A synthesis of fluency interventions for secondary struggling readers

**Jade Wexler · Sharon Vaughn · Meaghan Edmonds ·
Colleen Klein Reutebuch**

Abstract   Previous research studies examining the effects of fluency interventions on the fluency and comprehension outcomes for secondary struggling readers are synthesized. An extensive search of the professional literature between 1980 and 2005 yielded a total of 19 intervention studies that provided fluency interventions to secondary struggling readers and measured comprehension and/or fluency outcomes. Findings revealed fluency outcomes were consistently improved following interventions that included listening passage previewing such as listening to an audiotape or adult model of good reading before attempting to read a passage. In addition, there is preliminary evidence that there may be no differential effects between repeated reading interventions and the same amount of non-repetitive reading with older struggling readers for increasing reading speed, word recognition, and comprehension.

Keywords   Secondary · Fluency · Interventions

Introduction

Based on the past two decades of reading research, the knowledge and practices associated with improved outcomes for teaching beginning readers in the elementary grades have yielded converging evidence that provides confidence to educational leaders and teachers about practices associated with improved outcomes

J. Wexler (✉) · S. Vaughn · C. K. Reutebuch
Special Education, The University of Texas at Austin, College of Education SZB 228, 1 University Station D4900, Austin, TX 78712, USA
e-mail: jwexler@mail.utexas.edu

M. Edmonds
Educational Psychology, The University of Texas at Austin, College of Education SZB 228, 1 University Station D4900, Austin, TX 78712, USA

for students. The National Reading Panel (NRP) report (2000) identified five of the most critical components of reading instruction necessary for students to become proficient readers. These critical components include: (a) phonological awareness, (b) phonics, (c) fluency, (d) vocabulary, and (e) comprehension. Explicit, systematic, and extensive instruction in these elements of reading facilitate for most students the ultimate goal of reading fluently and comprehending text. While there is considerable knowledge about beginning reading practices for young children, the knowledge and practices for teaching older students (grades 6 and older and/or ages 11–21) who struggle with reading difficulties has been less systematically studied and reviewed (Biancarosa & Snow, 2004).

Fluency is a critical element for many older students with reading difficulties. Fluency, the ability to read text with speed and accuracy is essential for older students because: (a) students with reading difficulties consistently struggle with this specific component of reading (Lyon & Moats, 1997; Meyer & Felton, 1999; Torgesen et al., 2001; Torgesen, Wagner, & Rashotte, 1997), (b) fluency is often neglected in reading instruction (Allington, 1983), and (c) reading words correctly and at an appropriate speed is associated with comprehension and learning from text (Kuhn & Stahl, 2000; Shinn & Good, 1992). Knowing what fluency interventions or elements of intervention are associated with effective outcomes for secondary struggling readers is essential (Edmonds et al., in press; Pressley, 2004).

The purpose of this synthesis is to summarize the research on the efficacy of fluency interventions in enhancing the fluency and comprehension outcomes of students with reading difficulties in grades 6 through 12, which reflects the most common grades for secondary students.

The role of fluency in the process of learning to read

Two of the first researchers to bring fluency to the forefront as a critical element in the reading process, LaBerge and Samuels (1974), introduced their theory of automatic information processing. They proposed that to be an efficient reader, a student should be able to recognize and identify words instantly and then connect the words as they read to make meaning. Perfetti (1985) extended this theory when he explained that focusing on decoding consumes memory capacity, which inhibits comprehension. In addition, Carver (1997) introduced the rauding theory which proposes that a student reads at the fastest rate at which he can comprehend text. All of these theories suggest that fluency is an outcome of a set of learned skills and that there is a connection between being a fluent reader and being able to comprehend text.

Chall (1983) describes 6 stages of learning to read which correspond to these theories and through these stages, the role of fluency can be understood. The first stage addresses the prereading stage of literacy such as the development of print concepts or phoneme awareness. The second stage addresses the beginning of formal instruction such as the development of the alphabetic principle. It is the third stage of the reading process, however, often referred to as the "ungluing from print" stage in which students develop their fluency. Students in this stage have already

established their decoding ability and are therefore reading with automaticity as well as making use of the prosodic features in language such as appropriate stress and intonation in their reading. After mastering the "ungluing from print" stage, Chall suggests that it should be easier for students to read for meaning. It is in this stage that students make a shift from learning to read to reading to learn and develop the skills needed to interact with expository text and complex vocabulary. As students mature as readers they enter the final stage of reading in which they are able to consider multiple viewpoints and critically evaluate what they read.

More recently, researchers such as Wolf and Katzir-Cohen (2001) have shifted their work to address fluency as a skill that must be honed when acquiring literacy instead of as an outcome of a series of skills. They raised the idea that some students with reading disabilities have specific problems in naming speed, which differs from students who face challenges related to phonological processing. Although not without controversy, Wolf and Bowers' (2000) double deficit model of reading disability, which corresponds with this idea, suggests that interventions for students who can decode accurately but remain dysfluent should focus on improving fluency. Students who fall in the double deficit subtype demonstrate the co-occurrence of phonological and naming-speed deficits.

Fluency: essential but difficult to impact

Students who read text slowly tend to focus their efforts at the word recognition level, making it difficult for them to attend to meaning (Samuels, 1979). Students who can read text fluently are generally overall better readers as they are able to demonstrate an understanding of the text they read (Shinn & Good, 1992). However, fluency has been a very difficult area to impact through intervention. In intervention studies that have effectively focused on and increased other critical reading components such as phonological awareness, they did not significantly affect fluency (Lovett, Steinbach, & Frijters, 2000; Torgeson, 2004; Torgesen et al., 2001). Therefore, making progress in related beginning reading skills has not consistently influenced fluency.

Lyon and Moats (1997) noted that "improvements in decoding and word-reading accuracy have been far easier to obtain than improvements in reading fluency and automaticity" (p. 579). While targeting fluency directly remains a necessary component of a reading intervention, questions remain regarding the extent to which the development of related reading skills will impact fluency.

Previous reports of effective fluency interventions (Chard, Vaughn, & Tyler, 2002; Kuhn & Stahl, 2000; Meyer & Felton, 1999; NRP, 2000; Therrien, 2004; Wolf & Katzir-Cohen, 2001) have identified and synthesized fluency studies for struggling readers primarily at the elementary level. Fluency practices that have been examined through research can be organized into the following categories: repeated reading with and without a model, criteria for repetitions in a repeated reading intervention, text difficulty, intensity of intervention, and effect on comprehension.

Repeated reading with and without a model

Overall, previous reports on fluency outcomes (Chard et al., 2002; Kuhn & Stahl, 2000; Meyer & Felton, 1999; NRP, 2000; Therrien, 2004; Wolf & Katzir-Cohen, 2001) revealed that repeated reading practice does improve speed as well as accuracy in reading for younger and older elementary students (Meyer & Felton, 1999). Repeated reading without a model involves having students independently read a passage a specified number of times without having the passage modeled prior to reading by, for example, an adult or tape recording. Chard et al. (2002) reported that using repeated reading without a model still produced overall better scores on fluency, accuracy, and comprehension than reading a passage only one time.

Interestingly, when Kuhn and Stahl (2000) examined studies with multiple comparisons, they found that 8 studies showed the repeated readings group was significantly different than the control; however, 21 comparisons did not show this effect. It is important to note that the majority of studies were with at risk students; however, 9 of the studies were with average and above average students. In some studies the comparison intervention was a non-repetitive reading treatment in which the students read the same amount of text as the students doing repeated reading. The question remains about overall treatment effectiveness when comparing repeated reading to the same amount of non-repetitive reading.

