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Reviewing Evidence on the Relations Between Oral Reading Fluency and Reading Comprehension for Adolescents

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Abstract

In this article, I systematically review evidence on the relations between oral reading fluency (ORF) and reading comprehension (RC) for adolescents with limited reading proficiency (ALRP) in Grades 6 to12. I organized findings from 23 studies into five themes: (a) unclear role of ORF in the simple view of reading model for ALRP, (b) ALRP have distinct reader profiles, (c) ORF consists of more than automaticity, (d) the role of ORF varies, and (e) oral reading automaticity has tenuous predictive value for ALRP. Results suggest that knowledge of an adolescent's ORF, as commonly defined and assessed, provides helpful information about an adolescent's reader profile but is not sufficient to evaluate instructional needs or measure progress. I conclude the article with a discussion on implications for researchers, assessment developers, practitioners, and school administrators.

Keywords

fluency, reading comprehension, struggling readers, adolescent literacy, oral reading, prosody

Reading fluency is the execution of multiple cognitive and language processes (Berninger et al., 2001). In research and practice, oral reading fluency (ORF) is commonly defined and measured as words read correctly per minute (WCPM), thereby assessing accuracy and rate concurrently and excluding the role of prosody (Kuhn & Schwanenflugel, 2019). In reviews on curriculum-based measures for reading (CBM-R, a measure of oral reading accuracy and rate intended to represent grade-level curricular expectations) for elementary through middle school readers, CBM-R correlates with reading comprehension (RC) and is an efficient method for progress monitoring and screening (Fuchs et al., 2001; Reschly et al., 2009; Wayman et al., 2007). In effect, ORF has become a proxy for reading proficiency and is used to predict performance on high-stakes reading tests (Baker et al., 2015; Shinn et al., 2002). For elementary readers, measures of ORF are often used to determine whether students are making adequate progress in reading; however, ORF may not be as appropriate for measuring adolescents' response to instruction and intervention. Grounded in the simple view of reading (SVR; Hoover & Gough, 1990), one difference between elementary and adolescent reading is the increased instructional emphasis on language comprehension as opposed to word identification. In this literature review, I address the extent to which ORF serves as a predictor of RC for adolescents with limited reading proficiency (ALRP) and the extent to which it is appropriate to rely on ORF scores to determine adolescent readers' needs and their comprehension abilities.

Factors Influencing Adolescent Readers

Acknowledging that any label representing a group is imperfect and may hold unintended connotations, I use the phrase *adolescents with limited reading proficiency* in this review to refer to students in middle and high school whose comprehension of grade-level text is insufficient. The ALRP may be students who score below the 40th percentile on standardized and norm-referenced RC exams and may have identified learning disabilities affecting their reading. Although some researchers consider fourth grade to be the onset of adolescence, more often, as I do in this review, researchers define adolescence as including students in Grades 6 to 12 to align with common organizational practices in U.S. middle and high schools (Reynolds, 2021). Certain factors related to the unique curricular demands of middle and high schools and developmental needs of adolescents may require distinct methods for measuring literacy.

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First, adolescent literacy focuses on listening, speaking, reading, writing, thinking, and reasoning skills and strategies to learn in each content area (Ehren, 2005). In middle school and high school, literacy demands become more challenging as content instruction typically involves texts with greater complexity (e.g., length, structures, reading level, vocabulary, data, including figures and tables). Specifically, many general reading skills (e.g., reading fluently, paraphrasing main ideas) are applicable in all content areas, and certain reading skills are effective for specific situations and specialized per discipline (Shanahan & Shanahan, 2008). When reading complex texts, the use of higher-order thinking may require slower reading; thus, the relation between ORF and RC may have limited applicability (Paris et al., 2005).

