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Title: Effective programs for struggling readers: A best-evidence synthesis

Conference Section: Research ↔ Practice at the National Level

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Background

Reading is a vital skill, necessary for academic success, future employment and daily living. Yet many students fail to develop basic literacy skills (National Center for Education Statistics, 2015). These reading deficits can be addressed and even eliminated if students receive effective interventions in their primary years (Scarborough, 2009; Snow, Burns, & Griffin, 1998). Identifying and implementing effective programs for struggling readers in the elementary grades is of great importance.

Purpose

Several reviews of programs for struggling readers in elementary school have been completed (Galuschka, Ise, Krick, & Schulte-Körne, 2014; Slavin, Lake, Davis, & Madden, 2011; Wanzek et al., 2016; Wanzek & Vaughn, 2007). However, since those reviews have appeared, many additional studies have been published. In particular, funding supporting this type of rigorous program evaluation has been made available through the Institute for Education Sciences (IES) and Investing in Innovation (i3), and this funding has accelerated the pace of progress in this area. The use of evidence in education has also grown and is now encouraged and even in some cases required by the Every Student Succeeds Act (ESSA). There is high demand for up-to-date information about what programs are effective, particularly for elementary struggling readers.

This review builds upon the existing reviews by updating what is known about the effectiveness of programs for struggling elementary readers. It differs from the more recent of the prior reviews in that it focuses on identifying replicable programs and includes not only supplemental programs (such as tutoring), but also includes studies of effects on struggling readers of class- and school-wide models used with struggling readers.

Method

This study uses a best-evidence synthesis approach (Slavin, 1986), which combines traditional meta-analytic techniques of systematic review and effect size calculations (Lipsey & Wilson, 2001) with narrative descriptions of individual programs and studies.

Inclusion Criteria

1. Studies needed to evaluate reading programs for students reading below grade level in kindergarten through fifth grade.
2. Studies needed to include a comparison group of children reading below grade level receiving the typical instruction that would have occurred without the intervention (“business as usual”).
3. Studies could have taken place anywhere, but the report had to be available in English.
4. The studies had to use either random assignment or quasi-experimental methods with adjustments for pretest differences. The level of assignment could be schools, teachers, or students. Any matching needed to be done prior to the intervention. Post-hoc quasi-experiments were excluded.
5. Studies had to demonstrate baseline equivalence between groups based on the analytic sample (after attrition).
6. Studies with pretest differences greater than 0.25 SD were excluded.

7. Studies' outcome measures needed to be quantitative measures of reading, such as standardized reading assessments. Experimenter- or developer-made measures and measures aligned to treatment were excluded.
8. Studies needed to have a minimum duration of 12 weeks from pretest to posttest.
9. Studies had to evaluate programs that could be replicated. If programs were delivered by research staff and/or provided levels of support that could not be feasible in actual practice, studies were excluded.

Literature Search Procedure

A broad literature search was conducted to locate as many studies that might meet the inclusion criteria as possible. Electronic searches were made of educational databases including JSTOR, ERIC, EBSCO, PsycInfo, and Dissertations Abstracts International. Various combinations of key words, such as “reading,” “primary students,” “curriculum,” and “randomized” were used to identify studies. Search results were limited to studies published between 1990 and 2017, with the exception of studies related to educational technology, which needed to be published between 2000 and 2017. Google Scholar and other internet search engines and educational publisher websites were also searched. Citations from identified studies and previous reviews of reading interventions were examined for possible inclusion as well.

Effect sizes

Effect sizes were calculated as the difference between adjusted posttest scores for treatment and control students, divided by the unadjusted standard deviation of the control group. Alternative procedures were used to estimate effect sizes when unadjusted posttests or unadjusted standard deviations were not reported, as described by Lipsey and Wilson (2001).

Overall mean effect sizes were calculated for each program and category of programs, weighted by inverse variance.

Findings

A total of 61 studies of 40 programs for elementary struggling readers met the inclusion criteria. Overall, these studies exhibited a high level of methodological rigor, with 74% ($n = 45$) of the studies randomized at either the student or cluster level and only 26% using quasi-experimental methods ($n = 16$).