Repeated reading with a previewing procedure requires a student to listen to some type of model of good reading of a passage prior to reading the same passage independently. Using repeated reading with a model (i.e., a tape recording or computer) seems to be more effective than not using a model at all; however, modeling from a teacher or another adult is the most effective method of repeated reading with a model (Chard et al., 2002; Therrien, 2004). Another effective practice is to conduct repeated readings by pairing a peer or cross age tutor with a struggling reader to provide the student with a model for good reading and a chance to receive corrective feedback (Kuhn & Stahl, 2000).

Criteria for repetitions in a repeated reading intervention

In studies that show the positive effect of repeated reading on reading rates, the number of times a student rereads the passage varies. These rereading requirements generally range from 1 to 7 times. Meyer and Felton (1999) suggest that the general consensus regarding the amount of re-readings necessary to affect fluency and comprehension is 3–4 times. Therrien's (2004) results also showed that to positively affect comprehension 4 rereads was better than 3 rereads.

Instead of setting a rereading requirement, some fluency interventions require students to reach a certain criterion such as a specific oral reading rate. Therrien (2004) reported that studies which required students to reach a set criterion had much better results than the studies that specified a number of re-readings. Kuhn and Stahl's (2000) synthesis did not find a clear positive effect for either procedure.

Text difficulty

There is some variation among findings regarding the difficulty of text used during fluency interventions. Some researchers report that using independent level text, or text that can be read accurately, as the basis for fluency work with struggling readers will have the most positive outcomes (Chard et al., 2002; Meyer & Felton, 1999). Kuhn and Stahl (2000), however, evaluated 11 studies that used materials at or above the child's instructional level and found differences favoring the treatment group. A majority of the subjects in these studies were students reading below grade level. They hypothesize that using more difficult materials in fluency instruction will lead to the greatest gains.

Intensity of intervention

Most of the fluency interventions were not intensive and were intended to be quick and fairly non-disruptive to the classroom procedures already in place. The length of the fluency interventions ranged from approximately 1–15 days (Wolf & Katzir-Cohen, 2001). In addition, the duration of each session ranged from only 10–20 min (Meyer & Felton, 1999). In order to better evaluate intervention effectiveness, studies longer in duration may be necessary.

Effect on comprehension

Scores on brief measures of oral reading fluency are highly predictive of scores on standardized tests of reading comprehension such as the Stanford Achievement Test for students with reading disabilities in middle and junior high school (Fuchs, Fuchs, Hosp, & Jenkins, 2001). It follows that interventions aimed at improving fluency may also improve students' comprehension. Chard et al. (2002) noted that fluency growth was associated with comprehension growth even when the intervention was not directly aimed at improving comprehension. Therefore, an added benefit of an intervention targeting fluency may be improved comprehension.

Fluency and its role at the secondary level

The majority of intervention studies addressing the effectiveness of fluency instruction have been conducted with elementary grade students. For this reason, considerably less is known about these interventions at the secondary level. Although fluency is generally regarded as a critical component of a reading intervention at the elementary level, the importance of fluency actually extends into the upper grades as well (Rasinski et al., 2005). Effective fluency interventions at the secondary level may be necessary for students who are at risk readers, regardless of their age.

The role of fluency becomes especially important for secondary students. Like elementary students who struggle with reading, secondary students who struggle spend a majority of their mental energy slowly trying to decode words. A student's ability to read text with speed and accuracy influences their understanding of text. Therefore, when students do not read with speed and accuracy, their ability to comprehend text is threatened. For secondary students who must keep up with large quantities of text written at challenging levels (Swanson & Hoskyn, 2001), not being able to read fluently makes it difficult to keep up with content and class demands (Woodruff, Schumaker, & Deschler, 2002).

Because there is no existing published synthesis on fluency interventions for students in grades 6–12 (ages 11–21), synthesizing the literature in this area will assist in identifying effective practices for teachers and guidelines for additional research.

Method

For this synthesis, a comprehensive search of the literature was conducted through a three-step process. First, a computer search of ERIC and PsycINFO was conducted to locate studies published between 1980 and 2005. Descriptors or root forms of those descriptors (reading difficult*, learning disab*, LD, mild handi*, mild disab* reading disab*, at-risk, high-risk, reading delay*, learning delay*, struggle reader, dyslex*, read*, fluen*) were used in various combinations to capture the greatest possible number of articles. The initial search yielded 2,608 abstracts. Next, the collection of abstracts was searched for articles that met the synthesis criteria and it was also searched for prior syntheses and reference lists were reviewed in seminal studies to ensure that all studies were identified. Articles were then located and identified that matched the synthesis criteria.

In addition to the computer searches, a hand search of seven major journals was conducted from 2000 through 2005 to ensure that all studies were identified. Journals examined in this hand search included those that are most representative of journals that publish research on secondary students with reading difficulties/ disabilities: *Annals of Dyslexia, Exceptional Children, Journal of Educational Psychology, Journal of Learning Disabilities, Journal of Special Education, Learning Disability Quarterly and Scientific Studies of Reading*.

Studies were selected if they met the following criteria:

1. Participants were struggling readers. For the purpose of this synthesis, struggling readers were defined as low achievers, students with unidentified reading difficulties, dyslexia and/or with reading, learning, or speech language disabilities. Studies also were included if disaggregated data were provided for struggling readers regardless of the characteristics of other students in the study. Only disaggregated data on struggling readers were used in the synthesis.
2. Participating students were in grades 6–12 (ages 11–21). This grade range was selected because it represents the most common grades describing secondary students. When a sample also included older or younger students and it could be determined that the sample mean age was within the targeted range, the study

was accepted. Studies were also included if the study disaggregated data for any student(s) who fell in this grade or age range.

3. Studies were accepted when researchers utilized treatment-comparison, single group, or single subject designs.

4. Interventions consisted of any type of fluency intervention with a comprehension and/or fluency outcome. Fluency and comprehension outcomes were selected because they are the most appropriate outcomes from fluency interventions.

5. The language of instruction was English. English was selected because it is the language of instruction for all but a very few secondary students in the United States and because the orthography of an alphabetic language (from easy to difficult) is associated with variation in fluency and would likely be an uncontrolled variable that would influence outcomes.

Data analysis

Coding procedures

Extensive coding procedures were employed to organize pertinent information from each study. A previously designed code sheet that was developed for previous intervention syntheses was adapted (Kim, Vaughn, Wanzek, & Wei, 2004; Vaughn et al., 2003). The code sheet included elements specified in the What Works Clearinghouse Design and Implementation Assessment Device (Institute of Education Sciences, 2003), a document used to evaluate the quality of studies.

The code sheet was used to record information on variables including participant information (e.g., sex, ethnicity, age), study design, intervention/comparison information, clarity of causal inference, and reported findings. Participant information was coded using three forced-choice items (socioeconomic status, risk type and gender) as well as two open-ended items (age as described in text and risk type as described in text). Similarly, design information was gathered using a combination of forced-choice (e.g., research design, assignment method, fidelity of implementation) and open-ended items (selection criteria). Intervention/comparison information was coded using 10 open items (e.g., site of intervention, role of person implementing intervention, duration of intervention) as well as a written description of the treatment and comparison conditions.

