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Fluency Interventions for Struggling Readers in Grades 6 to 12: A Research Synthesis

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Abstract

This systematic review synthesizes fluency intervention research for struggling readers in Grades 6 through 12 from January 2006 to October 2019. The search yielded 17 studies examining reading fluency and comprehension outcomes. Most studies examined repeated reading (RR) interventions to improve reading fluency for struggling readers at these grade levels, resulting in improved fluency but few positive effects on reading comprehension outcomes, similar to trends observed in prior systematic reviews. Reading connected text with an equivalent word count to word counts of RR sessions did not result in increased reading fluency, a finding aligned with a prior synthesis. Few studies used a fluent reader as a model prior to RRs, despite previous support for modeling within fluency interventions.

Keywords

reading fluency, reading comprehension, secondary, intervention, synthesis

Reading fluency is reading with speed, accuracy, and appropriate expression (National Reading Panel, 2000). Fluency is considered one of the critical components of reading and a target area within the Common Core State Standards (www.corestandards.org). Fluency instruction is typically provided in the elementary grades because literacy instruction aims to develop students' basic word reading skills and automatic word recognition to support reading comprehension. Literacy instruction in the secondary grades increasingly focuses on reading comprehension and content acquisition. Starting in sixth grade, reading fluency is no longer a curriculum standard for typical readers, who are expected to read and comprehend grade-level texts with proficiency (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). A large number of students enter the secondary school grades with deficits in reading performance, showing difficulties in comprehension, automatic word recognition, decoding, and fluency (Manset-Williamson & Nelson, 2005). In a large study ($N = 1{,}025$) of struggling readers in sixth through eighth grades, students exhibited difficulties in decoding, reading fluency, and comprehension (Cirino et al., 2013). In particular, 46% of the struggling readers demonstrated difficulties in reading fluency, and 84% demonstrated difficulties in comprehension. Overall, 78% of the sample had overlapping difficulties in both areas (Cirino et al., 2013).

In spite of the fact that reading fluency is not included in the instructional standards for secondary grades, fluent and accurate word reading has been theorized to facilitate reading comprehension (LaBerge & Samuels, 1974; Perfetti, 1980, 1985). Students with slow and labored word recognition expend mental energy trying to decode the text, which detracts from the task of comprehending (Rasinski, 2003). The reader's cognitive load may be taxed at the expense of efficient comprehension processing (Oakhill et al., 2003; Perfetti, 1985). When students recognize words rapidly and with ease, cognitive resources can be spent on inferring meaning from text (LaBerge & Samuels, 1974; Perfetti, 1980). Students' word reading proficiency is highly predictive of reading comprehension in the younger grades (García & Cain, 2014). There is some evidence to suggest that a shift occurs around age 10, at which point students' word reading becomes less predictive of reading comprehension for older readers (García & Cain, 2014). The caveat to this finding is that reading fluency may still be an important and necessary component of reading instruction for older struggling readers as these students continue to struggle with fluent and accurate word reading. Furthermore, inadequate reading fluency has implications for older struggling readers who are expected to learn grade-level content by reading text.

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Struggling readers in the secondary grades need support to increase fundamental literacy skills such as fluency (Kamil et al., 2008). The majority of struggling readers in the secondary grades require interventions that support several components of reading (e.g., reading fluency, word reading skills, comprehension; Cirino et al., 2013). Given the importance of reading fluency to free up cognitive resources to focus on comprehension and thus content learning, it is necessary to determine the impact of reading fluency interventions on the reading fluency and reading comprehension outcomes of secondary struggling readers and to identify the features of those interventions that best remediate the reading fluency and comprehension needs of struggling readers.

Prior Research on Secondary Fluency Interventions

There is much known about what instructional practices in reading are most effective for younger students in the primary grades, but less is known about how to best support struggling readers at the secondary level (Vaughn et al., 2010). Recent syntheses have examined the effects of fluency interventions for elementary students (e.g., Stevens et al., 2016; Strickland et al., 2013; Wanzek et al., 2010). Numerous syntheses have examined the effects of multicomponent reading comprehension interventions for secondary readers (Edmonds et al., 2009; Scammacca et al., 2007; Solis et al., 2011), but few systematic reviews have more specifically examined the effects of fluency interventions on the reading fluency and reading comprehension outcomes of secondary students (e.g., Lee & Yoon, 2017; Morgan & Sideridis, 2006; Wexler et al., 2008). Morgan and Sideridis (2006) conducted a meta-analysis of reading fluency interventions published between 1990 and 2006 for students in kindergarten through Grade 12; the authors determined age did not moderate the effectiveness of the interventions. The meta-analysis was limited to single-case design studies, and only 33 of the 107 participants were in the secondary grades. Furthermore, the majority of participants were general education students, and it was not possible to disaggregate the findings for students with reading difficulties specifically.

In 2017, Lee and Yoon conducted a meta-analysis examining repeated reading (RR) interventions specifically for students with reading disabilities across Grades K through 12. RR interventions increased students' words read correctly per minute (WCPM) by 1.41 standard deviations. A moderator analysis indicated RR interventions were more effective for students in the elementary grades reading at the elementary level. Listening passage preview (LPP), where a more proficient reader models fluent reading, was associated with improved reading fluency outcomes. Other RR features, such as error correction, goal setting, vocabulary preview, and peer-mediated interventions (incorporating peer practice), did not result in statistically significant effects. Although this meta-analysis provides information on the effects of RR interventions across the grade levels, the majority of these studies were conducted with students in the elementary grades.

Wexler et al. (2008) conducted the most recent systematic review of the effects of reading fluency interventions, published between 1980 and 2005, specifically for secondary struggling readers. Findings suggested interventions that included LPP or corrective feedback resulted in more positive effects than interventions lacking those features. Results indicated fluency interventions improved secondary struggling readers' reading rate; however, improved reading fluency did not always result in improved reading comprehension performance. In addition, the authors found students did not make comprehension gains after time spent in RR interventions above and beyond students who participated in wide-reading intervention (i.e., without reading text repeatedly), suggesting the association between reading fluency and reading comprehension may decrease as students enter the middle and high school grade levels. Wide reading of various text types enhances students' vocabulary and background knowledge, which are highly predictive of reading comprehension, particularly for older students. The authors identified a need for future high-quality research to determine (a) the effects of reading fluency interventions and (b) to better understand the impact of reading fluency interventions on reading comprehension outcomes for struggling readers in the secondary grades.

Since the Wexler et al. (2008) review, conducted more than 10 years ago, no systematic reviews have examined the effects of reading fluency interventions on the reading fluency and reading comprehension outcomes of secondary students with reading difficulties. Updating and extending Wexler et al.'s review is necessary to further examine the literature base for reading fluency interventions and the extent to which improved reading fluency interventions are associated with improved reading comprehension for older struggling readers.

