (20 students per year). The 60 children eligible for the study were randomly assigned to one of two groups (30 per group): *LiPS*[®] (formerly *Auditory Discrimination in Depth*[®]) or *Embedded Phonics* (an instructional program developed by the authors). The interventions were provided to students in two eight-week phases: an intensive phase and an application/generalization phase. Pretest data were collected two to three weeks prior to the start of the interventions, posttest data were collected two to three weeks after completion of the eight-week intensive intervention period, and follow-up data were collected one year and two years following the posttest. Ten students were not available for the second follow-up data collection, leaving 50 students

in the analysis sample: 26 students that received *LiPS*[®] and 24 students that received *Embedded Phonics*.

Extent of evidence

The WWC categorizes the extent of evidence in each domain as small or medium to large (see the WWC Procedures and Standards Handbook, Appendix G). The extent of evidence takes into account the number of studies and the total sample size across the studies that meet WWC evidence standards with or without reservations.⁵

The WWC considers the extent of evidence for *LiPS*[®] to be small for students with learning disabilities in the alphabetics, reading fluency, reading comprehension, writing, and math domains. No studies that meet WWC evidence standards with or without reservations examined the effectiveness of *LiPS*[®] on students with learning disabilities in the general reading achievement, science, social studies, or progressing in school domains.

Effectiveness Findings

The WWC review of interventions for *LiPS*[®] addresses student outcomes in nine domains: alphabetics, reading fluency, reading comprehension, general reading achievement, writing, math, science, social studies, and progressing in school. The study included in this report covers five domains: alphabetics (including the constructs of phonological awareness, word attack, and letter-word identification), reading fluency, reading comprehension, writing, and math. The findings below present the authors' estimates and WWC-calculated estimates of the size and the statistical significance of the effects of *LiPS*[®] on students with learning disabilities.⁶

Alphabetics. Findings from the Torgesen et al. (2001) study were based on comparisons of *LiPS*[®] students and control group students (who participated in an intervention titled *Embedded Phonics*) on eight measures of alphabetics, including four measures of phonological awareness, three measures of word attack skills, and one measure of letter-word identification. The study authors found statistically significant effects favoring the *LiPS*[®] group for two of the eight measures, including the Lindamood Auditory Conceptualization Test and the Word Attack subtest from the Woodcock Reading Mastery Test–Revised. WWC analyses, which were corrected for multiple comparisons, confirmed these statistically significant positive findings. Neither the study

5. The extent of evidence categorization was developed to tell readers how much evidence was used to determine the intervention rating, focusing on the number and size of studies. Additional factors associated with a related concept—external validity, such as the students' demographics and the types of settings in which studies took place—are not taken into account for the categorization. Information about how the extent of evidence rating was determined for *LiPS*[®] is in Appendix A6.
6. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), a correction for multiple comparisons was needed, so the significance levels may differ from those reported in the original study.

Effectiveness *(continued)*

authors nor the WWC found statistically significant effects for the other six measures of alphabets. According to WWC criteria, *LiPS*[®] has potentially positive effects on alphabets for students with learning disabilities.

Reading fluency. Torgesen et al. (2001) found statistically significant effects favoring the *LiPS*[®] group for two measures of reading fluency: the Reading Accuracy and Reading Rate subtests from the Gray Oral Reading Test–III. WWC analyses found neither of these comparisons to be statistically significant; however, the WWC-calculated average effect across the two outcomes was large enough to be considered substantively important according to WWC criteria (that is, an effect size of at least 0.25). Thus, the WWC found *LiPS*[®] to have potentially positive effects on reading fluency for students with learning disabilities.

Reading comprehension. Torgesen et al. (2001) found no statistically significant effects on either of the two measures of reading comprehension: the Passage Comprehension subtest of the Woodcock Reading Mastery Test–Revised and the Reading Comprehension subtest of the Gray Oral Reading Test–III. The WWC-calculated average effect size across the two outcomes was not large enough to be considered substantively important. According to WWC criteria, *LiPS*[®] has no discernible effects on reading comprehension for students with learning disabilities.

The WWC found *LiPS*[®] to have potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities

Improvement index

The WWC computes an improvement index for each individual finding. In addition, within each outcome domain, the WWC computes an average improvement index for each study and an average improvement index across studies (see WWC Procedures and Standards Handbook, Appendix F). The improvement index represents the difference between the percentile rank of the average student in the intervention condition and the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is entirely based on the

Writing. Torgesen et al. (2001) found, and the WWC confirmed, a statistically significant effect favoring the control group on the Spelling subtest from the Kaufman Test of Educational Achievement. According to WWC criteria, *LiPS*[®] has potentially negative effects on writing for students with learning disabilities.