Second, established ORF expectations for typically developing readers extend from kindergarten through eighth grade (Hasbrouck & Tindal, 2017). For fluent reading, the number of WCPM initially increases per grade level; however, beginning at the sixth-grade level, the number of WCPM stays the same even as the grade levels increase. Thus, reduced variability in ORF at upper grade levels makes an ORF score less useful. Furthermore, these ORF expectations do not take into account prosodic reading, which has been studied extensively as a component of ORF (e.g., Chomsky, 1978; Rasinski, 1990). Curiously, in the past two decades, ORF has gone from an unacknowledged component of reading to overemphasized as rate of reading (Kuhn & Schwanenflugel, 2019). If administrators in middle and high schools inadvertently privilege ORF performance to determine reading needs and progress, they may draw incorrect conclusions resulting in erroneous placement decisions for adolescent readers (Samuels, 2007).

Purpose of the Review and Research Questions

In this review, I aimed to clarify the relationship between ORF and RC for ALRP. In an attempt to align theory and assessment of reading fluency, Kuhn et al. (2010) concluded that implementation of fluency instruction and assessment in many schools and classrooms was built upon an incomplete conceptualization of the fluency construct. Potential reasons include the efficiency and objectivity of measuring oral reading accuracy and rate and federal policies and accountability pressures prompting frequent assessment to identify students with specific learning disabilities (Deeney, 2010). However, adolescent literacy researchers and practitioners in middle and high schools need accurate and representative measures for determining adolescents' reading needs, measuring their progress, designing instruction, and selecting specific interventions.

Literature reviews on ORF for elementary-age readers (Fuchs et al., 2001; Reschly et al., 2009) and its technical adequacy (Reschly et al., 2009; Wayman et al., 2007) have shown a correlation with RC. Longitudinal studies and qualitative investigations of university and adult readers (e.g., Birch & Chase, 2004; Corkett et al., 1998; Fink, 1998) and some quantitative studies with adolescent readers (e.g., Clemens et al., 2017; Valencia et al., 2010) have indicated varied influences of ORF on RC, and some readers with dyslexia have been able to compensate for weak word-level skills to achieve proficient RC (Gelbar et al., 2018). However, there has not been a synthesis of related quantitative studies focusing on adolescents and, specifically, those with limited reading proficiency. Furthermore, since the publication of several pinnacle research-based reports, guides, and reviews (e.g., Biancarosa & Snow, 2006; Kamil et al., 2008; National Reading Panel, National Institute of Child Health and Human Development, 2000; Slavin et al., 2008), the evidence base on adolescent literacy instruction and intervention practices has grown dramatically (e.g., Baye et al., 2019; Herrera et al., 2016; Reynolds, 2021).

Thus, I sought to provide a reflection for the field on how researchers have chosen to define and measure ORF in recent years and how their results connect to reading theory and potentially practices in schools. In addition, I wanted the results of this review to serve as a comparison to reviews on the role of ORF for elementary-age readers. To address these gaps in knowledge, I posed two research questions to guide this review:

> **Research Question 1 (RQ1):** To what extent does ORF serve as a predictor of comprehension for ALRP?
> **Research Question 2 (RQ2):** To what extent is it appropriate to rely on ORF scores to determine adolescent readers' needs and their comprehension abilities?

Method

Literature Search and Selection

I used the conceptual framework for systematic reviews of research established by Hallinger (2014) to provide a structure for this review. That framework suggests the use of the following guiding questions to support interconnectedness among the procedures for literature search, selection, and analysis:

1. What are the central topics of interest, guiding questions, and goals?
2. What conceptual perspective guides the review's selection, evaluation, and interpretation of the studies?
3. What are the sources and types of data employed for the review?
4. How are data evaluated, analyzed, and synthesized in the review?