In the years since Wexler et al. (2008), reading researchers have continued to study interventions to improve reading fluency. As more recent research studies may be more likely to be considered by practitioners, who are likely to seek out the most current research, it would be beneficial to both classroom teachers and researchers alike to examine and aggregate the current status of research in this area, most importantly to identify any new trends or, interventions with specific implications for previously understudied student groups (e.g., English learners, secondary students with persistent and intractable reading difficulties). In addition, the field of reading research continues to become more rigorous in terms of study design, as shown by generally accepted study quality standards, updated as recently as

2020 (What Works Clearinghouse [WWC], 2020). This shift in rigor has the potential to provide more confidence in positive intervention results, which could supersede previous findings in this area. Finally, Wexler et al. (2008) did not include any specific findings on the ability of otherwise successful fluency interventions to generalize to unfamiliar texts or the extent to which gains in fluency can be maintained. There is a pressing need for greater understanding of follow-up effects of reading interventions (Daniel et al., 2020). Overall, a review is necessary for these two overarching goals: (a) examine current findings and whether they are consistent with prior systematic review in this area, and if not, identify where divergence occurs and (b) given the inherent ever-evolving nature of research, capture the present state of interventions in this area, especially with regard to novel findings surrounding generalization of intervention effects, and contribute much needed knowledge about specific student groups.

The purpose of this synthesis is to extend the findings of Wexler et al. (2008), adding to the knowledge base by summarizing the results of reading fluency interventions for struggling readers in Grades 6 through 12 published since 2006. The following research question was addressed:

> **Research Question:** Which fluency interventions are associated with positive outcomes in reading fluency and comprehension for struggling readers in Grades 6 through 12?

Method

Operational Definitions

Fluency intervention is defined as any intervention that attempts to improve the speed, accuracy, or expression of reading. *Struggling reader* is defined as students with reading difficulties, reading disabilities, learning disabilities, dyslexia, or at-risk for reading or learning disabilities. *Secondary student* refers to a student in the middle or high school grades (6–12).

Search Procedures

We conducted a systematic search of the literature by expanding the search process of Wexler et al. (2008). Initially, we searched four electronic databases: Educational Resources Information Clearinghouse, PsycINFO, Education Source, and Academic Search Complete. Education Source and Academic Search Complete were additional databases not used by Wexler et al. Expanding the search across databases increases the number of journals examined and provides more comprehensive results. The search was limited to studies published from January 2006 to October 2019. The search terms used to capture the target population included "learning dis*," "learning diff*," "learning problem*," "special education," "inadequate respon*," "non respon*," "at risk," "high risk," "reading problem*," "reading diff*," "reading dis*," "struggling reader*," "dyslex*," "reading delay," "learning delay," and "poor reader*." Search terms related to intervention included "fluency," "reading rate," "reading accuracy," "intervention," "strateg*," "resource," "approach," "program," "IEP," "curriculum," "teaching method," "treatment," "instruction," "pull out," and "small group."

The initial computer search yielded 3,779 articles (see Figure 1). After duplicates were removed, 2,774 records remained. In an attempt to locate all available studies, we conducted a hand search of the same journals as those searched in the Wexler et al. review (i.e., *Learning Disabilities Research and Practice*, *Reading and Writing Quarterly*, *The Journal of Special Education*, *Learning Disabilities*, and *Learning Disability Quarterly*), yielding no additional studies. The abstracts of these studies were reviewed to identify articles that matched the inclusion criteria. We removed 2,531 studies at this phase based on the information provided in the abstract indicating the study did not meet inclusion criteria (e.g., the intervention was provided in a language other than English, participants included students in the elementary grades). After sorting the abstracts, we reviewed the full text of 243 articles, resulting in 17 studies that met inclusion criteria. A hand search was also conducted of any additional journal, not previously listed above, which published an included study. No additional studies were found.

Inclusion Criteria

Studies were included if they met the following criteria. First, participants were identified by the authors as struggling readers in Grades 6 through 12 (see operational definitions). Studies with combined samples of struggling and nonstruggling readers were included if data for struggling readers were disaggregated. Studies with students younger than sixth grade were included if 50% or more of the study sample fell within the specified grade range. Second, studies employed an experimental or quasi-experimental group design, with a comparison/control group included, or a single-case design (SCD); we excluded single-group and case study designs. Third, studies examined a reading fluency intervention provided in English within school settings (i.e., we excluded fluency intervention studies conducted in clinic or private settings). Finally, studies included at least one outcome measure for reading fluency and/or reading comprehension. Studies examining multicomponent interventions were included if fluency instruction accounted for at least 50% of the intervention.

Coding Procedures

Studies that met the inclusion criteria were coded using a previously designed code sheet developed for education syntheses (Vaughn et al., 2014). The following data were

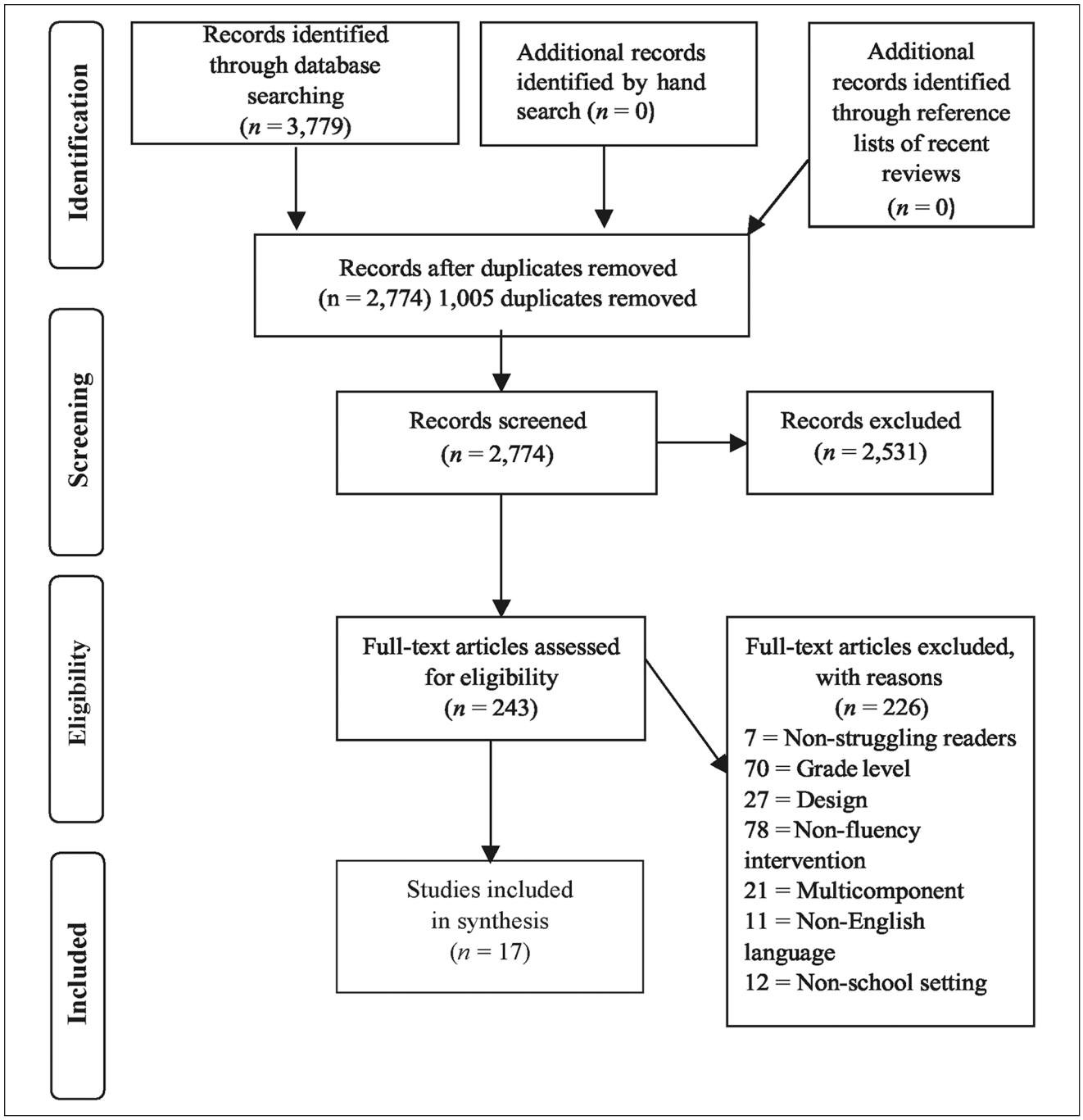

Figure 1. PRISMA diagram detailing the search process.