Programs were organized according to how they were delivered, either individually (one-to-one), in small groups (one-to-small group), in classrooms, in a comprehensive tiered approach, or using instructional technology. Categories were further divided by who the interventions were delivered by, teachers, paraprofessionals, or volunteers. Findings are summarized in Tables 1A to 5.

All categories of programs had positive effects on average, but the magnitude of the effects varied (Table 6). The types of interventions with the largest effects were one-to-one tutoring and classroom approaches. One-to-one tutoring programs (Tables 1A-1D), including those taught by teachers, paraprofessionals, or volunteers, had a weighted mean effect size of +0.36 ($n = 23$). Classroom approaches (Table 3) had a weighted mean effect size of +0.48 ($n = 7$). The other categories had weighted mean effect sizes of less than 0.20.

One-to-one tutoring ($ES = +0.36$) was much more effective than one-to-small group tutoring ($ES = +0.17$). Surprisingly, teachers ($ES = +0.37$) were no more effective than

paraprofessionals (ES = +0.42), though both achieved much better outcomes than volunteers (ES = +0.15).

Several programs had both average effect sizes of meaningful magnitude and multiple studies documenting their effectiveness. These included Reading Recovery, Targeted Reading Intervention, Sound Partners, and Lindamood Phonemic Sequencing (LiPS)/ Auditory Discrimination in Depth (ADD) in the one-to-one tutoring category and Quick Reads in the small group category. It also includes Ladders to Literacy and Cooperative Integrated Reading and Composition in the classroom approaches. In the comprehensive tiered approaches category, Success for All has numerous studies, many with substantive effect sizes. In the instructional technology category, there are no programs that have more than one study of their efficacy.

Conclusions

Many interventions exist that can effectively help struggling readers in elementary schools. There are 21 programs that meet the strong and moderate evidence ratings of ESSA (Table 7). These programs include all types of tutoring, classroom approaches, and comprehensive, tiered programs. Some types of interventions have larger impacts than others, but the diverse nature of the interventions gives schools choice over how they will intervene with students who need additional support. Schools should be encouraged to employ these proven programs in order to help all students achieve reading success.

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Table 1A: One-to-One Tutoring by Teachers

Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Reading Recovery								
May, Sirinides, Gray, & Goldsworthy, 2016	Student randomized	12-20 weeks	6888 students	1	Students with lowest scores at screening. 19% ELL, 13% AA, 20% H, 43% W	ITBS Comp Reading Words Total Reading	+0.43* +0.43* +0.48*	+0.48
Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994	Student randomized	5 months	193 students	1	Students below 37 th percentile. 74%W, 26% AA, 65% FRL	Gates MacGinitie Woodcock	+0.51* +0.49*	+0.50
Curry, Griffith, & Williams, 1995	Quasi-experiment	1 year	553 students	1	Students at or below 30 th percentile at pretest. 47%AA, 47%H, 6%W 93% FRL, 8% SPED	ITBS	-0.16	-0.16
Huggins, 1999	Quasi-experiment	1 year	122 students	1	High-poverty students in Detroit, MI identified as lowest in their class.	CAT Comp Vocabulary	+0.03 -0.15	-0.03
Targeted Reading Intervention								
Vernon-Feagans, Kainz, Hedrick, Ginsberg, & Amendum, 2013	Cluster randomized	1 year	15 schools 296 students	K,1	Students identified as struggling readers by teachers in disadvantaged rural schools.	Woodcock Johnson Word Attack Letter-Word ID Passage Comp	+0.36* +0.54* +0.48*	+0.46