5. What are the major results, limitations, and implications of the review?

First, to discover trends and patterns across studies, I restricted the search to cross-sectional studies using quantitative methods with sample sizes of 30 or greater. Due to the focus on the relation between the predictor variable (ORF) and outcome variable (RC) using statistical approaches that require larger sample sizes to show social validity (i.e., generalizability of findings; Lenth, 2001), I excluded case studies, single-case design studies, and research results with potentially low statistical power. To identify relevant literature, I chose search terms related to the research question components and terms commonly found in the keywords of similar articles. Using Education Research Complete and ERIC Digest from EBSO Host with no date range, I entered the search terms *fluen** or *reading rate*, and *comprehen** or *prosod** or *assess** (variables under study), and *adol** or *grade 6 or grade 7 or grade 8 or grade 9 or grade 10 or grade 11 or grade 12* or *ages 11–17* or *high school* or *middle school*, *struggling readers* or *at-risk readers* or *learning disab** (population under study). These online databases generated 1,504 peer-reviewed articles after duplicates were removed, as of February 20, 2021. After screening, I assessed 177 articles for eligibility and identified 20 studies meeting the inclusion criteria. To increase comprehensiveness, I searched for additional studies on reference lists of these initial articles, all subsequently identified articles, several meta-analyses, literature reviews, reports on the broad topic of adolescent literacy (e.g., Kamil et al., 2008; Slavin et al., 2008), and a theoretical paper on ORF (Fuchs et al., 2001). I did not uncover any studies through these ancestral searches that I had not already identified through the electronic database search. Next, I individually searched journals in which two or more selected studies were found (i.e., *Reading and Writing* and *Scientific Studies of Reading*) by using the search engine on each journal's website with no date range and yielded two more studies. As a final search procedure, I emailed the first author of included studies to inquire about potentially missing studies and discovered one more to incorporate in the review. Figure 1 is a PRISMA flow diagram providing the number of studies yielded per action in the search process (Moher et al., 2009; Rethlefsen et al., 2021).

Throughout implementation of the search procedure described thus far, I examined the title and abstract of each article using the criteria outlined in Table 1. In some cases, I inspected articles further to determine with certainty whether a study would be included. Basic, initial selection criteria included empirical studies of study subjects in Grades 6 to 12 and assessed reading skills in English in the United States. Another criterion for inclusion was that students needed to be assessed on ORF and RC. Specifically, if selected studies investigated the relation between ORF and multiple reading component skills (e.g., word recognition, vocabulary), only the relation between ORF and RC was examined for the review. Furthermore, I only selected studies that included a standardized RC measure. Studies included participants who were categorized as below average on RC assessments and may have identified disabilities. Across included studies, definitions for ALRP (typically termed struggling readers) were characterized as students (a) scoring lower than the 40th percentile on at least one standardized measure of RC, (b) scoring within one half of one standard error of measurement surrounding the cut point for pass-fail on the state reading test, (c) with a diagnosed disability related to reading, or (d) enrolled in a reading remediation class. Sometimes, reviewed studies included ALRP within samples of proficient readers; however, I excluded studies from this review if all participants were identified as proficient readers. In addition, I excluded studies if they focused on underlying factors to fluency only and *not* how it relates to RC or focused on a fluency intervention. I also excluded studies using only high-stakes state accountability tests in reading as the outcome variable because their result represents more than RC skill, such as knowledge of elements of literature, test-taking anxiety, stamina, and motivation due to the length of the test and volume of similar tests. Furthermore, I did not intend for this review to synthesize studies aimed to determine the technical adequacy of reading curriculum-based measure (CBM-R); thus, if studies focused only on correlating CBM-R to general reading outcome measures or state reading accountability tests, I did not include them. The combined search methods resulted in 23 empirical studies conducted in the United States between 2006 and 2021. There were no studies meeting the selection criteria published prior to 2006.