recorded for each study: (a) participant information (e.g., age, grade level, number of participants with disabilities), (b) research design, (c) treatment fidelity, (d) description of treatment and comparison groups, (e) clarity of causal inference, (f) measures, and (g) results and effect sizes (ESs). In addition, we coded the treatment description to include the type of intervention and features specific to fluency interventions (e.g., modeling by a proficient adult, error correction, performance feedback).

To establish reliability, the first author and an experienced doctoral student participated in training on the use and interpretation of items on the coding form. A previously completed code sheet of an intervention study, coded by a researcher with experience coding education syntheses, was selected to serve as the gold standard. The first and second coders coded the same article, using the completed code sheet to establish reliability. Reliability was calculated as total agreements across all sections divided by the

agreements plus disagreements; 76% of studies were double coded by the first author and second author, resulting in 90% interrater agreement. Discrepancies were resolved via discussion between coders until agreement was achieved.

ES calculation for the group design studies. For the treatment-comparison studies, ESs were reported if the studies provided adequate statistical information (group sizes, group means, and standard deviation). ESs were calculated as the difference between the group means divided by the pooled standard deviation (Hedges' *g*; Hedges, 1985). For one study that did not report statistical information necessary for ES calculation (Keehn et al., 2008), results were reported as mean gain scores.

Analysis procedures for the synthesis of SCD studies. SCD studies were evaluated using WWC design standards for single-case research (Kratochwill et al., 2010, 2013). First, we evaluated the study as *meets design standards*, *meets design standards with reservations*, or *does not meet design standards* (see Table 2 for evaluation results). Studies were rated as *meets design standards* if the following criteria were met: (a) The independent variable was systematically manipulated; (b) each outcome variable was systematically measured over time by more than one assessor, with interobserver agreement exceeding 0.80 on at least 20% of the data points; (c) experimental control was demonstrated if the design provides at least three different opportunities to demonstrate an intervention effect at different time points (i.e., at least three baseline and three intervention phases in a multiple baseline design); and (d) the phase included a minimum of five data points. If a multiple baseline design met the aforementioned criteria and included at least three to four data points per phase, then the study received a rating of *meets design standards with reservations*. A study that did not meet Criteria a, b, or c, or contained fewer than three data points per phase, was rated *does not meet design standards*. According to the WWC design standards, it is possible for a SCD study to receive a designation of *meets design standards* or *meets design standards with reservations* but not demonstrate evidence of an effect. Therefore, studies rated *meets design standards* or *meets design standards with reservations* were visually analyzed to determine a causal, or functional, relation. Studies rated *does not meet design standards* were deemed ineligible for review of a causal relation, in line with recommendations of WWC. We analyzed the following data: (a) stable baseline, (b) within-phase consistency, and (c) adjacent phase comparison. We integrated this information to determine whether there are at least three demonstrations of an effect. For studies that demonstrated an effect at a minimum of three points between, the data were further analyzed to determine *moderate* or *strong* evidence of effect. We analyzed the following additional data from the SCD studies using the WWC standards for design and evidence evaluation: (a) level, (b) trend, (c) variability, (d) immediacy of the effect, (e) overlap, and (f) consistency of data patterns (Kratochwill et al., 2013; see the SCD analysis section for more details). For studies with *moderate* or *strong* evidence of an effect, ESs were calculated as the percent of nonoverlapping data (PND; Scruggs et al., 1987). PND was not calculated for studies that had *no evidence of an effect*, even if they were rated *meets design standards* or *meets design standards with reservations*.

Results

Seventeen studies met the inclusion criteria. Four studies used a group design (treatment-comparison); Table 1 summarizes the features of these studies. The remaining 13 studies used a single-case design; Table 2 summarizes the descriptive characteristics of these studies. ESs are presented for three of the four group design studies (see Table 3). Seven SCD studies received *meets design standards* or *meets design standards with reservations* ratings (see Table 2). PND for SCD studies demonstrating an experimental effect are presented in Table 4, as Kratochwill et al. (2013) recommended reporting ESs for SCD studies with *moderate* or *strong* evidence of an effect. The results of SCD studies that received *meets design standards* or *meets design standards with reservations*, but lacked evidence of effect, are presented in Table 5. Six SCD studies received *does not meet design standards* and were deemed ineligible for further review of evidence of an effect, according to the WWC design standards (Edwards & Lambros, 2018; Hawkins et al., 2011; Kostewicz & Kubina, 2011; Lingo, 2014; Powell & Gadke, 2018; Wu et al., 2020). We synthesize the results of the 11 studies (i.e., four group design and the seven single-case designs meeting design standards) by the predominant component of each fluency intervention: RR with a model (e.g., LPP), RR without a model, or a fluency intervention that did not use RR (e.g., multicomponent/instructional package, Readers Theater). For each intervention type, we present additional features used, such as error correction (i.e., immediately correcting mispronounced words during oral reading) and performance feedback (i.e., participants provided the number of words read correctly after reading).

Repeated Reading Interventions

All but three studies employed RR. Two studies examined RR with modeling by a more proficient reader (LPP), either an adult or a peer. One study examined RR with a similarly performing peer. Five studies examined RR without modeling by a more proficient reader. One study included a model but not RR.

RR with a model. Barnes and Rehfeldt (2013) used a multiple-probe-across-participants design with LPP, error correction, and performance feedback. LPP consisted of the adult

Table 1. Experimental Study Information.

Study	Design	*N*	Grades	Struggling reader	Description of conditions	Fidelity reported?	Sessions	Hours
Bemboom & McMaster (2013)	Treatment-comparison quasi-experiment[a]	93	10	Reading difficulties	T1: Teacher-directed high school Peer-Assisted Learning Strategies (listen passage preview, retell, paragraph summary, error correction) T2: High school Peer-Assisted Learning Strategies C: Typical reading instruction	Yes	*M* = 9.5	*M* = 3.5
Keehn et al. (2008)	Treatment-comparison quasi-experiment	36	10	Reading difficulties, other (unspecified)	T: Readers Theater (practiced reading in repertory groups with error correction) C: Typical reading instruction	Yes	30	25
Spencer & Manis (2010)	Treatment-comparison quasi-experiment	60	6–8	LD, other (SLI, OHI, MMR, autism)	T: Great Leaps (phonics, sight phrases, story passages) with repeated reading with error correction and performance feedback C: Skills for School Success (classroom and study skills)	Yes	*M* = 56.6	*M* = 9.43
Wexler et al. (2010)	Treatment-comparison experiment	96	9–12	LD, other (EBD, OHI, MMR, autism)	T1: Repeated reading with peer (three times with modeling, error correction, summarization) T2: Wide reading with peer (nonrepeated reading with equivalent word count to T1) with T1 procedures C: Typical reading instruction	Yes	50	*M* = 12.2

Note. T1 = treatment condition 1; T2 = treatment condition 2; C = comparison group; SLI = speech/language impairment; OHI = other health impairment; MMR = mild mental retardation; EBD = emotional/behavioral disorder.
[a]Nonequivalent comparison group.