Information on clarity of causal inference was gathered using 11 items for true experimental designs (e.g., sample sizes, attrition, plausibility of intervention contaminants) and 15 items for quasi-experimental designs (e.g., equating procedures). Additional items allowed the coder to describe the measures and indicate measurement contaminants. Finally, the precision of outcome for both effect size estimation and statistical reporting was coded using a series of 10 forced-choice, yes/no questions including information regarding assumptions of independence, normality, and equal variance. In order to calculate effect sizes, information related to outcome measures, direction of effects, and reading outcome data for each intervention or comparison group was recorded.

In addition, information specific to fluency interventions was coded. This included specific information regarding repeated reading interventions such as the type of repeated reading intervention (with or without a model), the type of model when appropriate (adult, peer, computer, or audiotape), the number of repetitions or criteria for repetitions set, and information regarding the difficulty of the text that was used.

Interrater reliability

The lead author and a graduate student participated in training on the use and interpretation of items from the code sheet (8 h). Interrater reliability was established by having both coders independently code an article. Responses from the two coders were used to calculate the percent agreement (i.e., agreements divided by agreements plus disagreements). An interrater reliability of .98 was achieved. After interrater reliability was established and the remaining articles were coded by the author, a meeting was conducted to clarify and reach consensus on remaining questions.

Once the coding had been completed, the studies were summarized in a table format. Table 1 provides a summary of treatment-comparison, single group and single subject studies.

Effect size calculation

Effect sizes were calculated for treatment-comparison studies and single group studies that provided adequate statistical information. For treatment-comparison design studies, the effect size, d, was calculated as the difference between the mean posttest score of the intervention group minus the mean posttest score of the comparison group divided by the pooled standard deviation. For studies in this synthesis which employed a treatment-comparison design, effect sizes can be interpreted as ES = .20 as small, ES = .50 as medium, and ES = .80 as a large effect (Cohen, 1988). For single-group studies, a standardized mean-change measure was used to calculate effect sizes (Becker, 1988). The effects of one single group study which provided enough information was computed using standardized pre-post mean differences and then converted to the d metric. Effects of single subject research were calculated as the percent of non-overlapping data (PND, Scruggs, Mastropieri, & Casto, 1987). Other summary data were provided for studies lacking data necessary to compute effect sizes.

Results

Nineteen studies met the criteria for inclusion in the synthesis. Eleven used a single-subject design, and two studies examined interventions with a single group of students. A treatment and comparison design was used in six studies. Effect size, d, is reported for treatment/comparison studies with the descriptive findings below.

Table 1 Summary of design/intervention, participants, measures, and findings

Design/Intervention	Participants	Measure	Findings/Results
Fluency: treatment/comparison			
Allinder et al. (2001)	7th grade	WJRM-word ID	T1 vs. C; ES = .05
• T1: Students use strategy during read aloud conferences (n = 33).	49 (6 LD; 7 SPL; 1 OHI & SPL; 35 SR)	WJRM-word attack	T1 vs. C; ES = −.03
		WJRM-comprehension	T1 vs. C; ES = −.33
• C: Students do best reading (n = 16)		Slope on maze task	T1 vs. C; ES = .79
Conte and Humphreys (1989)	9–13 yr	Oral reading	T1 vs. C; ES = .23
	26 (SR)	Silent reading: Ekwall reading grade	T1 vs. C; ES = .00
• T1: In repeated reading with audiotape, the teacher and student previewed the text; student listened to a short passage once or twice and then began to track the words in the book as they were read on tape. The student reads the passage along with the tape and then without the tape (n = 13)		Oral reading: Ekwall speed scores	T1 vs. C; ES = .97
		Silent reading: Ekwall speed scores	T1 vs. C; ES = 1.02
		WRMT-word attack	T1 vs. C; ES = −.79
		WRMT-comprehension	T1 vs. C; ES = −.16
• C: Students read from basal readers (n = 13)		Boder test of reading and spelling patterns	T1 vs. C; ES = −.66
Fuchs et al. (1999)	16 yr; 9th grade	CRAB: oral reading fluency	T1 vs. C; ES = .11
• T1: Partner reading, paragraph shrinking, and prediction relay (n = 52)	102 (74 LD; 4 MMR; 22 SR; 2 other)	CRAB: Comprehension	T1 vs. C; ES = .25
• C: No peer pairing (n = 50)			
Homan et al. (1993)	6th	Errors: words read incorrectly	T1 vs. T2; ES = .04
• T1: Pairs with teacher supervision, student reads same passage four times (n = 13)	26 (SR)	Time: minutes for a student to read passage	T1 vs. T2; ES = −.51
• T2: Students used: echo reading, unison reading, cloze reading Students did not repeat passages read (n = 13)		Retellings: unprompted story retellings	T1 vs. T2; ES = −.36

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results
O'Shea et al. (1987)	11.3–13.6 yr	Reading Rate: The number of words read correctly divided by the total reading time	T1A vs. T2A; ES = −.22
• T1: Students were given a cue to read quickly and accurately. Students were exposed to all three levels of the repeated reading condition: one, three, and seven readings (n = 16)	(M = 12.63)	*Note:	T1B vs. T2B; ES = −.02
	5th–8th		T1C vs. T2C; ES = −.04
	29 (LD)	A = 1 reading	T1A vs. T2B; ES = −.77
		B = 3 readings	T1B vs. T2C; ES = −.37
		C = 7 readings	T1A vs. T1B; ES = −.64
• T2: Students were given a cue to read for comprehension. Students were exposed to all three levels of the repeated reading condition: one, three, and seven readings (n = 16)		Comprehension: the percentage of story propositions (POP) retold during the final reading	T1B vs. T1C; ES = −.31
			T1A vs. T1C; ES = −.99
		*Note:	T1A vs. T2B; ES = −1.18
			T1A vs. T2C; ES = −1.87
		A = 1 reading	T1B vs. T2C; ES = −1.00
		B = 3 readings	T2A vs. T2B; ES = −.38
		7 readings	T2B vs. T2C; ES = −.70
			T2A vs. T2C; ES = −1.10
			T1A vs. T2A; ES = −.82
			T1B vs. T2B; ES = −.39
			T1C vs. T2C; ES = −.91
			T1A vs. T2B; ES = −1.12
			T1B vs. T2C; ES = −1.0
			T1A vs. T1B; ES = −.64
			T1B vs. T1C; ES = −.02
			T1A vs. T1C; ES = −.61
			T1A vs. T2B; ES = −.77

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results
Rashotte and Torgeson (1985) • T1: Students orally read one of seven unrelated non-overlapping stories four times a day for 28 total readings • T2: Students again read repetitively except that the seven stories in this condition contained a high degree of shared words. • T3: Students read four different stories each day, none of which were repeated. Over the 7 day period students read 28 unrelated overlapping stories	Mean Age = 10.5 12 (LD)	• Number of words read correctly per minute • Comprehension: RR vs. non-repetitive reading	T1A vs. T2C; ES = −1.15 T1B vs. T2C; ES = −.37 T2A vs. T2B; ES = −.58 T2B vs. T2C; ES = −.42 T2A vs. T2C; ES = −.99 • Greater speed increases for lower abilities and with text with high degree of word overlap • No significant gains • If stories had few shared words, RR is not more effective for improving speed than an equal amount of non-repetitive reading
Fluency: single group Carver and Hoffman (1981) study one • T1: Students completed a maze passage on a computer-based instructional system by choosing one of the word choices that made the passage make the most sense. Each programmed prose passage was read on a PLATO IV computer terminal until mastery was achieved	9th–10th grade 6 (SR)	• Rate of good reading (RGR): measure gives a reading efficiency score which combines accuracy, rate, and grade level of passage *(standardized)* • National reading standards test *(standardized)* • Gates–MacGinitie *(standardized)*	• 15% gain • 3.6 grade equivalent (GE) gain • Little or no gain