Amendum, Vernon-Feagans, & Ginsberg, 2011	Cluster randomized	1 year	7 schools 175 students	K, 1	Students rated below grade level in reading. Districts in the southwestern United States.	Woodcock Johnson Word Attack Letter-Word ID Passage Comp	+0.52* +0.52* +0.72*	+0.59
TEACH								
Mantzicopoulos, Morrison, Stone, & Setrakian, 1992	Student randomized	2 years	116 students	1-2	Middle-class children in suburban San Francisco in lowest third of their class.	SDRT Comp PA Woodcock Word Attack K-ABC Reading/Decoding	+0.10 +0.09 +0.30 +0.29	+0.19
Intensive Reading Remediation								
Blachman et al., 2004	Student randomized	1 year	69 students	2,3	Children below 25 th percentile at pretest in upstate NY. 81%W, 14%AA	Woodcock Word ID Word Attack GORT Accuracy Rate Comp	+0.99* +0.96* +0.74* +0.86* +0.54*	+0.82
Early Steps/Next Steps								
Morris, Tyner, & Perney, 2000	Cluster quasi-experiment	1 year	11 schools 86 students	1	At-risk readers identified by their teachers in high-poverty AA schools in urban TN.	Woodcock Johnson Word Attack Passage Comp	+0.92* +0.80*	+0.86
Reading with Phonology								
Hatcher, Hulme, & Ellis, 1994	Quasi-experiment	7 months	63 students	Ages 6-7	Students with low scores on a screening measure from schools in rural Northern	BAS Word Reading Neale Analysis of Reading Ability Accuracy	+0.40* +0.62* +0.94*	+0.65

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Notes: AA = African American, BAS = British Ability Scale, C = Control, CAT = California Achievement Test, Comp = Comprehension, E = Experimental, ELL = English Language Learner, ID = Identification, FRL = Free & Reduced Lunch, GORT = Gray Oral Reading Test, H = Hispanic, ITBS – Iowa Test of Basic Skills, K-ABC = Kaufman Assessment Battery for Children, PA = Phonetic Analysis, SDRT = Stanford Diagnostic Reading Test, SPED = Special Education, W = White

Table 1B: One-to-One Tutoring by Paraprofessionals

Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Sound Partners								
Vadasy & Sanders, 2011	Student randomized	1 year	187 students	1	Students performing in the bottom half of their classroom. 47%ELL, 78%FRL, 20%Asian, 26%AA, 38%H	Word Reading Comprehension	+0.34* +0.19*	+0.27
Vadasy & Sanders, 2010	Student randomized	18 weeks	148 students	K	Students performing in the bottom half of their classroom. 56% Bilingual, 85%FRL, 21% Asian, 24%AA, 42% H	Word Reading Comprehension	+1.03* +0.96*	+1.00
Vadasy, Sanders, & Peyton, 2006	Student randomized	18 weeks	67 students	K	Students with low scores on screening measures. 87% Minority, 33% Title I, 26% ELL,	Word Reading Comprehension	+1.09* +0.23	+0.66

Notes: AA = African American, C = Control, E = Experimental, ELL = English Language Learner, FRL = Free & Reduced Lunch, H = Hispanic

Table 1C: One-to-One Tutoring by Teachers and Paraprofessionals								
Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Lindamood Phonemic Sequencing (LiPS)/ Auditory Discrimination in Depth (ADD)								
Torgesen, Wagner, & Rashotte, 1997	Student randomized	2 1/2 years	65 students	K-2	Students with low scores at screening. 50%W, 49%AA	WJ Word ID WA PC	+0.65* +1.02* +0.39	+0.69
Reading Rescue								
Ehri, Dreyer, Flugman, & Gross, 2007	Clustered quasi-experiment	6 months	8 schools 134 students	1	Spanish-dominant students with low scores at screening. 95%FRL	Gates MacGinitie	+0.87*	+0.87

Notes: AA = African American, C = Control, E = Experimental, FRL = Free & Reduced Lunch, ID = Identification, PC = Passage Comprehension, W = White, WA = Word Attack, WJ = Woodcock Johnson