Table 2. SCD Study Information.

Study	Design	*N*	Grades	Struggling reader	Baseline	Intervention	Fidelity reported?	Total sessions	WWC standards	Evidence of effect
Alber-Morgan et al. (2007)	Multiple baseline across participants	4	6–7	LD, other (EBD)	1-min timed oral reading	T1: Repeated condition; untimed reading with error correction, praise, and performance feedback; two timed repeated readings T2: Repeated reading condition with prediction	Yes	31	MwR	Moderate (WCPM)
Barnes & Rehfeldt (2013)	Multiple probe across participants	2	5–6	Other (autism, PDD-NOS)	1-min timed oral reading	T: Passage preview (modeling of fluent reading), error correction, and performance feedback; three reading passages	Yes	9–17	MwR	No
Dufrene et al. (2010)	Multiple baseline across participants	4	6–7	Reading difficulties	1-min timed oral reading	T: Repeated reading with listening passage preview, error correction, and performance feedback (peer tutor)	Yes	8–18	MwR	No
Edwards & Lambros (2018)	Multiple baseline across participants	3	7	LD, Other (ID)	1-min timed oral reading	T: Video self-modeling	Y	8–12	DNM	NA
Escarpio & Barbetta (2016)	Alternating treatments	4	6–8	LD, other (EBD)	1-min timed oral reading	T1: Repeated readings (three) with vocabulary preview and error correction T2: Single reading with vocabulary preview and error correction T3: Equivalent-length wide (nonrepeated) with vocabulary preview and error correction	Yes	25–28	Meets	Strong (T1 vs. T2; WCPM) Moderate (T1 vs. T2, RC)
Hawkins et al. (2011)	Adapted alternating treatments	6	10–11	LD	Untimed oral reading	C: Control T1: Repeated reading with error correction T2: Repeated reading with error correction and vocabulary previewing	Yes	15	DNM	NA
Kostewicz & Kubina (2011)	Multiple probe across participants	7	7–8	LD, other (EBD, ADD)	Three 1-min readings with feedback only	T: Repeated reading with error correction and performance feedback	Yes	19–35	DNM	NA
Lingo (2014)	Multiple probe across participants	4	6	LD, other (OHI, MMD)	1-min timed oral reading	T: Great Leaps (phonics, sight phrases, story passages) with repeated reading with error correction and performance feedback (high school tutor)	Yes	11–25	DNM	NA

(continued)

Table 2. (continued)

Study	Design	*N*	Grades	Struggling reader	Baseline	Intervention	Fidelity reported?	Total sessions	WWC standards	Evidence of effect
Lingo et al. (2006)	Multiple probe across participants	7	6–7	LD, other (EBD, OHI)	1-min timed oral reading	T: *Corrective Reading* (word attack skills, word reading, story reading, individual reading, workbook exercises)	Yes	5–19	MwR	Moderate (WCPM: within program, general)
Powell & Gadke (2018)	Alternating treatments design	3	6–7	Reading difficulties	Three 1-min timed oral readings	C: Control T1: Repeated reading T2: Listening passage preview	Yes	13–25	DNM	NA
Southward & Goo (2019)	Multiple probe across participants	3	10	LD, other (OHI, ADHD, SLI)	1-min timed oral reading	T: Repeated reading with error correction and performance feedback	No	27–31	MwR	No
Vandenberg et al. (2008)	Multiple probe across participants	3	10–11	LD	1-min timed oral reading	T: Repeated reading with error correction and performance feedback	Yes	16–19	MwR	No
Wu et al. (2020)	Multiple baseline with withdrawal	2	7	Reading difficulties	1-min timed oral reading	T: Repeated reading with previewing expected behaviors, error correction (syllable segmentation, grammar, phrase drill) and contingent reward	Yes	28–36	DNM	NA

Note. *N* = sample size; WWC = What Works Clearinghouse; EBD = emotional/behavioral disorder; MwR = meets design standards with reservations; WCPM = words correct per minute; PDD-NOS = pervasive developmental disorder–not otherwise specified; ID = intellectual disability; DNM = does not meet design standards; NA = study ineligible for review of evidence of effect; RC = reading comprehension; ADD = attention-deficit disorder; OHI = other health impairment; MMD = mild mental disability; ADHD = attention-deficit, hyperactivity disorder; SLI = speech language impairment.

Table 3. Experimental Study Results.

Study	Intervention	Dependent measures	Effect size (Hedges' *g*)		M_{gain} scores (*SD*)
Bemboom & McMaster (2013)	T1: Teacher-directed high school Peer-Assisted Learning Strategies (listen passage preview, retell, paragraph summary, error correction, performance feedback) T2: High school Peer-Assisted Learning Strategies C: Typical reading instruction	AIMSWeb Maze passage	T1 vs. C	0.68	
			T2 vs. C	0.99	
			T1 vs. T2	–0.38	
		AIMSWeb ORF	T1 vs. T2	–0.10	
		MAP	T1 vs. T2	–0.63	
Keehn et al. (2008)	T: Readers Theater (practiced reading in repertory groups with performance feedback) C: Typical reading instruction	Ekwall IRI: Reading level			T: 1.75 (1.23) C: .70 (0.66)
		Ekwall IRI: Comprehension			T: 17.8 (16.73) C: 9.25 (18.59)
		NAEP Fluency Rating Scale[a]			T: 0.50 (.83) C: 0.24 (0.51)
		DFS Fluidity			T: 0.20 (0.36) C: 0.48 (0.75)
		DFS Expression			T: 1.13 (0.72) C: 0.25 (0.73)
Spencer & Manis (2010)	T: Great Leaps (phonics, sight phrases, story passages) with repeated reading with error correction and performance feedback C: Skills for School Success (classroom and study skills)	GORT-III Rate	T1 vs. C	0.09	
		GORT-III Accuracy	T1 vs. C	0.53	
		GORT-III Fluency	T1 vs. C	0.45	
		WRMT-R/NU Passage Comprehension	T1 vs. C	0.09	
Wexler et al. (2010)	T1: Repeated reading with peer (three times with modeling, error correction, summarization, and feedback) T2: Wide reading with peer (nonrepeated reading with equivalent word count to T1) with T1 procedures C: Typical reading instruction	WJ–PC	T1 vs. C	–0.10	
			T2 vs. C	–0.18	
			T1 vs. T2	0.10	
		TOSRE	T1 vs. C	–0.31	
			T2 vs. C	–0.38	
			T1 vs. T2	–0.31	
		AIMSWeb ORF	T1 vs. C	–0.07	
			T2 vs. C	–0.26	
			T1 vs. T2	0.18	
		TOSCRF	T1 vs. C	0.04	
			T2 vs. C	–0.23	
			T1 vs. T2	0.27	

Note. M_{gain} = mean gain score; ORF = oral reading fluency; MAP = Measures of Academic Progress; IRI = Informal Reading Inventory; NAEP = National Assessment of Educational Progress; DFS = Diagnostic Fluidity Scale; GORT = Gray Oral Reading Test; WRMT-R/NU = Woodcock Reading Mastery Test–Revised Normative Update; WJ-PC = Woodcock–Johnson Passage Comprehension; TOSRE = Test of Silent Reading Efficiency; TOSCRF = Test of Silent Contextual Reading Fluency.