Math. Torgesen et al. (2001) found no statistically significant effect on the Calculation subtest from the Woodcock-Johnson Psycho-Educational Battery–Revised. WWC analyses confirmed that there was no statistically significant effect; however, the effect on the Calculation subtest was positive and large enough to be considered substantively important according to WWC criteria. Thus, the WWC concludes that *LiPS*[®] has potentially positive effects on math for students with learning disabilities.

Rating of effectiveness

The WWC rates the effects of an intervention in a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative. The rating of effectiveness takes into account four factors: the quality of the research design, the statistical significance of the findings, the size of the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Procedures and Standards Handbook, Appendix E).

size of the effect, regardless of the statistical significance of the effect, the study design, or the analysis. The improvement index can take on values between –50 and +50, with positive numbers denoting favorable results for the intervention group.

Based on one study, the average improvement index for alphabets is +9 percentile points with a range of –4 to +34 percentile points across eight findings; the average improvement index for reading fluency is +17 percentile points based on two findings; the average improvement index for reading comprehension is +8 percentile points with a range of –5 to +21 percentile

The WWC found *LiPS*® to have potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities

(continued)

points across two findings; the improvement index for writing is –22 percentile points based on one finding; and the improvement index for math is +12 percentile points based on one finding.

Summary

The WWC reviewed 31 studies on *LiPS*® for students with learning disabilities. One of these studies meets WWC evidence standards; the remaining 30 studies do not meet either WWC

evidence standards or eligibility screens. Based on the one study, the WWC found that *LiPS*® has potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities. The conclusions presented in this report may change as new research emerges.

References

Meets WWC evidence standards

Torgesen, J. K., Alexander, A. W., Wagner, R. K., Rashotte, C. A., Voeller, K., & Conway, T. (2001). Intensive remedial instruction for children with severe reading disabilities: Immediate and long-term outcomes from two instructional approaches. *Journal of Learning Disabilities, 34*(1), 33.

Studies that fall outside the Students with Learning Disabilities review protocol or do not meet WWC evidence standards

Alexander, A., Anderson, H., Heilman, P., Voeller, K., & Torgesen, J. (1991). Phonological awareness training and the remediation of analytic decoding deficits in a group of severe dyslexics. *Annals of Dyslexia, 41*(1), 193–206. The study is ineligible for review because it does not use a comparison group.

American Federation of Teachers. (1999). *Building on the best, learning from what works: Five promising remedial reading intervention programs*. Washington, DC: Author. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Biemiller, A., & Siegel, L. S. (1997). A longitudinal study of the effects of the *Bridge Reading Program* for children at risk for reading failure. *Learning Disability Quarterly, 20*(2), 83–92. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

Brown, M. S. (1997). *The Auditory Discrimination in Depth program at the college level*. Unpublished master's thesis, West Virginia University, Morgantown. 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.

Burke, C., Howard, L., & Evangelou, T. (2005). *A project of hope: Lindamood-Bell Center in a school project*. Final evaluation report. San Diego, CA: SANDAG. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

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 includes less than 50% students with learning disabilities.

Conway, T., Heilman, P., Gonzalez-Rothi, L., Alexander, A., Adair, J., Crosson, B., et al. (1998). Treatment of a case of phonological alexia with agraphia using the *Auditory Discrimination in Depth (ADD)* program. *Journal of the International Neuropsychological Society, 4*(1), 608–620. The study is ineligible for review because it does not use a comparison group.

Eden, G. F., Jones, K. M., Cappell, K., Gareau, L., Wood, F. B., Zeffiro, T. A., et al. (2004). Neural changes following remediation in adult developmental dyslexia. *Neuron, 44*(3), 411–422.

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- Lance, D. M., Beverly, B. L., Evans, L. H., & McCullough, K. C. (2003). Addressing literacy: Effective methods for reading instruction. *Communication Disorders Quarterly*, 25(1), 5–11. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Lordi, D. L. (2004). The impact of a multi-sensory approach toward the improvement of reading and language processing skills in fourth- and fifth-grade students with specific reading difficulties and language processing disorders. (Doctoral dissertation, Union Institute and University, 2004). *Dissertation Abstracts International*, 66(02A), 140–497. The study is ineligible for review because it does not use a comparison group.
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- Osbourne, J. K. (1998). Does a phonological intervention program using a modified *Auditory Discrimination in Depth* program make a difference in kindergarten students’ ability to manipulate phonemes? (Master’s thesis, Grand Valley State University, 1998). *Masters Abstracts International*, 36(06), 88–1453. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
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- Pokorni, J. L., Worthington, C. K., & Jamison, P. J. (2004). Phonological awareness intervention: Comparison of *Fast ForWord*, *Earobics*, and *LiPS*. *Journal of Educational Research*, *97*(3), 147–157. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
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- Additional source:**
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- Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Lindamood, P., Conway, T., & Garvin, 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. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
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Appendix A1 Study Characteristics: Torgesen et al., 2001 (randomized controlled trial) (continued)