Table 1D: One-to-One Tutoring by Volunteers

Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Reading Partners								
Jacob, Elson, Bowden, & Armstrong, 2015	Student randomized	1 year	1,166 students	2-5	Students identified as struggling readers. 65% H, 19 AA, 91% FRL, 55% ELL, 11% SPED	SAT-10 Comp State Reading Tests	+0.10* +0.06	+0.08
Experience Corps								
Lee, Morrow-Howell, Jonson-Reid, & McCrary, 2012; Morrow-Howell, Jonson-Reid, & McCrary, 2009	Student randomized	1 year	881 students	1-3	Students identified by teachers as needed reading help. 94%FRL, 58%AA, 36%H, 24%ELL	Woodcock Johnson Word Attack Passage Comp	+0.10 +0.13*	+0.11
Gattis et al., 2010	Student randomized	1 year	254 students	1-2	Students identified by teachers with reading difficulties. 64%AA, 35%H 15%LEP	ECLAS Overall 1st grade 2nd grade	+0.20* +0.39* +0.03	+0.20
The Reading Connection								
Compton, 1992	Randomized	1 semester	483 students	1	Students with low scores on	ITBS	+0.22*	+0.22

					prior year's end of year test in Kalamazoo, MI. 53% minority			
West Philadelphia Tutoring Project								
Ritter, 2000	Randomized	1 year	385 students	2-5	Students identified by teachers as poorly performing in schools in Philadelphia, PA. 87% FRL, 96% AA	SAT-9	-0.10	-0.10
SPARK Literacy Program								
Jones, 2015	Student randomized	2 years	7 schools 194 students	K-2	Students in the bottom half on the pretest from Milwaukee Public Schools	MAP PALS	+0.36* +0.66*	+0.51
Start Making a Reader Today (SMART)								
Baker, Gersten, & Keating, 2000	Student randomized	2 years	84 students	1-2	Students identified by teachers as having reading difficulties in Title I schools in both city to rural areas of Oregon 47% W, 30%AA	Woodcock Johnson Word ID Passage Comp Word Comp	+0.62 +0.36 +0.46*	+0.48

Other Volunteer Tutoring								
Allor & McCathren, 2004	Cluster Quasi-experiment	6 months	Cohort 1: 8 schools 86 students	1	Students with low screening scores. 100%FRL, 100%AA	Cohort 1: Woodcock Word ID Word Attack Passage Comp	+0.59* +0.93* +0.49*	+0.47
	Student Randomized	6 months	Cohort 2: 10 schools 157 students	1	Students with low screening scores. 94% FRL, 96%AA	Cohort 2: Woodcock Word Identification Word Attack Passage Comp	+0.11 +0.80* +0.16	

Notes: AA = African American, C = Control, Comp = Comprehension, E = Experimental, ECLAS = Early Childhood Literacy Assessment System, ELL = English Language Learner, FRL = Free & Reduced Lunch, H = Hispanic, ID = Identification, ITBS – Iowa Test of Basic Skills, LEP = Limited English Proficient, MAP = Measures of Academic Progress, PALS = Phonological Awareness Literacy Screening, SAS-9 = Stanford Achievement Test, 9th edition, SAT-10 = Stanford Achievement Test, 10th edition, SPED = Special Education, W = White

Table 2A: Small Group Tutoring by Teachers

Study	Design	Duration	N	Grade	Group Size	Sample Characteristics	Posttest	ES by Measure	ES
Leveled Literacy Intervention									
Ransford-Kaldon et al., 2013	SR	1 year	320 students	k,1,2	1:3	Students reading below grade level. 69% H, 15% W, 8% AA, 34% ELL, 9% SPED, > 70% FRL	DRA2 K 1st 2nd	+0.51 -0.19 +0.04	+0.12
My Sidewalks									
Wilkerson, 2008	SR	1 year	278 students	2,3	1:6	Students receiving pull-out reading intervention. 7%AA, 14%H, 54%FRL, 8%ELL, 5%SPED	GRADE Total Comp Vocabulary	+0.06 +0.05 +0.15	+0.06
Words Their Way									
Eddy, Ruitman, Hankel, Matelski, & Schmalstig, 2011	SR	1 year	257 students	2, 4	NR	Students identified as at risk for academic failure. 33% FRL	MAT-8: Sounds & Print	+0.12	+0.12
New Heights Reading Program									
Lesnick, 2006	CR	18 weeks	59 classes 233 students	3, 5	NR	Students identified as teachers as reading below grade level in Philadelphia and suburban PA.	DRP	+0.09	+0.09
Failure Free Reading									
Torgesen et al., 2006, 2007	SR	1 year	16 schools 217 students	3, 5	1:3	Students that scored at or below the 30 th percentile in schools around Pittsburgh; 44%FRL, 80%W, 20%AA	Woodcock WA Word ID PC GRADE PSSA	-0.06 0.00 +0.12 -0.06 -0.16*	-0.03