[a]Measures syntactic phrasing.

Table 4. PND for Single-Case Designs That Meet or Meet With Reservations WWC Evidence Standards and Demonstrated Evidence of Causal Relation.

Study	Intervention	DM	St.	PND	St.	PND	St.	PND	St.	PND
Alber-Morgan et al. (2007)	T1: Repeated condition; untimed reading with error correction, praise, and performance feedback; two timed repeated readings T2: Repeated reading condition with prediction	WCPM	Theo	T1: 100 T2: 100	Kelly	T1: 73 T2: 100	Brian	T1: 90 T2: 100	Andrew	T1: 71 T2: 100
Escarpio & Barbetta (2016)	T1: Repeated reading (three) with vocabulary preview and error correction	WCPM T1 vs. T2	Gabriel	T1: 100 (standard)[a] 100 (enhanced)[b]	Kevin	T1: 91 (standard) 100 (enhanced)	Fred	T1: 86 (standard) 100 (enhanced)	Ulysses	T1: 100 (standard) 100 (enhanced)
	T2: Single reading T3: Equivalent-length wide (nonrepeated reading with vocabulary preview) and error correction	Correct comprehension questions T1 vs. T2	Gabriel	T1: 100 (standard) 100 (enhanced)	Kevin	T1: 100 (standard) 100 (enhanced)	Fred	T1: 88 (standard) 100 (enhanced)	Ulysses	T1: 88 (standard) 60 (enhanced)
Lingo et al. (2006)	T: *Corrective Reading* (word attack skills, word reading, story reading, individual reading, workbook exercises)	WCPM (within program)	Evan	48	John	100	Bill	67	David	80
		WCPM (generalization)	Evan	100	John	100	Bill	100	David	67
		WCPM (within program)	Tammy	16	Anthony	77	Will	100		
		WCPM (generalization)	Tammy	57	Anthony	83	Will	50		

Note. PND = percentage of nonoverlapping data; WWC = What Works Clearinghouse; DM = dependent measure; St. = student; WCPM = words correct per minute.
[a]Hundred-word passage at grade level. [b] Fifty percent increase in passage length and 6-month increase in grade level.

Table 5. Fluency and Comprehension Outcomes for Single-Case Designs That Meet, or Meet With Reservations, WWC Design Standards and Demonstrated No Evidence of Causal Relation.

Study	Intervention	Student	WCPM (M_{gain}, mean percentage)	EPM ($M_{decrease}$)	Comprehension (M_{gain}, % correctly answered)
Alber-Morgan et al. (2007) (a) Literal (b) Inferential	T1: Repeated condition; untimed reading with error correction, praise, and performance feedback; two timed repeated readings T2: Repeated reading condition with prediction	Theo	T1, T2: 56.8, 21.4	T1, T2: 1.4, 0.3	(a) T1, T2: 1.4, 0.5 (b) T1, T2: 1.6, 0.6
		Kelly	T1, T2: 35.2, 19.8	T1, T2: –1.1, 2.5	(a) T1, T2: 0.9, 0.2 (b) T1, T2: 0.6, 0.4
		Brian	T1, T2: 42.1, 20.8	T1, T2: 1.7, 0.5	(a) T1, T2: 0.9, 0.4 (b) T1, T2: 1.3, 0.3
		Andrew	T1, T2: 24.1, 17.5	T1, T2: 0.9, 1.0	(a) T1, T2: 0.6. 0.2 (b) T1, T2: 1.1, 0.2
Barnes & Rehfeldt (2013) (a) Topography based (b) Selection based	T: Passage preview (modeling of fluent reading), error correction, and performance feedback; three reading passages	Gavin	25.93	NA	(a) 70% (pre) (a) 95% (post) (b) 95.6 (pre) (b) 100% (post)
		Kyle	23.41	NA	(a) 33.3% (pre) (a) 76.6%(post) (b) 83.3% (pre) (b) 98% (post)
		Luke	31.93	NA	(a) 63.3 % (pre) (a) 93.3 % (post) (b) 96.4% (pre) (b) 100% (post)
Dufrene et al. (2010)	T: Repeated reading with listening passage preview, error correction, and performance feedback (peer tutor)	Jan	19.20	2.35	NA
		Donna	27.17	3.36	
		Darian	73.83	2.42	
		Tanya	18.97	0.3	
Escarpio & Barbetta (2016) Standard, enhanced	T1: Repeated reading (three) with vocabulary preview and error correction T2: Non-repeated reading T3: Equivalent-length nonrepeated reading with vocabulary preview and error correction	Gabriel	T1: 96.70, 109.66 T2: 82.40, 87.00 T3: 62.30, 70.67	T1: 3.60, 3.33 T2: 4.00, 4.00 T3: 4.50, 5.33	T1: 4.20, 5.00 T2: 2.20, 3.00 T3: 3.20, 2.66
		Kevin	T1: 85.40, 98.33 T2: 80.00, 85.67 T3: 58.50, 66.67	T1: 3.36, 3.00 T2: 3.91, 4.33 T3: 4.81, 5.00	T1: 4.55, 5.00 T2: 3.09, 3.00 T3: 3.50, 4.00
		Fred	T1: 113.63, 129.20 T2: 104.43, 108.40 T3: 114.63, 118.40	T1: 3.00, 3.20 T2: 4.00, 3.50 T3: 4.28, 4.60	T1: 4.75, 5.00 T2: 3.50, 4.00 T3: 3.13, 3.40
		Ulysses	T1: 111.40, 128.40 T2: 91.50, 98.00 T3: 92.50, 94.40	T1: 3.11, 2.40 T2: 3.50, 4.0 T3: 4.60, 5.20	T1: 4.78, 5.00 T2: 3.00, 4.40 T3: 3.25, 3.80

(continued)

Table 5. (continued)

Study	Intervention	Student	WCPM (M_{gain}, mean percentage)	EPM ($M_{decrease}$)	Comprehension (M_{gain}, % correctly answered)
Lingo et al. (2006) Within program, generalization	T: *Corrective Reading* (word attack skills, word reading, story reading, individual reading, workbook exercises)	Evan	6.9, 29.4	6.4, 9.4	65% (pre) 74% (post)
		John	23.6, 15.1	1.7, 2.5	84% (pre) 87% (post)
		Bill	18.4, 19	4.8, 8.3	68% (pre), 73% (post)
		David	11, 14.3	2.3, 6	71% (pre), 75% (post)
		Tammy	9.1, 19.3	3.5, 5.6	80% (pre), 87% (post)
		Anthony	26.6, 22.5	2.1, 2.7	91% (pre), 89% (post)
		Will	23.1, 26	4.7, 5.0	62% (pre), 73% (post)
Southward & Goo (2019)	Repeated reading with error correction and performance feedback	Sarah	43.9	NA	NA
		John	58	NA	NA
		Matthew	69	NA	NA
Vandenberg et al. (2008)	T: Repeated reading with error correction and performance feedback	Katherine	36	NR	7–9 correct
		Bobby	39	NR	7–8 correct
		Katrina	34	NR	5–8 correct
		Caden	45.28, 54.02	NA	NA

Note. WWC = What Works Clearinghouse; WCPM = words correct per minute; M_{gain} = mean gain score from baseline to intervention; EPM = errors per minute; $M_{decrease}$ = mean decrease score from baseline to intervention; NA = variable was not measured in study; NR = data were not reported or data were insufficient for calculation.

reading the passage aloud while the student followed along with the text. The adult provided error correction by immediately correcting misread words and having the student repeat the word within a phrase. After reading, the adult provided performance feedback in which each student was informed of their WCPM score and graphed their score. WCPM increased for all three participants and reading comprehension performance increased for two of the participants. In a multiple-baseline-across-participants design, a more proficient peer modeled fluently reading the text before the partner read the text repeatedly (Dufrene et al., 2010). The intervention included performance feedback after each reading, where the peer tutors shared the WCPM score with their tutee, and students received a reward for participation (i.e., a positive behavior "ticket" for completing all steps in the tutoring procedure). All four participants increased WCPM and decreased errors per minute (EPM).