Analysis of Study Components

Once relevant studies were ready for review, I considered how data would be evaluated, analyzed, and synthesized. Given the varied statistical methods employed in the studies, meta-analysis was not a viable option; therefore, I used analysis and summary charts to capture key components of each study for thematic synthesis. First, I summarized each study that met the criteria for inclusion in a chart outlining research purposes/questions, theoretical framework, definition of ORF, and method. I used a second chart to record claims and warrants of each study to avoid a situation that Hallinger (2014) cautions against—taking data out of context. This enabled a check to ensure congruency between the analysis and summarization of data and the stated claims in each article. Table 2 includes a final chart providing the study platform, methods, and results of each study, a condensed and refined version of the previous two working charts. Finally, to clarify the overall claim of this systematic

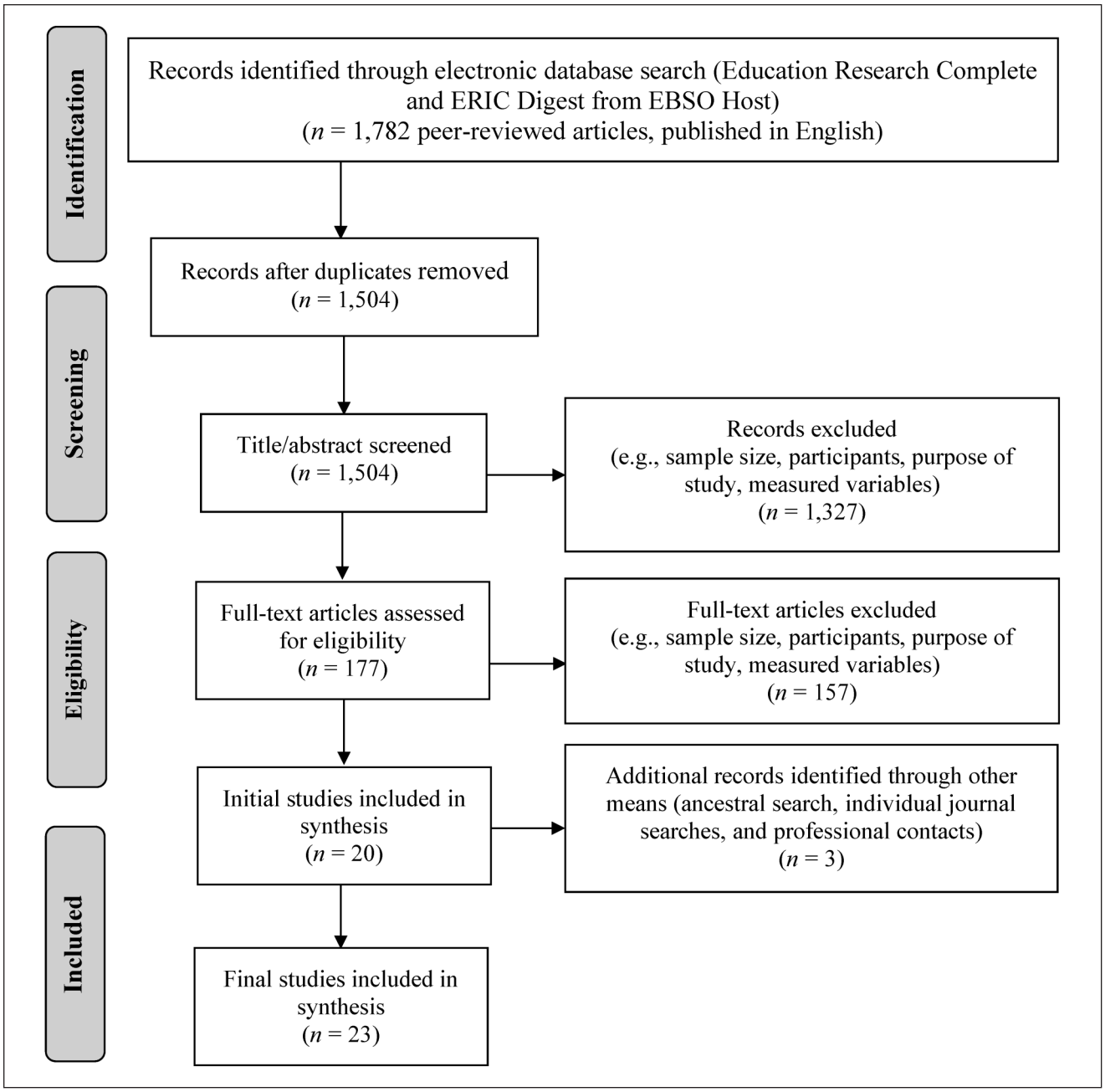

Figure 1. PRISMA flow diagram.
Source. Based on Moher et al. (2009) and Rethlefsen et al. (2021).

review and evaluate the quality and limitations of existing evidence found in the studies, I used an analytic process including note-taking, free writing, concept mapping, and coding to generate several themes (Machi & McEvoy, 2012).