*Note: No means or standard deviations reported

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results
Carver and Hoffman (1981) study two	9th–10th grade	• Rate of good reading (RGR): Measure gives a reading efficiency score which combines accuracy, rate, and grade level of difficulty of the passage.	• 17% gain
• T1: Students completed a maze passage on a computer based instructional system by choosing one of the word choices that made the passage make the most sense. Each programmed prose passage was read on a PLATO IV computer terminal until mastery was achieved	Study 2: 6 (SR)	• National reading standards test (NRS)	• 3.4 grade equivalent (GE) gain
		• Gates–MacGinitie reading test	• Little or no gain
Mercer et al. (2000)	6th–8th	CBM of oral reading fluency	T1: Significant growth
• T1 (19–25 months of instruction) instruction in phonics, sight phrases and oral reading	49 (LD)		T2: No significant effects shown
• T2 (10–18 months of instruction)			T3: Small effects
• T3 (6–9 months of instruction)			
Fluency: single subject			
Daly and Martens (1994)	11.11 yr	• Words read correctly per minute: Passage	PND (%)
• T1: Student read a passage with feedback	2 (LD)	• Words read correctly per minute: Word list	
• T2: Student read along with an audiotaped word list			T1 T2 T3
			S3 14 0 71
			S4 43 14 100
• T3: Student listened to an audiotaped passage while following along silently			S3 0 0 14
			S4 43 14 58

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results	
Freeland et al. ([2000](#))	7th–8th, 11th	• Total # of comprehension ques. answered correctly	PND (%)	
• T: Students read passage aloud twice while the instructor followed along and corrected any errors made by the student	12, 13, 16 yr 3 (LD)		S1	57
			S2	14
			S3	100
• C1: Students read passage silently twice		• Factual # of comp. ques. answered correctly	S1	57
			S2	57
(PND calculated as the percent of non-overlapping data between the control and experimental condition for each student)			S3	71
		• Inferential # of comp. ques. answered correctly	S1	14
			S2	14
			S3	0
		• Total rate of comp. (silent reading)	S1	14
			S2	14
			S3	57
		• Factual rate of comp. (silent reading)	S1	71
			S2	86
			S3	100
		• Inferential rate of comp. (silent reading)	S1	0
			S2	0
			S3	14

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results		
Rose and Beattie (1986)	11–6 yr	• Words read correctly per minute	PND (%)		
	1 (LD)			T1	T2
• T1: The teacher read the passage slowly at a conversational rate while the student followed along		• Errors per minute	S2	100	100
• T2: Same as listening condition except the teachers had prerecorded the passage			S2	0	0
Rose and Sherry (1984)	8th and 9th;	• Words read correctly per minute	PND (%)		
	14–10 to 16–2 yr			T1	T2
• T1: The student read a passage silently, informed the teacher when he was finished, and read the passage aloud to the teacher.	5 (LD)		S1	75	100
			S2	58	100
• T2: The teacher read the assigned passage to the student who followed along. The student then read the passage aloud to the teacher			S3	42	100
			S4	0	0
			S5	60	77
Scott and Shearer-Lingo (2002)	7th grade	• Words read per minute	PND (%)		
	3 (SR/BD)			T1	T2
• T1: A phonics based program where the teacher models letter sound correspondences, leading student through practice with the sounds, and then testing the students			S1	100	100
			S2	100	95
• T2: Involves daily 1-min timings of each of three segments; phonics sounds, sight phrases, and a brief story			S3	0	100

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results		
Shapiro and McCurdy (1989): • T1: Each student initially read a vocabulary list aloud along with an audiotape recording. After the initial reading, students read the list again. Oral rates were obtained during the second reading. The lists were rotated so a student read the same list every 7 days and feedback was not provided. The student then read the passage and then removed the passage and answered five comprehension questions	9th and 10th grade; 14–16 yr 5 (SR/BD)	• Oral reading rates-word lists: number of correct and incorrect words read per minute. • Oral reading rates-passages: the number of words read correct and incorrect per minute • Comprehension: percent of correct comprehension questions answered correctly • Target words read in context: percentage of each target word read correctly in each passage	PND (%)		
				T1 correct	T1 in-correct
			S1	85	0
			S2	65	6
			S3	62	46
			S4	78	0
			S5	0	0
			PND (%)		
				T1 correct	T1 incorrect
			S1	50	10
			S2	0	0
			S3	38	0
			S4	67	0
			S5	55	0
			Data not shown reported: little change in responding except S2		
			Mean gain		
			S1	2.9	
			S2	13	
			S3	1.2	
			S4	4.3	
			S5	3.6	

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results		
Skinner et al. (1997)	12 yr 5th–6th grade 2(1 LD; 1 LD/BD)		PND (%)		
				C1	T1	T2
• C1: The student read a passage silently		• Words correct per minute				
• T1: The student read silently as the experimenter read aloud the passages at a reduced rate of about 50 wcpm		• Mean words correct per minute • Mean errors per minute	S1	0	100	63
			S2	0	14	0
• T2: The student read silently as the experimenter read aloud at his natural rate			S1	29	65	31
			S2	26	42	31
(PND calculated as the percent of non-overlapping data between the control and experimental condition for each student)			S1	5.6	4.4	5.0
			S2	6.3	4.8	5.3
Skinner and Shapiro (1989)	14–18 yr 4 (SR/BD)	• Words read correctly per minute	PND (%)		
		*Note: true PND for S3 and S4 only because baseline is simultaneous for S1 and S2		T1	T2
• T1: The students were given a vocabulary worksheet from a randomly assigned set of words and read the words once with an audiotape. Then they were assessed on the same words			S1	58	83
		• Mean number of words correct	S2	50	67
			S3	58	42
		• Mean number of words incorrect	S4	75	83
• T2: The students were given a vocabulary worksheet from a set of words assigned to that condition and were instructed to read all the words aloud. They were then assessed on the same words			S1	88	95
			S2	58	59
			S3	69	59
			S4	101	98
			S1	2.8	2.3
			S2	2.5	1.5
			S3	4.6	11.8
			S4	2.8	3.1

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results		
Steventon and Frederick (2003)	15 (high school)	• Words read correctly per minute: practiced and unpracticed passages	PND (%)		
• T: Repeated reading was added to the program Corrective Reading; during the check out portion of the lesson the teacher instructed the student to read the passage three times and then a fourth for data collection	1 (LA)	• Errors per minute (EWPM): practiced and unpracticed passages	S1 practiced: 54		
			S2 unpracticed: 8		
			Mean decreased error rate = 1.4 errors per minute		
Strong et al. (2004)	12–14 yr	• Words correct per minute: SRA probes, a near-transfer measure (independent level text)	PND (%)		
	7th–8th grade			T1	T2
• T1: A program based on Direct Instruction that teaches decoding strategies through lessons that consist of word attack skills, group reading, and workbook exercises	6 (SR/BD)	• Words correct per minute: Seventh grade probes, a generalization measure (instructional/frustration level text)	S1	29	92
			S2	29	100
		• Mean number of comprehension questions answered: SRA probes	S3	45	83
• T2: T1 plus partner reading that consisted of two repeated choral readings with a RA providing corrective feedback followed by one round of partner reading with the partner providing corrective feedback			S4	36	100
			S5	73	50
			S6	47	75
			S1	0	33
NOTES: Effects did not generalize to a 7th grade passage-average of about 50% less on PND for T2			S2	29	58
			S3	18	67
			S4	0	50
			S5	13	50
			S6	27	50