Modeling by a similarly performing peer. One study examined modeling with a similarly performing peer (Wexler et al., 2010). The authors conducted a randomized control trial to compare RR with peer modeling, wide reading with modeling, and a typical-practice comparison condition. Although all students in the treatment conditions met the study's criteria as struggling readers, students were paired as higher-level and lower-level struggling readers based on median oral reading fluency scores. Error correction and summarization were included in both treatment conditions. In the RR treatment, the higher-level reader modeled reading the passage first. Each participant read a text three times. In the wide-reading treatment, the higher-level reader read a passage before the lower-level reader, but the participants read three passages one time each. There were no statistically significant effects in favor of the RR condition compared with the control condition on fluency (ES = –.07) or comprehension outcomes (ES = –.10), nor were there statistically significant effects in favor of wide reading compared with the control condition on fluency (ES = –.26) or comprehension (ES = –.18) outcomes. There were positive effects in favor of the RR compared with wide reading on the fluency (ES = .18) and comprehension (ES = .10) measures, although these differences were not statistically significant.

RR without a model. In a multiple-baseline-across-participants design, Alber-Morgan et al. (2007) compared two treatment phases of RR with a baseline phase without intervention. In the first phase of RR, students repeatedly read the text while the teacher provided error correction by having students repeat incorrect words. The data collector also reviewed errors with the student after each reading. After each reading, the data collector provided performance feedback by telling the student the number of correctly read words. In the second RR phase, students made predictions about the text in addition to repeatedly reading the text and receiving error correction and performance feedback. During the first RR phase, all four participants increased WCPM, decreased EPM, and improved the number of correctly answered literal and inferential comprehension questions. The second RR phase with prediction demonstrated an additional increase in WCPM for all four participants, as compared with the previous phase of RR alone (WCPM; PND range T1: 71%–100%, PND range T2: 100%).

In a multiple-probe-across-participants design, Vandenberg et al. (2008) found that the RR with error correction and performance feedback phase resulted in an increase in the mean of WCPM for all three students as compared with baseline. The experimenter provided error correction by reviewing misread words with the student. The experimenter provided performance feedback by calculating WCPM with the student and charting the data after each reading. All participants answered more comprehension questions correctly in the treatment phase as compared with baseline. However, the overlap and inconsistency in data points did not indicate evidence of an effect, as outlined by WWC design guidelines for determining a functional relation (Kratochwill et al., 2013). Vandenberg et al. also utilized a fluency criterion where students gradually increased the number of WCPM, and probes were taken on unpracticed passages. For all students, the mean of WCPM on unpracticed passages was reported to be between the mean of the treatment condition and the baseline condition.

Southward and Goo (2019) also used a multiple-probe-across-participants design to examine RR with error correction and performance feedback on students' WCPM. The teacher provided error correction immediately after any miscues during reading. The teacher provided performance feedback by sharing and graphing WCPM with the participant after four reads of the passage. All three participants in the study demonstrated an immediate increase in reading fluency upon introduction of RR, with increases in WCPM over baseline of 81.7%, 61.8%, and 51.5%. The researchers also introduced probes on unpracticed passages. Participants generally maintained the improvement in WCPM on unpracticed probes, with increases in WCPM over baseline of 26.8%, 24.4%, and 5.2%. Despite an increase in the amount of WCPM from the baseline phase to treatment, the review of data for a functional relation revealed instability and decelerating trendlines, which did not allow for a determination of effect, as defined by WWC design guidelines (Kratochwill et al., 2013).

Spencer and Manis (2010) examined the Great Leaps Reading program in a quasi-experimental study. The Great Leaps Reading program (Campbell, 2005) consists of successive RRs of three levels of text: sounds or individual words, sight phrases, and connected text. The paraprofessional provided error correction by reviewing errors with the student after each session. The study included a treatment

group receiving the Great Leaps Reading intervention from paraprofessionals trained by the researchers, and a control group that worked on general classroom and study skills for an equivalent amount of time. The treatment group statistically significantly outperformed the control group on a standardized measure of fluency (ES = .62). There was no statistically significant difference on a standardized measure of reading comprehension.

Escarpio and Barbetta (2016) employed an alternating-treatment design to compare three treatment phases: a single reading of a passage, RR, and a wide-reading condition (referred to as equivalent non-RR within the study), where participants read a passage with a word count equivalent to the word amount read in RR condition. All three treatment phases included error correction and brief vocabulary instruction before reading. The researcher performed error correction by immediately correcting any errors during the first reading and rereading the misread words at the end of the first reading. Before each passage was read, the researcher delivered brief vocabulary instruction consisting of asking students to read five words aloud. For misread words, the student was asked to demonstrate knowledge of the word's meaning by using it in sentence. If the student did not know the meaning of the word, the researcher used the word in a sentence to demonstrate its meaning. In addition, each phase had two conditions, a standard condition in which the student read text at his or her reading level, and an enhanced condition in which the student read text 6 months above his or her reading level. The standard RR conditions showed the greatest positive impact on WCPM for three of four participants (PND: 86%–100%), and the enhanced RR condition showed increased WCPM for all four participants (PND: 100%) compared with the standard and enhanced single-reading condition. Standard and enhanced RR condition also resulted in a higher increase in correctly answered literal comprehension questions than the single-reading phase (PND range: 88%–100% [standard] and 60%–100% [enhanced]). The students in the enhanced RR condition performed the highest, followed by students in the standard and enhanced single-reading condition, followed by the students in the standard and enhanced wide-reading conditions. RR in both standard and enhanced conditions showed the greatest decrease in EPM, as compared with both the standard and enhanced conditions of single-reading or wide-reading phases.

Interventions Without RR

Three studies examined fluency interventions that did not use RR. Bemboom and McMaster (2013) used a quasi-experimental design to compare the effects of a teacher-directed fluency intervention, a peer-mediated fluency intervention, and a control condition in which students received no fluency instruction. The peer-mediated condition consisted of Peer-Assisted Learning Strategies (PALS; Fuchs et al., 2000), which included partner reading, error correction, and performance feedback. During partner reading, a peer models fluent reading of the text for the reader. During error correction, the peer provides correction of any errors and asks the reader to repeat the corrected word. During performance feedback, the teacher circulates among the partner groups and provides feedback on the rate, accuracy, and expression of the reader. After reading, the reader summarized the main idea of the passage in 10 words or less. The teacher-directed condition included the same components as the peer-mediated condition, but the teacher served as the model of fluent reading. No statistically significant differences were found between the two treatment conditions on the measure of reading fluency. The treatment conditions could not be compared with the control group on measures on oral reading fluency due to no fluency data collected for the control group. The peer-mediated condition outperformed the teacher-directed condition on the posttest measure of comprehension (ES = 1.00 vs. 0.69). There were statistically significant differences in favor of both treatment conditions when compared with the control group on a measure of reading comprehension, with the peer-mediated condition having a larger effect (ES = .39) than teacher directed (ES = .26).