As data analysis for a systematic review is largely inductive, I used an analytic procedure with recursive steps to ensure consistency (Glaser & Strauss, 1967; Petticrew & Roberts, 2008). I paraphrased the results of each study to depict a code. A *code* is a phrase or series of words that represents the explicit and implicit meaning of the results. An example code from Brasseur-Hock et al. (2011), garnered from the results section of their article, was *adolescents with below-average comprehension were divided into five distinct skill profiles, indicating substantial heterogeneity in reading component skills.* Occasionally, some results contained more than one code. Next, I compared codes and clustered similar codes into categories. A

Table 1. Selection Criteria.

Inclusion criteria	Exclusion criteria
Uses quantitative methods with sample size of 30 or greater	Uses qualitative methods or has sample size less than 30
Students in sixth to 12th grade	Only students in fifth grade or younger
Assessed reading skills in English in the United States	Assessed reading skills in other languages in other countries outside the United States
Students assessed on ORF and RC	Focused on measuring intervention effectiveness or technical adequacy of ORF
Standardized RC measure as the outcome variable	ORF or state reading accountability assessment as the only outcome variable
Some students were identified as struggling readers and may have learning or reading disabilities	Focused only on students who were identified as proficient readers
Total yield: 23 studies in the United States between 2006 and 2021	

Note. ORF = oral reading fluency; RC = reading comprehension.

category captures the meaning of a group of codes at an abstract level, and in the case of this systematic review, categories became themes that unite the results of reviewed studies. For example, when the example code from Brasseur-Hock et al. was corroborated with codes from seven other studies (Cirino et al., 2013; Clemens et al., 2017, 2019; Cutting et al., 2009; Dennis, 2012; Lesaux & Kieffer, 2010; Tilstra et al., 2009), the outcome was the category or theme *ALRP have distinct reader profiles*. To check the quality of each theme, I assessed them for internal homogeneity and external heterogeneity. Internal homogeneity means the codes in a given theme are related to one another; external heterogeneity means themes are unique in their meaning in comparison with other themes.

Results

In this section, I first provide an overview of how researchers for the included studies defined and measured ORF and RC to understand assumptions used and to critically appraise each study's results. Next, I address five key themes: (a) unclear role of ORF in the SVR for ALRP, (b) ALRP have distinct reader profiles, (c) ORF consists of more than automaticity, (d) the role of ORF varies, and (e) oral reading automaticity has tenuous predictive value for ALRP.

Defining and Measuring Fluency and Comprehension

The two key variables of focus in this review were ORF as a predictor and RC as an outcome. In Table 2, I have specified how study authors defined and assessed ORF and RC. I found that having an awareness of any alignment issues across definitions and measurement of ORF as well as how researchers analyzed their results was important to exploring the extent of its influence as a *predictor* of RC.

ORF. Fluency, whether oral or silent, is a complicated product due to the simultaneous execution of rate, accuracy, and prosody (Hasbrouck & Glaser, 2012; Kuhn et al., 2010). For studies providing an explicit definition of ORF, I compared the assessment(s) used in the study with the definition. Four studies did not provide an ORF definition (Brasseur-Hock et al., 2011; Cirino et al., 2013; Hock et al., 2009; Tolar et al., 2014); thus, I inferred their definition of ORF based on the assessments selected in the given study. Given that all definitions involved rate, the areas for debate are whether accuracy and prosody are required features of fluent oral reading.