Characteristic	Description
Comparison	Students in the comparison group participated in a competing intervention, developed by the study authors, called <i>Embedded Phonics</i> . This intervention was delivered for the same amount of time as <i>LiPS</i> [®] and also taught phonemic awareness and phonemic decoding. However, the <i>Embedded Phonics</i> instruction emphasized application through reading meaningful text and recognizing, practicing, and spelling high-frequency sight words.
Primary outcomes and measurement	The authors assessed students with a battery of tests at the pretest, posttest, one-year follow-up, and two-year follow-up time points. In the domain of alphabets, phonological awareness was measured by administration of the Lindamood Auditory Conceptualization Test and the Elision subtest, the Non-word Repetition subtest, and the Rapid Letter Naming subtest from the Comprehensive Test of Phonological Processes (CTOPP); word attack was measured by administration of the Word Attack subtest of the Woodcock Reading Mastery Test–Revised (WRMT–R) and the Phonemic Decoding and Sight Word Efficiency subtests of the Test of the Word Reading Efficiency (TOWRE); and letter-word identification was measured by administration of the Word Identification subtest of the WRMT–R. The domain of reading fluency was measured by administration of the Reading Accuracy and Reading Rate subtests of the Gray Oral Reading Test–III (GORT–III). The domain of reading comprehension was measured by administration of the Passage Comprehension subtest of the WRMT–R and the Reading Comprehension subtest of the GORT–III. The domain of writing was measured by administration of the Spelling subtest of the Kaufman Test of Educational Achievement. The domain of math was measured by administration of the Calculation subtest from the Woodcock-Johnson Psycho-Educational Battery–Revised (WJ–R). Other outcomes were reported in the study but were not included in this report because they were outside the scope of the Students with Learning Disabilities review. For a more detailed description of these outcome measures, see Appendices A2.1–2.5.
Staff/teacher training	The teachers who administered each program all had at least one year’s experience teaching children with reading disabilities using that method or one very similar to it. The teachers who taught <i>LiPS</i> [®] were all drawn from those working at a clinic where the program had been used for the previous five years.

Appendix A2.1 Outcome measures for the alphabetic domain

Outcome measure	Description
<i>Phonological awareness construct</i>	
Lindamood Auditory Conceptualization Test (LAC)	The LAC is an individually administered, norm-referenced assessment that measures a child's ability to perceive and conceptualize speech sounds using a visual medium (as cited in Torgesen et al., 2001).
Elision subtest from the Comprehensive Test of Phonological Processes (CTOPP)	The CTOPP Elision subtest measures the child's ability to manipulate sounds in words (as cited in Torgesen et al., 2001).
Non-word Repetition subtest from the CTOPP	The CTOPP Non-word Repetition subtest measures the ability of a child to combine sounds that are presented orally and to put the separate sounds together to form a nonsense word (as cited in Torgesen et al., 2001).
Rapid Letter Naming subtest from the CTOPP	The CTOPP Rapid Letter Naming subtest measures rate of access to phonological information in long-term memory (as cited in Torgesen et al., 2001).
<i>Word attack construct</i>	
Word Attack subtest from the Woodcock Reading Mastery Test–Revised (WRMT–R)	The WRMT–R Word Attack subtest measures phonemic decoding skills by asking students to read pseudowords. Students are aware that the words are not real (as cited in Torgesen et al., 2001).
Phonemic Decoding subtest from the Test of Word Reading Efficiency (TOWRE)	The TOWRE Phonetic Efficiency Decoding subtest measures the number of pronounceable non-printed words that can be accurately decoded within 45 seconds (as cited in Torgesen et al., 2001).
Sight Word Efficiency subtest from the TOWRE	The TOWRE Sight Word Efficiency subtest assesses the number of real printed words that can be accurately identified within 45 seconds (as cited in Torgesen et al., 2001).
<i>Letter-word identification construct</i>	
Word Identification subtest from the WRMT–R	The WRMT–R Word Identification subtest measures basic word reading skills and requires the child to read aloud isolated words that range in frequency and difficulty (as cited in Torgesen et al., 2001).