Table 1 continued

Design/Intervention	Participants	Measure	Findings/Results		
				T1	T2
			S1	100	100
			S2	0	100
			S3	100	100
			S4	100	100
			S5	100	100
			S6	100	
Valleley and Shriver (2003)	15, 16 yr	• 4th grade comp. questions; range of # correct	S1	6–10	
• T: Students engaged in repeated readings in which the student rereads the same passage until he/she exhibits three consecutive fluency improvements.	9th–10th 3 (LD)	• 5th grade comp. questions; range of # correct	S2	4–10	
		• Words correct per minute (compared to 4th grade baseline)	S3	6–10	
			S1	10–10	
		• Words correct per minute (compared to 5th grade baseline)	S2	5–10	
			S3	9–10	
			S1	12	
			S2	24	
			S3	17	
			S1	100	
			S2	100	
			S3	100	

Note. T = Treatment; C = Comparison; WRMT = Woodcock Reading Mastery Test; CRAB = Comprehensive Reading Assessment Battery; CBM = Curriculum-Based Measures; ES = effect size; PND = Percent of Non-overlapping Data; wcpm = Words Correct Per Minute; RR = Repetitive Reading; GE = Grade Equivalent; RA = Research Assistant; S = Student; LD = Learning Disability; SR = Struggling Reader; BD = Behavior Disorder; LA = Low achiever; OHI = Other Health Impairment; SPL = Speech/Language Impairment; MMR = Mild Mental Retardation; NR = Not reported; M = Mean; yr = year

Quality of studies

In 2002, the What Works Clearinghouse (WWC) was created by the U.S. Department of Education's Institute of Education Sciences (IES) to provide the public with a source of information on what works in education. To differentiate high-quality scientifically based research from weaker research, the WWC identified several features of research designs that improve confidence in their findings. These features include: (a) the use of random assignment, (b) evidence of the use of a fidelity of treatment check, and (c) the use of standardized measurement.

According to the IES, one of the most crucial elements of scientifically based research is random assignment and therefore, the WWC rates highly those studies that make claims of causal relationships when the study employs random assignment in their design. Four of the nineteen studies in this synthesis used random assignment of students to treatment and comparison groups (Allinder, Dunse, Brunken, & Obermiller-Krolikowski, 2001; Conte & Humphreys, 1989; Homan, Klesius, & Hite, 1993; O'Shea, Sindelar, & O'Shea, 1987).

Another crucial element of scientifically based research is evidence of the use of a fidelity of treatment check. Also known as treatment integrity, fidelity of treatment describes the intervention in sufficient detail that allows for replication and provides evidence that the findings are related to the intervention as specified. Descriptions of how fidelity of treatment is assessed improve our confidence that the intervention was implemented with "accuracy and consistency" (Gresham, MacMillan, Beebe-Frankenberger, & Bocian, 2000, p. 198). Fourteen studies in the synthesis, despite differences in research design, included evidence of fidelity of treatment (Allinder et al., 2001; Conte & Humprheys, 1989; Daly & Martens, 1994; Freeland, Skinner, Jackson, McDaniel, & Smith, 2000; Fuchs, Fuchs, & Kazdan, 1999; Rose & Beattie, 1986; Rose & Sherry, 1984; Scott & Shearer-Lingo, 2002; Shapiro & McCurdy, 1989; Skinner, Cooper, & Cole, 1997; Skinner & Shapiro, 1989; Steventon & Frederick, 2003; Strong, Wehby, Falk, & Lane, 2004; Valleley & Shriver, 2003).

The WWC also evaluates the reliability of outcome measures used in intervention studies. Confidence in intervention results can be improved with the use of reliable and standardized measures. It is likely that when measures developed by researchers are used, effect sizes may be inflated (Swanson & Hoskyn, 1998), thereby compromising our confidence in the results because of a bias in the effects of intervention. Only four studies from this synthesis used standardized measures (Allinder et al., 2001; Carver & Hoffman, 1981; Conte & Humphreys, 1989. Fuchs et al., 1999). Only two studies included in this synthesis incorporated all three of the best evidence criteria (Allinder et al., 2001; Conte & Humphreys, 1989).

Study findings

Effects by type of study design

The three types of study designs represented in this synthesis of studies include: (a) treatment/comparison, (b) single group, and (c) single subject. Treatment/

comparison study designs that use random assignment provide the most generalizable, causal results, although information from all the studies can help guide future research and inform the field.

Treatment comparison: Out of 19 total studies in this synthesis, 6 represented a treatment comparison design (Allinder et al., 2001; Conte & Humphreys, 1989; Fuchs et al., 1999; Homan et al., 1993; O'Shea et al., 1987; Rashotte & Torgeson, 1985). Four of the studies included random assignment of students to treatments or comparison groups (Allinder et al., 2001; Conte & Humphreys, 1989; Homan et al., 1993; O'Shea et al., 1987). All of the authors provided enough information to calculate effect sizes except for Rashotte and Torgeson (1985) whose results are reported descriptively. Effect sizes for fluency and comprehension outcomes in studies using random assignment of students ranged from small to large (ES range = .23 to 1.02). The largest effects were reported for a study implementing a repeated reading intervention that incorporated an audiotaped previewing condition of a story (Conte & Humphreys, 1989) and then measured students' oral (ES = .97) and silent (ES = 1.02) reading speed scores. Another large effect was reported by Allinder et al. (2001) on the slope measure on a maze task (ES = .79) for students receiving a specific fluency strategy cue when reading. Although this is a relatively large effect, it is important to note that a slope measure can be deceiving as it does not account for the students' initial reading level. Effects sizes from standardized tests were very small. Conte and Humphreys (1989) reported a small effect on the Ekwall Reading Grade (Oral Reading) for students reading repeatedly with audiotaped material (ES = .23). Another small effect was reported by Fuchs et al. (1999) for students participating in partner reading, paragraph shrinking, and prediction relay. Paragraph shrinking, similar to paragraph summarization, requires students to identify the main idea of several paragraphs to formulate a summary. Prediction relay is an extension of paragraph shrinking to larger amounts of text and requires students to formulate predictions and then confirm or disconfirm after reading. This small effect was found on the Comprehensive Reading Assessment Battery (Comprehension Questions) (ES = .25).

An additional group design did not provide enough information to compute effect sizes and therefore, descriptive findings are presented (Rashotte & Torgeson, 1985). In this study, students participated in three conditions. The first two conditions represented repeated reading conditions. In the first condition, students read orally one of seven unrelated, non-overlapping stories four times a day for 7 days. Condition two was the same as condition one except that the stories shared a high degree of shared words. The final condition was a non-repetitive condition in which students read four different stories each day. Findings indicated that both interventions with repeated reading performed better than sustained reading on reading rate. Neither of the repeated reading conditions, however, performed significantly better than the sustained reading condition on reading accuracy, suggesting that perhaps students in the sustained reading condition were able to make gains in word recognition that were generalizable. Repeated reading tended to have little effect on word analysis skills. There were no significant differences among the reading conditions on measures of comprehension; however, students in this study showed a relatively high level of understanding on pretest stories, leaving little room for improvement.