ORF as rate alone. Six of the 23 studies present ORF as reading rate (Adlof et al., 2006; Cirino et al., 2013; Clemens et al., 2017; Cutting et al., 2009; Cutting & Scarborough, 2006; Dennis, 2012). Researchers most frequently used the Gray Oral Reading Test (GORT) rate subtest to measure rate in connected text. In addition, researchers often selected the Test of Word Reading Efficiency (TOWRE) Sight Word Efficiency and Phonemic Decoding Efficiency subtests to measure rate of isolated word reading, but less commonly used the Texas Middle School Fluency Assessment (Passage Fluency and Word Lists) and the Passage Reading Fluency Probe from the easyCBM. To note, Clemens et al. (2017) and Cutting et al. (2009) defined ORF as word reading speed, but measured both rate and accuracy.

ORF as accuracy and rate. In 12 of 23 studies, researchers defined ORF as the number of WCPM, often referred to as oral reading automaticity (WCPM; Brasseur-Hock et al., 2011; Clemens et al., 2019; Denton et al., 2011; Eason et al., 2013; Gelbar et al., 2018; Hock et al., 2009; Kershaw & Schatschneider, 2012; Lesaux & Kieffer, 2010; Ritchey et al., 2015; Savage, 2006; Tighe & Schatschneider, 2014; Tolar et al., 2014). Most of these studies included more than one standardized measure to

Table 2. Characteristics of Reviewed Studies.

Author(s), year	Study platform	Method	Results
Adlof et al. (2006)	*Research Purpose*: to determine whether a fluency component should be added to the SVR *Theoretical Framework*: SVR *Definition of ORF*: passage reading rate and isolated word reading rate	*Sample Characteristics:* $n = 604$ second, fourth, and eighth graders (276 nonimpaired; 328 language impaired) *Measures*: ORF: GORT-3 Rate subtest (connected text rate); TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests (single word rate) RC: WRMT-R Passage Comprehension subtest; GORT-3 Comprehension subtest; QRI-2 RC subtest Other skills measured: listening comprehension; accuracy *Statistical Approach*: concurrent and predictive SEM and profile analysis	• Few individuals had problems in fluency separate from word recognition accuracy or listening comprehension. • The correlation decreased across grades for word recognition and RC, whereas it increased for listening comprehension and RC. • Fluency did not account for unique variance in RC. • Mean comprehension for children in the rate deficit group was well within normal limits.
Brasseur-Hock et al. (2011)	*Research Question*: Do adolescents with below-average comprehension exhibit differentiated profiles of component reading skills, including word reading accuracy, word-level and passage-level fluency, and oral language? *Theoretical Framework*: SVR *Definition of ORF*: pace, accuracy, and rate of passage reading and isolated word reading Note: The definition was inferred by how the ORF construct was measured by three assessments.	*Sample Characteristics:* $n = 319$ beginning ninth graders (minimum of 55 students per reading achievement level) *Measures*: ORF: TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests; GORT-4 Fluency (Rate and Accuracy subtests combined) RC: WLPB-R Passage Comprehension subtest, GORT-4 Passage comprehension subtest; Kansas State Assessment reading subtest Other skills measured: listening comprehension; reading achievement; word level (decoding and word identification); vocabulary (receptive and expressive) *Statistical Approach*: LCA	• Adolescents with below-average comprehension were divided into five distinct skill profiles, indicating substantial heterogeneity in component skills. • A single measurement of RC did not provide accurate and precise classification of the source of a students below-average comprehension. • Fluency skills vary and do not correlate with other reading component skills.
Cirino et al. (2013)	*Research Hypothesis*: 1. Although we expect reader groups to have different latent means, we expect that measures assessing reading components do so in the same manner in both types of readers. 2. Among struggling readers, we expect that the vast majority of these students will have difficulties in one or more external reading measures in multiple areas rather than in comprehension alone, and we expect that a sizeable proportion will have weaknesses with basic decoding skills. *Theoretical Framework*: SVR *Definition of ORF*: passage reading rate and isolated word reading rate Note: The above definition was inferred by how ORF was measured.	*Sample Characteristics:* $n = 1{,}748$ sixth-, seventh-, and eighth-grade students were oversampled for struggling readers (1,025 struggling readers) *Measures*: ORF: TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests; Texas Middle School Fluency Assessment Passage Fluency and Word Lists subtests RC: Grade RC subtest; WJ-III Passage Comprehension subtest; Texas Middle School Passage Comprehension subtest Other skills measured: decoding; combined fluency, and comprehension *Statistical Approach*: multigroup confirmatory factor analysis	• Of the 84% who struggled with comprehension, only 12% had *only* a comprehension issue. Considering the whole sample of struggling readers, 68.2% had difficulty in more than one domain. • Comprehension and fluency measures yield different findings in struggling versus typical readers. • Fluency is more related to decoding in struggling readers, whereas it is more related to comprehension in typical readers, although these correlations are difficult to compare, as the way these factors are indexed varies across groups.
Clemens et al. (2019)	*Research Purpose*: to investigate whether pretest skills, including word reading fluency, text reading fluency, and vocabulary knowledge, moderated the effects of a multicomponent intervention on the RC skills of students in Grades 6 through 8 *Theoretical Framework*: several frameworks were referenced, includes SVR *Definition of ORF*: reading connected text with ease and efficiency (i.e., passage reading rate and accuracy)	*Sample Characteristics:* $n = 226$ sixth to eighth graders with low achievement on a reading accountability assessment *Measures*: ORF: easyCBM and SWE from TOWRE-2 RC: GMRT Comprehension subtest, GRADE Comprehension Scale, and GORT-5 Comprehension Other skills measured: vocabulary *Statistical Approach*: main effects model as base with moderation effects analysis	• Pretest sight word reading and vocabulary were not statistically significant predictors of posttest comprehension and did not demonstrate statistically significant interaction effects with intervention condition. • Pretest ORF demonstrated a statistically significant interaction with condition ($\beta = -0.116$, $p = .03$), indicating pretest reading fluency moderated the effects of intervention condition. • A negative effect indicates that as students' pretest ORF scores decreased, a greater effect of the CCT intervention was observed (and vice versa).