Lingo et al. (2006) conducted two studies using multiple-probe-across-participants designs to evaluate the *Corrective Reading* program (Engelmann et al., 1999) for improving reading fluency outcomes. *Corrective Reading* lessons include instruction in decoding (word attack and word reading), story reading, and teacher-directed and independent workbook exercises. All seven participants increased their WCPM (PND range: 16%–100%), and students maintained those gains on grade-level passages selected for generalization compared with the passages used in the program (PND range: 50%–100%). Six of seven participants increased reading achievement from pretest to posttest.

Keehn et al. (2008) employed a quasi-experimental design examining the effects of Readers Theater on reading fluency and comprehension outcomes when compared with business-as-usual instruction. Readers Theater converts a story to a script that students learn, rehearse, and perform, which provides opportunities for students to repeatedly practice reading text. Readers Theater includes elements of vocabulary instruction, oral reading of the script (both teacher-led and in peer groups), and coaching of expressive reading. The Readers Theater group had statistically significantly higher mean gain scores than typical instruction on overall reading level (M_{gain} = 1.70 vs. 0.70), fluidity, or smoothness of reading (M_{gain} = 0.20 vs. 0.48) and expression, or stress and intonation (M_{gain} = 1.13 vs. 0.25). There was not a statistically significant difference in

favor of the treatment condition on measures of comprehension (M_{gain} = 17.8 vs. 9.25), fluency (M_{gain} = 0.50 vs. 0.51), and vocabulary (M_{gain} = 17.1 vs. 9.00).

Discussion

This review extends the Wexler et al. (2008) synthesis to examine the effects of fluency interventions on the reading fluency and reading comprehension outcomes of secondary struggling readers. This review differs from the previous review in that we used additional databases for the electronic search to seek more potentially eligible studies and provide more comprehensive results. We intended to differentiate SCD studies by using more rigorous quality standards (e.g., WWC standards) to better synthesize the results from these studies. As such, we discuss the results in answering the research question: Which fluency interventions are associated with positive outcomes in reading fluency and comprehension for struggling readers in Grades 6 through 12? We organize the discussion in relation to extending Wexler et al. (2008). It should be addressed here that the corpus of studies in the present synthesis yielded results aligned with the previous findings of Wexler et al. (2008), yet also delivered some findings which diverged from that previous review, in some cases strongly. These incongruencies will be noted as we address the key features of fluency interventions associated with positive results, and as we discuss the findings to our research question within the overarching goals to both report on current research while extending and expanding upon previous reviews.

Wexler et al. (2008) reported three key findings from their previous synthesis of reading fluency interventions for secondary struggling readers. First, RR interventions were associated with increased reading fluency but were not strongly associated with any improvements on comprehension measures. Second, the feature of RR interventions most commonly associated with improved fluency outcomes was providing a modeling of proficient reading prior to repeatedly reading the text. The positive effect of modeling was usually enhanced when error correction was included as well. Third, wide reading, which included equivalent word reading amounts to RR interventions, had a similar positive association with increased reading fluency, suggesting wide reading may be a similarly beneficial fluency intervention to RR for secondary students.

As with Wexler et al. (2008), the majority of fluency interventions included in this synthesis addressed RR. The findings of this current synthesis also found that RR interventions resulted in improved reading fluency. However, there was inconsistency between the results of single-case designs and group designs with regard to positive effects on fluency outcomes. Taking the results of all studies overall, it cannot be said that there is a strong consensus that RR is linked to improved fluency for secondary struggling readers.

Although many individual participants displayed increased reading fluency, the findings of this synthesis from experimental group studies do not consistently and conclusively support the use of RR as a fluency intervention for older struggling readers, despite support for RR from the body of included single subject studies. Wexler et al. (2008) found that students who received RR with a model of fluent reading by an adult or more competent peer demonstrated more gains in fluency rate than students who received RR without a model. Within the current synthesis, there was not a consensus among included studies that modeling served as the feature most associated with increased fluency. The studies most strongly demonstrating a positive effect on fluency included two single-case studies examining RR with no model (Alber-Morgan et al., 2007; Escarpio & Barbetta, 2016), a reading program with RR but no model (Spencer & Manis, 2010), a reading program without RR or modeling (Lingo et al., 2006), and a study comparing modeling without RR as provided by a peer versus a teacher (Bemboom & McMaster, 2013). Bemboom and McMaster (2013) found that the peer-mediated condition resulted in greater gains on fluency than the teacher-mediated condition. Two other single-case studies also examined modeling. Modeling by a proficient reader was associated with positive increases for fluency in two studies (Barnes & Rehfeldt, 2013; Dufrene et al., 2010). An adult served as the model in Barnes and Rehfeldt and a more proficient peer was the model in Dufrene et al. This does however suggest modeling by a peer may be just as effective as that of a teacher or paraprofessional. These two studies however did not meet the most stringent WWC standards for evidence of effect, despite meeting quality standards. Given these are the results of only two studies representing six participants, and the previously stated conflicting results, it is best to state the findings of the current synthesis do not strongly align with the findings from the Wexler et al. synthesis, as results from RR with a model did not clearly converge to show a consensus of improvement in fluency outcomes. In the current review, there was conflicting support suggesting the use of modeling as a feature of RR to improve reading fluency.

RR is as an evidence-based practice for younger students with reading disabilities (Stevens et al., 2016). The mixed findings surrounding RR for struggling readers in the secondary grades may be explained that secondary readers are likely to have more persistent and intractable reading difficulties and reading fluency may possibly be a less malleable construct. For comprehension, it may also be that students are becoming proficient readers in the elementary grades, but in the upper grades perhaps background knowledge and vocabulary are more important for reading comprehension.

With regard to the impact of fluency interventions on comprehension outcomes, the findings of this synthesis

strongly align with Wexler et al (2008). Wexler et al. (2008) found that although RR interventions for secondary readers generally improved overall reading rate and accuracy, they did not improve comprehension outcomes. As the link between improved fluency and improved comprehension remains unclear for secondary students, it is important to consider the results from the current studies. The majority of studies in this synthesis reported an increase in reading fluency outcomes, with four SCD studies reporting increased reading comprehension outcomes after RR (Alber-Morgan et al., 2007; Barnes & Rehfeldt, 2013; Escarpio & Barbetta, 2016; Vandenberg et al., 2008) and two studies reporting improved reading comprehension after a non-RR intervention (Keehn et al., 2008; Lingo et al., 2006). However, this reporting of results must be taken with aforementioned concerns about quality standards in mind. Only one single-case study reporting improved reading comprehension met the most stringent quality standards (Escarpio & Barbetta, 2016). Across the experimental studies, fluency interventions did not consistently result in a subsequent increase in reading comprehension. Of the four experimental studies included in this synthesis, only one reported an increase in comprehension (Keehn et al., 2008), in the form of gain scores on sixth-grade reading passages. As previously stated, this study was quasi-experimental in nature, unlike the other experimental studies, which were randomized.