Single group: Two studies provided treatment conditions without comparison groups. One study which was replicated once is reported descriptively (Carver & Hoffman, 1981). In this study, the authors used a computer based repeated reading intervention. Results were determined by a Rate of Good Reading (RGR) score which combines the accuracy, rate, and grade level difficulty of a passage. Students in study one and two (the replication study) showed a gain of between 15% and 17%. Additionally, students showed an overall grade equivalent gain of 3.6 in study one while the gain for study two students was 3.4 grade equivalents on the National Reading Standards Test (NRS). While this gain may seem impressive at first glance, it is important to note that the NRS test is a paper and pencil version of the same task presented on the computer in which case the gains might be explained by a familiarity of the task. On another standardized test, the Gates–MacGinitie Reading Test, both groups of students showed little or no gain with scores clustered around the means for grades four and five.

In the second single group study, conducted by Mercer, Cambell, Miller, Mercer, and Lane (2000), students were instructed in the Great Leaps Reading Program which consisted of having students repeat reading of phonics elements, sight word phrases and oral reading of connected text with graphing of oral reading fluency. Three groups of students participated in the intervention according to three varying periods of instruction (19–25, 10–18, and 6–9 months). Although results indicated significant growth for the group who participated in 19–25 months of instruction, relatively no significant effects for students in 10–18 months of instruction, and small effects for students participating in 6–9 months of instruction, because there is no comparison group, it is difficult to discern whether gains are a function of typical growth or growth related to treatment.

Single subject: The majority of studies providing fluency interventions for secondary struggling readers used a single-subject design. Three studies implemented multiple element designs (Daly & Martens, 1994; Freeland et al., 2000; Skinner et al., 1997). Three studies implemented an alternating treatment design (Rose & Beattie, 1986; Rose & Sherry, 1984; Skinner & Shapiro, 1989) and 5 studies implemented a multiple baseline design (Scott & Shearer-Lingo, 2002; Shapiro & McCurdy, 1989; Steventon & Frederick, 2003; Strong et al., 2004; Valleley & Shriver, 2003). As noted above, while results from single-subject studies are not meant to be generalizable to a large population, they can still provide information that is valuable to guiding future research and, when replicated, can have many of the same interpretations as random assignment studies.

Overall, the corpus of studies show positive effects for interventions that employed repeated reading with a previewing condition in which students preview text in a variety of ways. Most notable are listening passage previewing interventions in which students preview a passage prior to reading it while following along silently with an audiotape or adult model of good reading. Results were not as positive for interventions that incorporated repeated reading without a model. While one would expect reading rates to improve for students participating in a repeated reading intervention, results showed that in several studies students made minimal improvements in reading rate and/or comprehension and the improvements that were made did not generalize to unpracticed passages.

Effects by elements that influence performance in repeated reading on fluency and comprehension

Repeated reading with a model: Twelve studies examined the effects of repeated reading with some type of model or previewing procedure (Conte & Humphreys, 1989; Daly & Martens, 1994; Freeland et al., 2000; Fuchs et al., 1999; Mercer et al., 2000; Rose & Beattie, 1986; Rose & Sherry, 1984; Scott & Shearer-Lingo, 2002; Shapiro & McCurdy, 1989; Skinner et al., 1997; Skinner & Shapiro, 1989; Strong et al., 2004). Findings are summarized by type of model (e.g., audiotape).

Audiotape model. Five studies utilized an audiotaped model of good reading for students before reading isolated words or passages (Conte & Humphreys, 1989; Daly & Martens, 1994; Rose & Beattie, 1986; Shapiro & McCurdy, 1989; Skinner & Shapiro, 1989). Results were mixed with slight improvements in reading rate, but not necessarily in other reading tasks such as word recognition and comprehension. One study showed that students who previewed words or passages by listening to a tape of good reading prior to rereading improved their reading rate on passages or word lists (Daly & Martens, 1994). Other positive results were reported by Rose and Beattie (1986) who found that by using a pre-recorded audiotape of a teacher modeling good reading, students were able to improve their reading rate. This study also included a condition that used the (live) teacher as a model of good reading, however, results showed there were no differences between conditions. Interestingly, across all these studies, although some of the students who used an audiotaped model of good reading improved their reading rate on future readings, they did not necessarily improve their word attack or comprehension ability (Conte & Humphreys, 1989). Students showed minimal generalization from listening to an audiotaped word list when compared to reading the word lists in passages (Shapiro & McCurdy, 1989; Skinner & Shapiro, 1989). This suggests that the effects of having an audiotaped model of good reading may improve reading rate on practiced passages or word lists, but this improvement may not generalize to unpracticed passages or to a broader range of reading tasks such as word recognition or comprehension.

Modeling by an adult or more proficient peer. Seven studies utilized an adult or peer as a model of good reading before or during reading while students engaged in repeated reading of isolated phonics elements, words, and/or passages (Freeland et al., 2000; Fuchs et al., 1999; Mercer et al., 2000; Rose & Sherry, 1984; Scott & Shearer-Lingo, 2002; Skinner et al., 1997; Strong et al., 2004). The adult model of good reading used in these studies was the experimenter, the students' teacher or some other instructor. Studies conducted by Freeland et al. (2000), Mercer et al. (2000), Scott and Shearer-Lingo (2002) and Strong et al. (2004) used an adult reader to provide corrective feedback during or prior to reading. The study by Fuchs et al. (1999) used a peer to provide corrective feedback if a student was stuck on a word during reading.

Overall, the studies showed inconsistent improvement in reading rate and comprehension. For example, students in the Strong et al. (2004) study improved their reading rate on both independent and instructional level text although there

were minimal improvements shown in comprehension questions answered. The study by Fuchs et al. (1999) resulted in small gains in comprehension (ES = .25), but in contrast to the elementary Peer-Assisted Learning Strategies (PALS) procedure (Fuchs, Fuchs, Mathes, & Simmons, 1997) no gains in reading rate were found. The comprehension gains may be attributable to the other components of the PALS procedure which were used, including a prediction and summarization component, both of which are comprehension strategies. Additionally, the lack of gains in reading rate may be due to the relatively small emphasis on repeating reading in this intervention.

Studies by Skinner et al. (1997), Rose and Beattie (1986) and Rose and Sherry (1984) all showed fairly consistent improvements in reading rates when using an adult as a model of good reading. Studies by Skinner et al. (1997) and Rose and Sherry (1984) both showed consistent improvements from using an adult model of good reading compared to silent previewing. Furthermore, Skinner et al. (1997) found better results when the adult model of good reading read at a slow rate of approximately 50 words per minute while the student follows along.

Overall, having students preview text with some type of model of good reading or having an adult provide a model of good reading through corrective feedback seems to have positive effects on reading rate, although these improvements may not necessarily generalize to word reading accuracy or comprehension.