Appendix A2.2 Outcome measures for the reading fluency domain

Outcome measure	Description
Reading Accuracy subtest from the Gray Oral Reading Test–III (GORT–III)	The GORT–III Reading Accuracy subtest measures the number of word reading errors that occurred while reading a series of short paragraphs that increase in difficulty (as cited in Torgesen et al., 2001).
Reading Rate subtest from the GORT–III	The GORT–III Reading Rate subtest measures the amount of time taken to read short paragraphs that increase in difficulty (as cited in Torgesen et al., 2001).

Appendix A2.3 Outcome measures for the reading comprehension domain

Outcome measure	Description
Passage Comprehension subtest from the WRMT–R	The WRMT–R Passage Comprehension subtest asks students to read silently and fill in missing words in a short paragraph (as cited in Torgesen et al., 2001).
Reading Comprehension subtest from the GORT–III	The GORT–III Reading Comprehension subtest asks students to read paragraphs and answer five comprehension questions for each paragraph. The questions are read to students by the tester (as cited in Torgesen et al., 2001).

Appendix A2.4 Outcome measures for the writing domain

Outcome measure	Description
Spelling subtest from the Kaufman Test of Educational Achievement (KTEA)	The KTEA Spelling subtest is a norm-referenced test consisting of 50 items (as cited in Torgesen et al., 2001).

Appendix A2.5 Outcome measures for the math domain

Outcome measure	Description
Calculation subtest from the Woodcock-Johnson Psycho-Educational Battery–Revised (WJ–R)	The WJ–R Calculation subtest measures the subject’s skill in performing mathematical calculations including addition, subtraction, multiplication, and division. The calculations involve decimals, fractions, and whole numbers (as cited in Torgesen et al., 2001).

Appendix A3.1 Summary of study findings included in the rating for the alphabetics domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®–comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
LAC	Grade 4	50	82.3 (10.1)	69.0 (17.3)	13.3	0.93	Statistically significant	+32
CTOPP Elision subtest	Grade 4	50	96.4 (14.3)	97.9 (12.8)	–1.5	–0.11	ns	–4
CTOPP Non-word Repetition subtest	Grade 4	50	102.2 (16.1)	103.0 (19.0)	–0.8	–0.04	ns	–2
CTOPP Rapid Letter Naming subtest	Grade 4	50	93.3 (10.3)	93.1 (11.5)	0.2	0.02	ns	+1
WRMT–R Word Attack subtest	Grade 4	50	98.0 (7.0)	90.3 (8.3)	7.7	0.99	Statistically significant	+34
TOWRE Phonemic Decoding subtest	Grade 4	50	84.7 (4.8)	83.7 (5.8)	1.0	0.19	ns	+7
TOWRE Sight Word Efficiency subtest	Grade 4	50	72.1 (5.8)	72.7 (7.8)	–0.6	–0.09	ns	–3
WRMT–R Word Identification subtest	Grade 4	50	79.9 (11.2)	80.5 (9.6)	–0.6	–0.06	ns	–2
Domain average for alphabetics⁹						0.23	ns	+9

ns = not statistically significant

LAC = Lindamood Auditory Conceptualization Test

CTOPP = Comprehensive Test of Phonological Processing

WRMT–R = Woodcock Reading Mastery Test–Revised

TOWRE = Test of Word Reading Efficiency

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the alphabetics domain. One- and two-year follow-up findings from Torgesen et al. (2001) are not included in these ratings, but are reported in Appendices A4.1 and A4.6.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.

(continued)

Appendix A3.1 Summary of study findings included in the rating for the alphabetics domain¹ *(continued)*

5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between -50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), a correction for multiple comparisons was needed, so the significance levels may differ from those reported in the original study.
9. This row provides the study average, which in this instance, is also the domain average. The WWC-computed domain average effect size is a simple average rounded to two decimal places. The average improvement index is calculated from the average effect size.

Appendix A3.2 Summary of study findings included in the rating for the reading fluency domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®-comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
GORT-III Reading Accuracy subtest	Grade 4	50	93.1 (12.4)	87.5 (13.4)	5.6	0.43	ns	+17
GORT-III Reading Rate subtest	Grade 4	50	75.6 (8.2)	72.1 (7.9)	3.5	0.43	ns	+17
Domain average for reading fluency⁹						0.43	ns	+17

ns = not statistically significant

GORT-III = Gray Oral Reading Test-III

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the reading fluency domain. One- and two-year follow-up findings from Torgesen et al. (2001) are not included in these ratings, but are reported in Appendices A4.2 and A4.7.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between -50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.
9. This row provides the study average, which in this instance, is also the domain average. The WWC-computed domain average effect size is a simple average rounded to two decimal places. The average improvement index is calculated from the average effect size.