Spell Read									
Torgesen et al., 2006, 2007	SR	1 year	191 students	3, 5	1:3	Students that scored at or below the 30 th percentile in schools around Pittsburgh 44%FRL, 69%W, 31%AA	Woodcock WA Word ID PC GRADE PSSA	+0.39* +0.08 +0.03 +0.09 -0.15*	+0.09
Corrective Reading									
Torgesen et al., 2006, 2007	SR	1 year	163 students	3, 5	1:3	Students that scored at or below the 30 th percentile in schools around Pittsburgh 44% FRL, 81% W, 19% AA	Woodcock WA Word ID PC GRADE PSSA	+0.15* +0.13 +0.08 +0.03 -0.10	+0.06
Early Reading Intervention									
Coyne et al., 2013	CR	1 year	48 teachers 162 students	K	NR	Students with low screening test scores. 60%W, 24%H, 9%AA, 15%ELL	WRMT-R WA Word ID	0.00 -0.18	-0.04
Wilson Reading									
Torgesen et al., 2006, 2007	SR	1 year	158 students	3, 5	1:3	Students that scored at or below the 30 th percentile in schools around Pittsburgh, 48%FRL, 56%W, 44%AA	WJ WA Word ID PC GRADE PSSA	+0.46* +0.15* +0.14 +0.13 -0.03	+0.17
Remediation Plus									
Corcoran & Ross, 2015	SR	6 months	87 students	1-3	1:3	Students identified as needed intervention beyond regular classroom instruction from 3 schools in Wisconsin 98% W, 14% SPED	WJ WA GORT Rate Fluency Comp	+0.13 -0.10 -0.04 +0.27	+0.07

Lindamood Phonemic Sequencing (LiPS)/ Auditory Discrimination in Depth (ADD)									
Torgesen, Wagner, Rashotte, Herron, & Lindamood, 2010	SR	1 year	74 students	1	1:3	Students from the bottom 35% of their class in 3 Florida elementary schools. 33% minority, 35% FRL	WJ Word ID WA PC	+0.63* +0.93* +0.46	+0.67
Read, Write, Type									
Torgesen et al., 2010	SR	1 year	73 students	1	1:3	Students from the bottom 35% of their class in 3 Florida elementary schools. 33% minority, 35% FRL	WJ Word ID WA PC	+0.41 +0.59* +0.33	+0.44

Notes: AA = African American, C = Control, Comp = Comprehension, CR = Cluster Randomized, DRA2 = Developmental Reading Assessment, 2nd Edition, DRP = Degrees of Reading Power, E = Experimental, ELL = English Language Learner, FRL = Free & Reduced Lunch, GORT = Gray Oral Reading Test, GRADE = Group Reading Assessment and Diagnostic Evaluation, H = Hispanic, ID = Identification, MAT-8 = Metropolitan Achievement Test, 8th edition, NR = Not Reported, PC = Passage Comprehension, PSSA = Pennsylvania System of School Assessment, SPED = Special Education, SR = Student Randomized, W = White, WA = Word Attack, WJ = Woodcock Johnson