Repeated reading without a model: Six studies examined the effects of repeated reading without a model or previewing procedure (Carver & Hoffman, 1981; Homan et al., 1993; O'Shea et al., 1987; Rashotte & Torgeson, 1985; Steventon & Frederick, 2003; Valleley & Shriver, 2003). These studies addressed the question of whether repeatedly reading text would increase reading rate and/or have an influence on comprehension. Each student read text independently a minimum of one time and a maximum of ten times and/or until a certain criterion was met such as three consecutive fluency improvements.

Similar to the results noted above for repeated reading studies using a model, several repeated reading studies without a model also resulted in slight increases in reading rate (Steventon & Frederick, 2003; Valleley & Shriver, 2003) or overall reading ability according to a Rate of Good Reading (RGR) score (Carver & Hoffman, 1981). In the study by Steventon and Frederick (2003) students participated in a repeated reading condition added to the Corrective Reading Decoding Strategies program (Engelmann et al., 1998). The one subject who fit the synthesis criteria showed slight improvement in reading rate in practiced passages, but improvements did not generalize, as no improvements were demonstrated in unpracticed passages. In the study by Valleley and Shriver (2003), students read a passage until they demonstrated three consecutive fluency improvements. Results were mixed with inconsistent improvements in oral reading fluency over baseline.

O'Shea et al. (1987) studied the effects of having students read text one, three, and seven times with a cue to read for fluency or comprehension. Results showed the cue had little effect on reading rate. Rather, the number of times a text was read repeatedly had the most influence. When comparing the effects of using a fluency versus a comprehension cue, prompting a student to read for comprehension had the most consistent positive effect.

Repeated reading without a model compared to non-repetitive reading. The final two studies that included a repeated reading component without the use of a model were conducted by Homan et al. (1993) and Rashotte and Torgeson (1985). Results were mixed on improvements in reading rate. Homan et al. (1993) had students reread text four times with peer and teacher supervision, but with no feedback. Reading text repeatedly did not improve rate (ES = −.51) or comprehension (ES = −.36) as much as an assisted non-repetitive reading condition. Relatedly, Rashotte and Torgeson (1985) found that repeated reading of unrelated non-overlapping stories and stories with a high degree of word overlap four times slightly improved reading rate compared to a condition of the same amount of non-repetitive reading. While reading rate improved, word reading accuracy and comprehension did not improve as a result of the repeated reading condition. These results indicate that repetitive reading may have a similar, if not equal influence on fluency and comprehension as the same amount of continuous, non-repetitive reading. Furthermore, word reading accuracy may improve more with non-repetitive reading.

Elements that influence fluency performance in repeated reading interventions: Several other elements may affect fluency and comprehension in repeated reading interventions.

Number of repetitions versus reaching a specified criterion: Repeated reading interventions differ in several ways. One difference is that some studies require a student to reread a text a specified number of times, while others require students to reach a specified criterion.

To determine the number of times students should read text repeatedly, the findings from O'Shea et al. (1987) provide pertinent information. While seven reads was significantly more effective than one read there were bigger effects for three reads compared with one read than for three reads compared with seven reads. It is also important to note that there were bigger gains between one and three rereads than between three and seven rereads, indicating that perhaps three rereads would serve almost as good as seven, saving more time for instruction. On a measure of story retell, both repeated reading conditions resulted in higher scores than the single reading condition.

Another way to conduct a repeated reading intervention is to specify criteria that students must reach before they are allowed to proceed to the next passage or move up in text difficulty. For example, a researcher might require a student to reach 150 words per minute on a passage before moving to the next level. While none of the studies compared setting different criteria in one single study, we can learn from the results of the studies that set various criteria. Valleley and Shriver (2003) had students engage in repeated readings in which the students reread the same passage until they demonstrated three consecutive fluency improvements or ten consecutive readings. Thus, the students read a passage a minimum of four times. Fluency improvements were defined as one more word per minute correct. Although results were fairly inconsistent, students made some gains in oral reading fluency with just 10 h of repeated reading. In another study, Conte and Humphreys (1989) studied the effects of repeated reading with audiotaped material compared to students who received an alternative reading program. Their criteria specified that students had to

read a passage without assistance of an audiotape and without hesitation (no pauses of 5 s or more), at the same speed as the tape, and no oral reading errors that distorted the meaning of the text. Students participating in the repeated reading condition showed significant effects of treatment on oral reading speed scores (ES = .97) and silent reading speed scores (ES = 1.02).

Text difficulty: To better understand the influence of text difficulty in repeated reading interventions, two studies were reviewed. High school students in the study conducted by Valleley and Shriver (2003) repeatedly read passages at the fourth and fifth grade level despite the fact that they did not meet their instructional level on baseline at either of these grade levels. Students also read cloze passages at the ninth grade level. Interestingly, after an additional 10 h of repeated reading practice, students improved their oral reading at the fifth grade level more than the fourth grade level when compared to respective baselines. Also, students made gains in words correct per minute on ninth grade cloze passages. These findings suggest that repeated reading may increase secondary students' oral reading fluency on passages above the students' instructional level and repeatedly reading text with shared words may increase fluency from one passage to the next. The repeated reading did not have an effect on students' comprehension.

In a related study, Rashotte and Torgeson (1985) also demonstrated increases in fluency when students were assessed after repeatedly reading seven stories that shared a high degree of word overlap. Although, using text with a high degree of shared words in a repeated reading intervention may increase students' reading rate, having text with a high degree of shared words did not improve comprehension or word recognition ability.

Effects by exceptionality

Criteria for inclusion in the synthesis specified that the subjects were struggling readers. Students, therefore, represented a range of exceptionalities including students identified as struggling readers or low achievers only, students with learning disabilities (LD), students with behavior disorders (BD), or some combination representing several categories. For the purpose of this synthesis, effects for students will be categorized into those studies primarily involving struggling readers, students with learning disabilities, and students with behavior disorders.

Five studies ($N = 100$) included subjects who were primarily identified as struggling readers only (Allinder et al., 2001; Carver & Hoffman, 1981; Conte & Humphreys, 1989; Homan et al., 1993; Steventon & Frederick, 2003). Ten studies ($N = 179$) included subjects primarily identified as students with LD (Daly & Martens, 1994; Freeland et al., 2000; Fuchs et al., 1999; Mercer et al., 2000; O'Shea et al., 1987; Rashotte & Torgeson; 1985; Rose & Beattie, 1986; Rose & Sherry, 1984; Skinner et al., 1997; Valleley & Shriver, 2003). Five studies ($N = 19$) included subjects with BD (Scott & Shearer-Lingo, 2002; Shapiro & McCurdy, 1989; Skinner et al., 1997; Skinner & Shapiro, 1989; Strong et al., 2004).

Outcomes of fluency interventions for secondary students did not seem to vary according to exceptionality. For example, conducting a repeated reading

intervention with struggling readers (Conte & Humphreys, 1989; Homan et al., 1993), students with LD (O'Shea et al., 1987; Rashotte & Toregson, 1985), and students with BD (Strong et al., 2004) all had similar effects in that repeated reading generally increased reading rate, but this did not necessarily generalize to unpracticed passages or comprehension skills.

Discussion

The ultimate goal of reading is to comprehend text (NRP, 2000). Secondary students are faced with reading and understanding complex content at a rapid pace, creating great challenges for struggling readers. One component of reading that can help students understand the text they read is fluency (Chall, 1983). When students are able to read text with speed and accuracy, they do not have to struggle at the word recognition level, making it more likely that they will be able to comprehend text.