Appendix A3.3 Summary of study findings included in the rating for the reading comprehension domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®-comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
		LiPS® group ³	Comparison group					
Torgesen et al., 2001⁸								
WRMT–R Passage Comprehension subtest	Grade 4	50	90.2 (9.0)	92.0 (19.8)	–1.8	–0.12	ns	–5
GORT–III Reading Comprehension subtest	Grade 4	50	91.7 (10.0)	86.0 (10.4)	5.7	0.55	ns	+21
Domain average for reading comprehension⁹						0.21	ns	+8

ns = not statistically significant

WRMT–R = Woodcock Reading Mastery Test–Revised

GORT–III = Gray Oral Reading Test–III

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the reading comprehension domain. One- and two-year follow-up findings from Torgesen et al. (2001) are not included in these ratings, but are reported in Appendices A4.3 and A4.8.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.
9. This row provides the study average, which in this instance, is also the domain average. The WWC-computed domain average effect size is a simple average rounded to two decimal places. The average improvement index is calculated from the average effect size.

Appendix A3.4 Summary of study findings included in the rating for the writing domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®-comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
KTEA Spelling subtest	Grade 4	50	76.3 (5.0)	80.0 (7.4)	-3.7	-0.58	Statistically significant	-22
Domain average for writing						-0.58	Statistically significant	-22

KTEA = Kaufman Test of Educational Achievement

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the writing domain. One- and two-year follow-up findings from Torgesen et al. (2001) are not included in these ratings, but are reported in Appendices A4.4 and A4.9.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between -50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A3.5 Summary of study findings included in the rating for the math domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®–comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
WJ–R Calculation subtest	Grade 4	50	90.9 (14.1)	86.9 (11.5)	4.0	0.30	ns	+12
Domain average for math						0.30	ns	+12

ns = not statistically significant

WJ–R = Woodcock–Johnson Psycho-Educational Battery–Revised

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the math domain. One- and two-year follow-up findings from Torgesen et al. (2001) are not included in these ratings, but are reported in Appendices A4.5 and A4.10.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.1 Summary of one-year follow-up findings for the alphabetic domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations				
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®–comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷	
			LiPS® group ³	Comparison group					
Torgesen et al., 2001⁸									
LAC	Grade 4	50	75.4 (14.0)	72.0 (13.9)	3.4	0.24	ns	+9	
CTOPP Elision subtest	Grade 4	50	93.3 (13.7)	94.4 (14.3)	–1.1	–0.08	ns	–3	
CTOPP Non-word Repetition subtest	Grade 4	50	109.8 (15.6)	108.2 (17.4)	1.6	0.10	ns	+4	
CTOPP Rapid Letter Naming subtest	Grade 4	50	90.0 (10.6)	92.4 (10.2)	–2.4	–0.23	ns	–9	
WRMT–R Word Attack subtest	Grade 4	50	92.3 (9.3)	87.0 (8.9)	5.3	0.57	ns	+22	
TOWRE Phonemic Decoding subtest	Grade 4	50	83.0 (7.4)	80.6 (9.1)	2.4	0.29	ns	+11	
TOWRE Sight Word Efficiency subtest	Grade 4	50	76.9 (6.4)	74.4 (9.6)	2.5	0.30	ns	+12	
WRMT–R Word Identification subtest	Grade 4	50	80.2 (9.6)	78.2 (11.3)	2.0	0.19	ns	+7	

ns = not statistically significant

LAC = Lindamood Auditory Conceptualization Test

CTOPP = Comprehensive Test of Phonological Processes

WRMT–R = Woodcock Reading Mastery Test–Revised

TOWRE = Test of Word Reading Efficiency

1. This appendix presents one-year follow-up findings for measures that fall in the alphabetic domain. Posttest scores were used for rating purposes and are presented in Appendix A3.1.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.

(continued)

Appendix A4.1 Summary of one-year follow-up findings for the alphabetic domain¹ *(continued)*

7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), a correction for multiple comparisons was needed, so the significance levels may differ from those reported in the original study.