Table 2B: Small Group Tutoring by Paraprofessionals									
Study	Design	Duration	N	Grade	Group Size	Sample Characteristics	Posttest	ES by Measure	ES
Schools and Homes in Partnership (SHIP)									
Gunn, Smolkowski, & Biglan, 2005	R	2 years	211 students	K-3	1:3	Students reading below grade level in rural districts in central Oregon. 62%H, 38%W	Woodcock Word ID Word Attack Vocabulary PC	+0.31 +0.66 +0.20 +0.29	+0.39
Quick Reads									
Vadasy & Sanders, 2008c	SR	15 weeks	162 students	2-3	1:2	Students below the 60 th percentile in fluency. 30%W, 28%AA, 23%H, 23% ELL, 17% SPED, 75% Title I	Woodcock Word ID GORT Comp GORT Fluency	+0.27* +0.16 +0.30*	+0.24
Vadasy & Sanders, 2008a	SR	20 weeks	119 students	4-5	1:2	Students reading below grade level. 40%AA, 25%W, 12%H, 27% ELL, 22% SPED, 90% Title I	Woodcock Word ID Word Comp PC	+0.33 +0.09 +0.23*	+0.22
Targeted Intervention									
Wang & Algozzine, 2008	CR	1 year	6 schools 139 students	1	NR	Students identified as at-risk in urban schools. 80% FRL, 89% AA or H	Woodcock Word ID Word Attack PC	+0.32 +0.43 +0.13	+0.29
Sound Partners									
Vadasy & Sanders, 2008b	SR	18 weeks	86 students	K	1:2	Students identified as at risk for reading failure on screening measures.	Word Reading Comprehension	+0.63* +0.41*	+0.52

						23% AA, 17% H, 69% Title I, 27% ELL, 6% SPED			
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Notes: AA = African American, C = Control, Comp = Comprehension, CR = Cluster Randomized, E = Experimental, ELL = English Language Learner, FRL = Free & Reduced Lunch, H = Hispanic, ID = Identification, NR = Not Reported, PC = Passage Comprehension, R = Randomized, SPED = Special Education, SR = Student Randomized, W = White

Table 2C: Small Group Tutoring by Teachers and Paraprofessionals

Study	Design	Duration	N	Grade	Group Size	Sample Characteristics	Posttest	ES by Measure	ES
Early Reading Intervention									
Simmons et al., 2011	CR	1 yr	57 teachers 206 students	K	NR	Students with low scores on screening measures. 19%AA, 42%H, 38%W, 12%SPED, 26%ELL	WRMT WA LWID PC	+0.51* +0.25 +0.07	+0.39
Quick Reads									
Vadasy & Sanders, 2009	SR	15 wks	202 students	2-3	1:2	Students below the 60 th percentile in fluency. 21%AA, 28%H, 74%Title I, 6%SPED, 29%ELL	WRMT LWID Comp GORT Fluency Comp	+0.03 +0.31* +0.38* -0.03	+0.17

Notes: AA = African American, C = Control, Comp = Comprehension, CR = Cluster Randomized, E = Experimental, ELL = English Language Learner, H = Hispanic, LWID = Letter-Word Identification, NR = Not Reported, PC = Passage Comprehension, SPED = Special Education, SR = Student Randomized, W = White, WA = Word Attack, WRMT = Woodcock Reading Mastery Test

Table 3: Classroom Approaches

Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Ladders to Literacy								
Fuchs et al., 2001	Cluster Randomized	20 weeks	22 teachers 115 students	K	The lowest 6 students in each classroom. 31% AA, 59% W, 39% FRL	Woodcock Word Attack Word ID	+0.31 +0.37	+0.34
O'Connor, 1999	Cluster quasi-experiment	1 year	17 classes 95 students	K	Children identified as at-risk of reading failure in a rural Midwestern district. 100% W	Woodcock Letter Word ID	+0.68*	+0.68
Contextually-Based Vocabulary Instruction								
Nelson & Stage, 2007	Cluster randomized	3 months	16 classrooms 73 students	3, 5	Students with low pretest scores in Midwestern schools. 70%W, 24%H	Gates MacGinitie Comprehension Vocabulary	+0.58 +0.31	+0.49
Cooperative Integrated Reading and Composition								
Bramlett, 1994	Cluster quasi-experiment	1 year	8 schools 149 students	3	Students in the bottom 33% of their classes in rural southern Ohio.	CAT Total Reading Comprehension Word Analysis Vocabulary	+0.33* +0.33* +0.56* +0.30*	+0.33