Being able to read text fluently, however, is not necessarily sufficient for secondary students to be able to comprehend the complex text they encounter. The trend from the fluency studies in this synthesis show that improved reading rate does not always result in improved comprehension (e.g., Rashotte & Torgeson, 1985).

One popular, commonly accepted way to increase fluency, repeated reading, seems to improve rate on practiced passages, passages that share a high degree of word overlap, or intervention related tasks, but gains in fluency from a repeated reading intervention do not necessarily generalize to other reading tasks such as passage comprehension and word attack skills (e.g., Conte & Humphreys, 1989). Although improving rate on practiced passages is encouraging, because secondary students have so much complex text they need to read, it is important that gains from time spent on a fluency intervention are transferrable and generalizable to unpracticed passages and have a positive effect for comprehension and word reading accuracy.

Results from Rashotte and Torgeson (1985) and Homan et al. (1993) demonstrate that reading text repeatedly may improve reading rate, but participants did not demonstrate as many gains in comprehension and word reading accuracy as those who read an equal amount of text non-repetitively. There is some speculation that the gains are due to an increase in opportunities to respond and practice (Skinner & Shapiro, 1989) or simply because students are able to make gains by spending more time reading. Additionally, when students have an opportunity to read a variety of text, they are exposed to different text structures and more vocabulary. Therefore, reading an equal amount of text without rereading as one would in a repeated reading intervention may be beneficial to increase rate as well as word accuracy and comprehension, the ultimate goal of reading. There may be no differential effects between a repeated reading intervention and a non-repetitive wide reading intervention.

These results are supported by other research on the relationship between fluency and comprehension. Few fluency interventions result in the development of better overall comprehension (Kuhn & Stahl, 2003). In addition, the correlation between oral reading fluency and comprehension seems to decrease as students get older and

text gets more complicated (Paris, Carpenter, Paris, & Hamilton, 2005). Other factors such as background knowledge or working memory may play a larger role in comprehending text as one gets older. While fluency instruction may improve reading rate, in order to become proficient at comprehending text, fluency instruction alone may not be sufficient.

A majority of the fluency interventions in this synthesis included a repeated reading component. Findings indicate that repeated reading interventions that incorporate the opportunity for students to preview the text with a model of good reading (e.g., an adult reader or audiotape reading of the text) or someone to provide corrective feedback, make more gains in rate then students who do not preview the text or preview the text silently or on their own (e.g. Skinner et al., 1997).

None of the studies included in this synthesis directly compared using a set number of times to read repeatedly with a set criterion of words per minute or percentage per minute; however, when comparing separate studies some conclusions can be drawn. It was not clear whether setting a specified number of times to read repeatedly or reaching a certain criterion was more beneficial; however, re-reading text three or four times may have as much benefit as re-reading seven times and much more benefit than reading the text only once to increase rate on practiced passages (O'Shea et al., 1987).

When examining separate studies including participants with a variety of exceptionality types, it is possible to conclude that the above effects were demonstrated regardless of students' exceptionality type. This suggests that all secondary struggling readers may be able to increase reading rate through repeated reading interventions and that struggling readers with a specified disability showed no overall difference in outcomes compared to struggling readers who did not carry a disability label.

Implications for educators

It is possible to draw particular instructional implications from the outcomes of this synthesis. One of the most common findings was that repeated reading interventions for secondary struggling readers improved reading rate, but had no direct effect on comprehension ability. For greater benefits, practitioners may want to couple repeated reading practice with some research-based comprehension strategy instruction to improve not only reading rate, but also comprehension. More research on the best combination of these components is warranted.

In addition, interventions that employed a component in which students read an equal amount of text non-repetitively compared to a repeated reading component showed promise in terms of effecting word accuracy and comprehension and did not differ widely on improvements in reading rate. Notably, repeated reading interventions for older readers may have some other drawbacks as well. Specifically, reading the same text repeatedly limits one's exposure to a variety of text structure, vocabulary, and subject matter. Therefore, spending time reading the same text repeatedly may not only sacrifice student exposure to text structure, vocabulary, and different subject matter, but these interventions may also have an

element of boredom to them. Because motivation at the secondary level for struggling readers is a necessary consideration, practitioners may want to consider how to provide reading opportunities within appropriate text to reduce boredom and increase interest. While fluency practice remains an important part of becoming a more proficient reader, practitioners may want to consider having students practice reading the same amount of text non-repetitively as they would in a repeated reading intervention (i.e., reading four different passages rather than one passage four times).

Limitations and directions for future research

Only 6 of the 19 studies in this synthesis employed a treatment/comparison research design with 4 of those studies applying random assignment, 3 used a fidelity of treatment check and 3 used standardized measures. Therefore, the research designs used by these studies limit the conclusions that can be drawn. Additional high-quality research is recommended to provide more convincing evidence regarding fluency interventions at the secondary level. The number of single group and single subject studies provide ample information to formulate testable hypotheses for rigorous treatment-comparison studies.

Subjects were struggling readers who were defined as low achievers, students with unidentified reading difficulties, dyslexia and/or with reading, learning, or speech language disabilities. A limitation of this synthesis is that although it included studies with a range of different types of struggling readers, none of the studies indicated whether English Language Learners (ELL) were included. Future research with this population is needed.

Although some secondary students read far below their grade level, they are still faced with keeping up with complex text. Often, this involves making a shift from reading primarily narrative text to reading more expository text. A majority of the studies, however, used only narrative text in their intervention (Allinder et al., 2001; Conte & Humphreys, 1989; Freeland et al., 2000; Homan et al., 1993; Mercer et al., 2000; Rashotte & Torgeson, 1985; Rose & Beattie, 1986; Rose & Sherry, 1984; Scott & Shearer-Lingo, 2002; Steventon & Frederick, 2003; Strong et al., 2004), making it difficult to generalize findings to expository text which secondary students encounter on a more regular basis in school. One study indicated that it used narrative and expository text (Daly & Martens, 1994) and one study used only word lists (Skinner & Shapiro, 1989). Only two studies used solely expository text for their fluency interventions: Shapiro and McCurdy (1989) used words and passages from a driver education manual and Valleley and Shriver (2003) used non fiction passages for their repeated reading intervention and used particpants' social studies or English textbooks to assess generalization. Several of the studies did not clearly indicate the type of text used in the fluency interventions (Carver & Hoffman, 1981; Fuchs et al., 1999; O'Shea et al., 1987; Skinner et al., 1997), which makes it difficult to replicate the studies and to determine the source of the effects. More research evaluating the relative influence of text types in fluency interventions is warranted.

Another limitation from these studies is that they were all relatively short in duration with the greatest number of sessions being 40 (Fuchs et al., 1999). Studies typically lasted only a few times a week and were an average of 5–20 min per session. Some of the highest effects came from studies with at least 20 sessions and an average of about 15 min (Conte & Humphreys, 1989; Fuchs et al., 1999; Rashotte & Torgeson, 1985). Results of increasing students' reading fluency in the study by Fuchs et al. (1999) was low; however, the amount of time devoted to fluency practice in this study was only about 10 min per session It is possible that this population may need more intensive interventions (e.g., longer duration) to increase fluency and comprehension gains.

This synthesis sought to provide a comprehensive examination of the effects of fluency interventions on the fluency and comprehension outcomes for secondary struggling readers. Although positive effects resulted from a variety of fluency interventions such as increasing reading rate, more research is warranted to determine the most effective way of increasing the fluency and ultimately, reading comprehension of secondary struggling readers.

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