Appendix A4.2 Summary of one-year follow-up findings for the reading fluency domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS [®] –comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS [®] group ³	Comparison group				
Torgesen et al., 2001⁸								
GORT–III Reading Accuracy subtest	Grade 4	50	97.4 (12.3)	90.8 (14.8)	6.6	0.48	ns	+18
GORT–III Reading Rate subtest	Grade 4	50	75.2 (9.3)	72.1 (13.2)	3.1	0.27	ns	+11

ns = not statistically significant

GORT–III = Gray Oral Reading Test–III

1. This appendix presents one-year follow-up findings for measures that fall in the reading fluency domain. Posttest scores were used for rating purposes and are presented in Appendix A3.2.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.3 Summary of one-year follow-up findings for the reading comprehension domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS [®] -comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
		LiPS [®] group ³	Comparison group					
Torgesen et al., 2001⁸								
WRMT-R Passage Comprehension subtest	Grade 4	50	92.0 (8.0)	91.5 (10.8)	0.5	0.05	ns	+2
GORT-III Reading Comprehension subtest	Grade 4	50	96.3 (10.0)	88.1 (12.2)	8.2	0.73	Statistically significant	+27

ns = not statistically significant

WRMT-R = Woodcock Reading Mastery Test-Revised

GORT-III = Gray Oral Reading Test-III

1. This appendix presents one-year follow-up findings for measures that fall in the reading comprehension domain. Posttest scores were used for rating purposes and are presented in Appendix A3.3.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between -50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), a correction for multiple comparisons was needed, so the significance levels may differ from those reported in the original study.

Appendix A4.4 Summary of one-year follow-up findings for the writing domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®–comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
KTEA Spelling subtest	Grade 4	50	75.5 (5.8)	74.0 (6.6)	1.5	0.24	ns	+9

ns = not statistically significant

KTEA = Kaufman Test of Educational Achievement

1. This appendix presents one-year follow-up findings for measures that fall in the writing domain. Posttest scores were used for rating purposes and are presented in Appendix A3.4.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.5 Summary of one-year follow-up findings for the math domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®–comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
WJ–R Calculation subtest	Grade 4	50	83.6 (13.5)	86.5 (10.1)	–2.9	–0.24	ns	–9

ns = not statistically significant

WJ–R = Woodcock–Johnson Psycho–Educational Battery–Revised

1. This appendix presents one-year follow-up findings for measures that fall in the math domain. Posttest scores were used for rating purposes and are presented in Appendix A3.5.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.6

Summary of two-year follow-up findings for the alphabetic domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations				
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®-comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷	
			LiPS® group ³	Comparison group					
Torgesen et al., 2001⁸									
LAC	Grade 4	50	75.3 (14.1)	76.2 (13.4)	-0.9	-0.06	ns	-3	
CTOPP Elision subtest	Grade 4	50	93.3 (13.9)	98.8 (13.6)	-5.5	-0.39	ns	-15	
CTOPP Non-word Repetition subtest	Grade 4	50	114.3 (13.7)	112.8 (14.0)	1.5	0.11	ns	+4	
CTOPP Rapid Letter Naming subtest	Grade 4	50	93.5 (11.3)	93.3 (12.4)	0.2	0.02	ns	+1	
WRMT-R Word Attack subtest	Grade 4	50	93.4 (12.5)	89.9 (10.4)	3.5	0.30	ns	+12	
TOWRE Phonemic Decoding subtest	Grade 4	50	85.7 (7.5)	82.7 (10.7)	3.0	0.32	ns	+13	
TOWRE Sight Word Efficiency subtest	Grade 4	50	79.7 (6.5)	77.8 (9.5)	1.9	0.23	ns	+9	
WRMT-R Word Identification subtest	Grade 4	50	84.5 (12.1)	83.9 (12.2)	0.6	0.05	ns	+2	

ns = not statistically significant

LAC = Lindamood Auditory Conceptualization Test

CTOPP = Comprehensive Test of Phonological Processes

WRMT-R = Woodcock Reading Mastery Test-Revised

TOWRE = Test of Word Reading Efficiency

1. This appendix presents two-year follow-up findings for measures that fall in the alphabetic domain. Posttest scores were used for rating purposes and are presented in Appendix A3.1.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.