One possible explanation for the discrepancy in reading comprehension findings among studies is the type of comprehension measure used in each study. Unstandardized, proximal measures are more likely to demonstrate an effect because of the close relationship between the information contained within the text and the content of the questions. There is typically greater confidence in standardized measures as an indicator of generalized reading comprehension growth. Of the 11 studies included in this synthesis, only five used standardized measures of reading comprehension (i.e., four experimental studies and one SCD; Bemboom & McMaster, 2013; Keehn et al., 2008; Lingo et al., 2006; Spencer & Manis, 2010; Wexler et al., 2010). Across the single-case studies, the proximal, unstandardized measures of reading comprehension typically consisted of literal or recall comprehension questions from the passage. Findings of improved comprehension based on distal and standardized measures of comprehension would provide more robust support for the link between fluency interventions and reading comprehension outcomes.

With regard to Wexler's third key finding, the comparison of RR interventions and wide-reading interventions, the additional question explored in the studies in this synthesis is the extent to which RR is more effective than one reading of text equivalent in word count to RRs in improving fluency and comprehension outcomes. A finding from Wexler et al. (2008) suggested that these conditions may have similar impacts on reading fluency. Two studies in the present synthesis compared RR with wide reading. No statistical difference was found between the RR and wide-reading treatment conditions (Wexler et al., 2010). However, Escarpio and Barbetta (2016) indicated that the RR condition in an alternating-treatment design showed increased WCPM, decreased EPM, and higher comprehension results than the single-reading condition or the wide reading (equivalent non-RR condition). RR may not be as beneficial for dysfluent word readers as it is for students in the elementary grades (Stevens et al., 2016). The discrepancy between these studies may suggest there is a variability of response among secondary students with reading difficulties, with some students showing benefits from RR, and other students showing similar benefits from wide reading.

Limitations and Future Research

This synthesis has several limitations. The 11 studies that are the corpus of the synthesis represents a small number of students. For example, the seven single-case studies that are the majority of the corpus in aggregate represent the findings of only 27 students. While this is understandable given the goals of SCD research, it does reflect what is essentially a small sample size. This means the conclusions drawn from aggregating these studies are less reliable and may not generalize to the larger population.

There was great variability in the types of struggling reader participants, which included comorbid diagnoses such as autism, emotional/behavioral disorders, and attention-deficit disorder, in addition to variation in defining struggling reader (e.g., specific learning disabilities, at-risk for reading difficulties). These additional characteristics limit the ability to compare the results across studies, as positive response to a fluency intervention could vary according to a student's disability type. Although all students met inclusion criteria as struggling readers, there were differences in how studies identified students as struggling, which included teacher reports, low achievement on standardized tests, or school/district criteria for a learning disability or referral for Tier 2 intervention.

In addition, the features of RR interventions (peer vs. teacher modeling/LPP, error correction, performance feedback) varied from study to study. It would be beneficial to explore the features of RR interventions that are associated with a greater improvement in reading fluency outcomes. It would be beneficial to learn which element or what combination of elements leads to greater gains in fluency. One specific line of future research could include questions about the effects of peer versus teacher modeling. Although the consensus appears to be that using a more proficient modeler is advisable, the benefits of pairing peers of similar reading abilities is unsupported or, at best, inconclusive, in the current synthesis.

There was also much variability in the comprehension measures used, and not all studies reported comprehension

outcomes. It would be beneficial for researchers to include standardized reading comprehension measures. This, combined with more rigorous study designs, could facilitate better understanding of the relationship between reading fluency interventions and comprehension outcomes for older struggling readers. Together, these limitations hinder the ability to adequately synthesize, extract information, and interpret findings on the fluency interventions' impact on reading comprehension outcomes for this population.

Overall, the inconsistency presented in the data from across studies, as well as weaknesses in the quality of studies themselves, limits the ability to make assertions of the effects of RR or the combination of RR with specific features on practice. An important point regarding the fluency interventions' effects on fluency and reading comprehension outcomes is the relative rigor of the seven single-case studies that formed the majority of this synthesis. Only one study met WWC design standards (Escarpio & Barbetta, 2016), and six studies met WWC design standards with reservations (Alber-Morgan et al., 2007; Barnes & Rehfeldt, 2013; Dufrene et al., 2010; Lingo et al., 2006; Southward & Goo, 2019; Vandenberg et al., 2008). Yet, these studies all showed increases in reading fluency from baseline with some studies also showing gains in comprehension. These results must be interpreted with study quality considerations in mind. Of the experimental group designs, only one was an experimental randomized control trial, considered the "gold standard" in research. Future research of rigorous single-case and group design studies is warranted to better identify the impact of fluency interventions on the reading fluency and reading comprehension performance of secondary struggling readers.

Implications for Practice

A goal of any systematic review is not just to synthesize intervention results for researchers but for practitioners as well. Teachers, interventionists, and reading specialists in the secondary grades are especially in need of evidence-based interventions for their students who demonstrate low oral reading fluency. The disparate results of studies in this corpus make it infeasible to provide sound recommendations to teachers looking to remediate fluency difficulties. This synthesis reveals the extent to which we remain unsure of the best practices for improving fluency for secondary struggling readers, but more specifically, the lack of clarity surrounding the conditions for which fluency interventions, such as RR, may work for which students and under what conditions. If any recommendation can be made, it is to proceed with caution in overreliance on RR, which may not be properly efficacious for this population. A key finding that aligned with Wexler et al. (2008) was that wide reading could have similar impacts on reading fluency. Teachers in secondary grades may wish to generally increase the amount of text read and vary the type of text as opposed to specifically utilizing RR. Equivalent wide reading (reading equivalent word amounts to RR) may be a preferable option for teachers in the secondary grades, as RR was not shown to be more or less effective for older students, and wide reading may be more feasible given the expectations of reading for content knowledge. Teachers may wish to focus on building background knowledge and teaching vocabulary as levers to improve comprehension for students with fluency deficits. Wide reading for content knowledge could potentially also address concerns teachers may have about the generalization of RR, such as when improvements in fluency are not seen to be maintained after the intervention itself. In this synthesis, only two studies looked at generalization as an indication of maintenance of effects (Lingo et al., 2006; Southward & Goo, 2019). Based on only two studies, it is unwise to make claims on RR's ability to make improvements generalize to new and unread texts.

Conclusion

We extended the Wexler et al. (2008) synthesis because students in the secondary grades with low reading fluency need evidence-based interventions, especially interventions that can improve fluency and reading comprehension outcomes simultaneously, if possible. RR remains the predominantly used intervention for improving reading fluency. However, the results of this synthesis suggest a lack of consensus to support RR with modeling for improving reading fluency and reading comprehension outcomes of older struggling readers. In addition, the effects of reading fluency interventions on students' reading comprehension outcomes remain unclear. In general, fluency interventions may be less impactful for struggling readers in the secondary grades. As such, the use of such interventions should be based on individual student needs, and ongoing progress monitoring should be used to adjust instruction when students show a lack of responsiveness to these interventions. In conclusion, the findings of this synthesis did not fully converge to a point to make a definitive statement on the overall effectiveness of fluency interventions for struggling readers in the secondary grades. Future research should inspect the nature of reading disabilities and difficulties for this age level to refine the approach to remediating fluency deficits for these students.

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