Stevens & Slavin, 1995a	Cluster quasi- experiment	2 years	7 schools 63 classes 137 students	2-6	Mainstreamed SPED students in a working- class suburb of Baltimore 9%FRL, 95%W	CAT Vocabulary Comprehension	+0.37* +0.32*	+0.34
Stevens & Slavin, 1995b	Cluster quasi- experiment	2 years	5 schools 45 classes 76 students	2-6	Mainstreamed SPED students in suburban MD. 10%FRL, 92%W	CAT Comprehension Vocabulary	+0.85* +0.76*	+0.82
PALS								
Mathes, Torgesen, & Allor, 2001	Cluster quasi- experiment	16 weeks	24 classes 75 students	1	Students in the bottom of their class from the Southeast. 47%W, 51%AA	Woodcock Word Identification Word Attack Passage Comprehension TERA-2	+0.59* +0.71* +0.74* +0.56*	+0.65

Notes: AA = African American, C = Control, CAT = California Achievement Test, E = Experimental, FRL = Free & Reduced Lunch, H = Hispanic, ID = Identification, SPED = Special Education, TERA-2 = Test of Early Reading Ability, 2nd edition, W = White

Table 4: Comprehensive Tiered Approaches

Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Success for All								
Hanselman & Borman, 2013	Cluster Randomized	1 year	56 schools 2842 students	3, 4	Students reading below grade level at Title I schools. 80%FRL, 80% minority, 10% SPED	GRADE 3rd grade 4th grade	-0.01 -0.02	-0.01
Quint, Zhu, Balu, Rappaport, & DeLaurentis, 2015	Cluster Randomized	3 years	37 schools 759 students	K-2	Students performing below the median at baseline. 57% FRL, 12% W, 18%AA, 66% H, 24% ELL	Woodcock Word Identification Word Attack Passage Comp Word reading efficiency	+0.17 +0.23* +0.19 +0.14	+0.18
Madden, Slavin, Karweit, Dolan, & Wasik, 1993	Cluster quasi-experiment	3 years	10 schools 342 students		Students in the lowest 25% of their classes in high-poverty schools in Baltimore, MD. 100% AA	Average of Woodcock and DORT: 1st grade 2nd grade 3rd grade	+0.82* +1.00* +0.98*	+0.93

Ross & Casey, 1998	Cluster quasi-experiment	2 years	8 schools 92 students	K-1	Students in the lowest 25% of their classes in high-poverty schools in Ft. Wayne, IN; 75% FRL, 45% minority	Woodcock Word Identification Word Attack Passage Comp DORT	+0.29 +0.56 +0.23 +0.32	+0.35
Dianda & Flaherty, 1995	Cluster quasi-experiment	2 years	6 schools 80 students	K-1	Students in the lowest 25% of their classes in California 72% FRL, 42%H, 34%W 32%ELL	Woodcock Word Identification Word Attack Passage Comp	+1.40* +1.70* +0.71	+1.27
Enhanced Core Reading Instruction								
Smith et al., 2016	Cluster Randomized	1 year	44 schools 811 students	1	Students scoring at or above the 10 th percentile and below the 30 th percentile. 7%SPED, 20%ELL, 19%H, 47%FRL	Woodcock Johnson Word Identification Word Attack SAT-10 Total Reading Word Reading Sentence Reading	+0.24 +0.32* +0.21 +0.24* +0.18	+0.24

Notes: AA = African American, C = Control, Comp = Comprehension, DORT = Durrell Oral Reading Test, E = Experimental, ELL = English Language Learner, FRL = Free & Reduced Lunch, GRADE = Group Reading Assessment and Diagnostic Evaluation, H = Hispanic, SAT-10 = Stanford Achievement Test, 10th edition, SPED = Special Education, W = White