(continued)

Appendix A4.6 Summary of two-year follow-up findings for the alphabetics domain¹ *(continued)*

7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.7 Summary of two-year follow-up findings for the reading fluency domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS [®] –comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS [®] group ³	Comparison group				
Torgesen et al., 2001⁸								
GORT–III Reading Accuracy subtest	Grade 4	50	95.0 (15.5)	90.4 (14.7)	4.6	0.30	ns	+12
GORT–III Reading Rate subtest	Grade 4	50	72.9 (9.5)	70.7 (12.9)	2.2	0.19	ns	+8

ns = not statistically significant

GORT–III = Gray Oral Reading Test–III

1. This appendix presents two-year follow-up findings for measures that fall in the reading fluency domain. Posttest scores were used for rating purposes and are presented in Appendix A3.2.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.8 Summary of two-year follow-up findings for the reading comprehension domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS [®] –comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS [®] group ³	Comparison group				
Torgesen et al., 2001⁸								
WRMT–R Passage Comprehension subtest	Grade 4	50	93.9 (8.9)	96.9 (11.5)	–3.0	–0.29	ns	–11
GORT–III Reading Comprehension subtest	Grade 4	50	94.0 (11.8)	87.2 (15.1)	6.8	0.50	ns	+19

ns = not statistically significant

WRMT–R = Woodcock Reading Mastery Test–Revised

GORT–III = Gray Oral Reading Test–III

1. This appendix presents two-year follow-up findings for measures that fall in the reading comprehension domain. Posttest scores were used for rating purposes and are presented in Appendix A3.3.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.9 Summary of two-year follow-up findings for the writing domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®– comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
KTEA Spelling subtest	Grade 4	50	75.0 (6.7)	75.3 (6.0)	–0.3	–0.05	ns	–2

ns = not statistically significant

KTEA = Kaufman Test of Educational Achievement

1. This appendix presents two-year follow-up findings for measures that fall in the writing domain. Posttest scores were used for rating purposes and are presented in Appendix A3.4.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A4.10 Summary of two-year follow-up findings for the math domain¹

Outcome measure	Study sample	Sample size (students)	Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation) ²		Mean difference ⁴ (LiPS®–comparison)	Effect size ⁵	Statistical significance ⁶ (at $\alpha = 0.05$)	Improvement index ⁷
			LiPS® group ³	Comparison group				
Torgesen et al., 2001⁸								
WJ–R Calculation subtest	Grade 4	50	85.5 (12.4)	89.4 (11.1)	–3.9	–0.33	ns	–13

ns = not statistically significant

WJ–R = Woodcock–Johnson Psycho–Educational Battery–Revised

1. This appendix presents two-year follow-up findings for measures that fall in the math domain. Posttest scores were used for rating purposes and are presented in Appendix A3.5.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Each intervention group mean is calculated as the unadjusted control mean plus the WWC-adjusted mean difference. Standard deviations are unadjusted.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
8. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), no corrections for clustering or multiple comparisons were needed.

Appendix A5.1 *LiPS*[®] rating for the alphabets domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.¹

For the outcome domain of alphabets, the WWC rated *LiPS*[®] as having potentially positive effects for students with learning disabilities. The remaining ratings (mixed effects, indeterminate effects, potentially negative effects, negative effects) were not considered, as *LiPS*[®] was assigned the highest applicable rating.

Rating received

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

Met. One study of *LiPS*[®] showed a statistically significant positive effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect, nor did any study show an indeterminate effect.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

Not met. One study of *LiPS*[®] had a strong design and showed a statistically significant positive effect.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

Appendix A5.2 *LiPS*[®] rating for the reading fluency domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.¹

For the outcome domain of reading fluency, the WWC rated *LiPS*[®] as having potentially positive effects on students with learning disabilities. The remaining ratings (mixed effects, indeterminate effects, potentially negative effects, negative effects) were not considered, as *LiPS*[®] was assigned the highest applicable rating.

Rating received

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

Met. One study of *LiPS*[®] showed a substantively important positive effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect, nor did any study show an indeterminate effect.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

Not met. No study of *LiPS*[®] showed a statistically significant positive effect.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

Appendix A5.3 **LiPS®** rating for the reading comprehension domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.¹ For the outcome domain of reading comprehension, the WWC rated *LiPS*® as having no discernible effects on students with learning disabilities.

Rating received

No discernible effects: No affirmative evidence of effects.

- Criterion 1: None of the studies shows a statistically significant or substantively important effect, either *positive* or *negative*.

Met. No study of *LiPS*® showed a statistically significant or substantively important effect, either positive or negative.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

Not met. No study of *LiPS*® showed a statistically significant positive effect.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

Met. No study of *LiPS*® showed a statistically significant or substantively important negative effect.

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

Not met. No study of *LiPS*® showed a statistically significant or substantively important positive effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

Not met. No study of *LiPS*® showed a statistically significant or substantively important negative effect, but one study showed an indeterminate effect.