Table 5: Instructional Technology

Study	Design	Duration	N	Grade	Sample Characteristics	Posttest	Effect Sizes by Group/ Measure	Overall Effect Size
Fast ForWord								
Rouse & Krueger, 2004	Student randomized	1 year	454 students	3-6	Students scoring in the bottom 20% on state tests. 59% FRL, 66% H, 27% AA, 61% ELL	Connecticut Mastery Test	+0.05	+0.05
Successmaker								
Gatti, 2013	Cluster randomized	1 year	292 students	3	Students below the 30 th percentile. 31%LEP, 82% FRL, 60%H, 7%AA	GRADE Word Reading Sentence Comp Vocabulary Passage Comp	+0.03 +0.05 +0.14 +0.01	+0.03
System 44								
Beam, Faddis, & Hahn, 2011	Student randomized	1 year	197 students	4,5	Students below the 50 th percentile in 4 schools in CA	TOSREC Woodcock Word ID Woodcock Word Attack	-0.04 +0.02 +0.16	+0.05
Beam & Faddis, 2012	Student randomized	1 year	172 students	4,5	Students below the 50 th percentile in an urban district in Michigan	TOSREC	-0.15	-0.15
Lexia								

Macaruso, Hook, & McCabe, 2006	Cluster quasi- experiment	7 mo.	10 classes 167 students	1	Title I students in the Boston area. 50% FRL	Gates MacGinitie	+0.21	+0.21
Reading Plus								
Reutzel, Petscher, & Spichtig, 2012	Quasi- experiment	1 year	80 students	3	Retained students identified as struggling readers in an urban public district in Florida	FCAT SAT-10	+1.09* 0.00	+0.55

Notes: AA = African American, C = Control, Comp = Comprehension, E = Experimental, ELL = English Language Learner, FCAT = Florida Comprehensive Assessment Test, FRL = Free & Reduced Lunch, GRADE = Group Reading Assessment and Diagnostic Evaluation, H = Hispanic, ID = Identification, LEP = Limited English Proficiency, SAT-10 = Stanford Achievement Test, 10th edition, TOSREC = Test of Silent Reading Efficiency and Comprehension

Table 6. Mean Weighted Effect Sizes of Program Categories

Category	Table	Mean ES	Studies
Individual Programs	1A-1D	+0.36	23
1:1 – Teachers	1A	+0.43	10
1:1 – Paraprofessionals	1B	+0.59	3
1:1 – Mixed Teacher & Paraprofessional	1C	+0.81	2
1:1 – Volunteers	1D	+0.15	8
Small Group Programs	2A-2C	+0.17	19
1:Small Group – Teacher	2A	+0.10	12
1:Small Group – Paraprofessional	2B	+0.32	5
1:Small Group – Mixed Teacher & Paraprofessional	2C	+0.28	2
Classroom Approaches	3	+0.48	7
Comprehensive Tiered School Approaches	4	+0.14	6
Instructional Technology	5	+0.07	6
Teachers as Tutors	1A & 2A	+0.37	22
Paraprofessionals as Tutors	1B & 2B	+0.42	8

Table 7. Programs meeting ESSA standards for strong and moderate ratings.

	Number of Studies	Average Effect Sizes	ESSA Rating
<i>Tutoring: One-to-one</i>			
Reading Recovery	4	+0.42	Strong
Targeted Reading Intervention	2	+0.51	Strong
Early Steps/Next Steps	1	+0.86	Moderate
Sound Partners	4	+0.58	Strong
Lindamood Phonemic Sequencing (LiPS)/ Auditory Discrimination in Depth (ADD)	2	+0.68	Strong
Reading Rescue	1	+0.87	Moderate
Reading Partners	1	+0.08	Strong
Experience Corps	2	+0.13	Strong
SPARK Literacy Program	1	+0.51	Strong
Start Making a Reader Today (SMART)	1	+0.48	Strong
<i>Tutoring: Small Group</i>			
Spell Read	1	+0.09	Strong
Corrective Reading	1	+0.06	Strong
Wilson Reading	1	+0.17	Strong
Read, Write, Type	1	+0.44	Strong
Quick Reads	3	+0.21	Strong
Early Reading Intervention	2	+0.20	Strong
<i>Classroom Approaches</i>			
Ladders to Literacy	2	+0.49	Strong
Cooperative Integrated Reading and Composition	3	+0.43	Moderate
PALS	1	+0.65	Moderate
<i>Comprehensive Tiered Approaches</i>			
Success for All	5	+0.12	Strong
Enhanced Core Reading Instruction	1	+0.24	Strong