Mixed effects: Evidence of inconsistent effects as demonstrated through either of the following criteria.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect, and at least one study showing 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.

Not met. No study of *LiPS*® showed a statistically significant or substantively important effect, either positive or negative.

OR

- Criterion 2: At least one study showing a statistically significant or substantively important effect, and more studies showing an *indeterminate* effect than showing a statistically significant or substantively important effect.

Not met. No study of *LiPS*® showed a statistically significant or substantively important effect, either positive or negative, but one study showed an indeterminate effect.

(continued)

Appendix A5.3 *LiPS*[®] rating for the reading comprehension domain (continued)

Potentially negative effects: Evidence of a negative effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *negative* effect.

Not met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *positive* effect, or more studies showing statistically significant or substantively important *negative* effects than showing statistically significant or substantively important *positive* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important effect, either positive or negative.

Negative effects: Strong evidence of a negative effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *negative* effects, at least one of which met WWC evidence standards for a *strong* design.

Not met. No study of *LiPS*[®] showed a statistically significant negative effect.

AND

- Criterion 2: No studies showing statistically significant or substantively important *positive* effects.

Not met. No study of *LiPS*[®] showed a statistically significant or substantively important positive effect.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

Appendix A5.4 *LiPS*[®] rating for the writing domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.¹

For the outcome domain of writing, the WWC rated *LiPS*[®] as having potentially negative effects on students with learning disabilities. The remaining rating (negative effects) was not considered, as *LiPS*[®] was assigned the highest applicable rating.

Rating received

Potentially negative effects: Evidence of a negative effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *negative* effect.

Met. One study of *LiPS*[®] showed a statistically significant negative effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *positive* effect, or more studies showing statistically significant or substantively important *negative* effects than showing statistically significant or substantively important *positive* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important positive effect.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

Not met. No study of *LiPS*[®] showed a statistically significant positive effect.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

Not met. One study of *LiPS*[®] showed a statistically significant negative effect.

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

Not met. No study of *LiPS*[®] showed a statistically significant or substantively important positive effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

Not met. One study of *LiPS*[®] showed a statistically significant negative effect. No study of *LiPS*[®] showed an indeterminate effect.

Mixed effects: Evidence of inconsistent effects as demonstrated through either of the following criteria.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect, and at least one study showing 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.

(continued)

Appendix A5.4 **LiPS®** rating for the writing domain *(continued)*

Not met. One study of *LiPS*® showed a statistically significant negative effect. No study of *LiPS*® showed a statistically significant or substantively important positive effect.

OR

- Criterion 2: At least one study showing a statistically significant or substantively important effect, and more studies showing an *indeterminate* effect than showing a statistically significant or substantively important effect.

Not met. One study of *LiPS*® showed a statistically significant negative effect. No study of *LiPS*® showed an indeterminate effect.

No discernible effects: No affirmative evidence of effects.

- Criterion 1: None of the studies shows a statistically significant or substantively important effect, either *positive* or *negative*.

Not met. One study of *LiPS*® showed a statistically significant negative effect.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

Appendix A5.5 *LiPS*[®] rating for the math domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.¹

For the outcome domain of math, the WWC rated *LiPS*[®] as having potentially positive effects on students with learning disabilities. The remaining ratings (mixed effects, no discernible effects, potentially negative effects, negative effects) were not considered, as *LiPS*[®] was assigned the highest applicable rating.

Rating received

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

Met. One study of *LiPS*[®] showed a substantively important positive effect.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect, nor did any study show an indeterminate effect.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

Not met. No study of *LiPS*[®] showed a statistically significant positive effect.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

Met. No study of *LiPS*[®] showed a statistically significant or substantively important negative effect, nor did any study show an indeterminate effect.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

Appendix A6 Extent of evidence by domain

Outcome domain	Number of studies	Sample size		Extent of evidence ¹
		Schools	Students	
Alphabets	1	3	50	Small
Reading fluency	1	3	50	Small
Reading comprehension	1	3	50	Small
Writing	1	3	50	Small
Math	1	3	50	Small
General reading achievement	0	na	na	na
Science	0	na	na	na
Social studies	0	na	na	na
Progressing in school	0	na	na	na

na = not applicable/not studied

1. A rating of “medium to large” requires at least two studies and two schools across studies in one domain and a total sample size across studies of at least 350 students or 14 classrooms. Otherwise, the rating is “small.” For more details on the extent of evidence categorization, see the WWC Procedures and Standards Handbook, Appendix G.