(continued)

Table 2. (continued)

Author(s), year	Study platform	Method	Results
Clemens et al. (2017)	*Research Questions*: What percentage of students with low RC also demonstrate low reading fluency and/or vocabulary knowledge? *Theoretical Framework*: several frameworks were referenced, includes SVR *Definition of ORF*: effortless and automatic reading of words in connected text (i.e., passage reading rate)	*Sample Characteristics: n* = 180 students, Grades 6 to 8; RC difficulties; SWD and ELL included *Measures*: ORF: Passage Reading Fluency probe from the easyCBM system RC: GMRT-4 Comprehension subtest; GRADE Comprehension subtest; GORT-5 Comprehension subtest Other skills measured: vocabulary *Statistical Approach*: LCA	• Of the struggling readers, the majority were either below average in both fluency and vocabulary or below average in fluency but average in vocabulary. • Low RC but adequate scores in reading fluency or vocabulary represented only a very small portion of the sample.
Cutting and Scarborough (2006)	*Research Questions*: 1. Do the contributions of word recognition/decoding and oral language skills to RC depend on the measure of comprehension that is used? 2. Beyond word recognition/decoding and oral language, do other skills account for additional variance in RC as measured by different tests? 3. Do the relative contributions of various predictors of comprehension differ for readers with differing levels of reading skills? *Theoretical Framework*: SVR *Definition of ORF*: reading speed of isolated words and words in context (i.e., passage reading rate and isolated word reading rate)	*Sample Characteristics: n* = 97 students, Grades 1.5 to 10.8; with reading and language deficits *Measures*: ORF: GORT-3 Rate subtest RC: RC subtests from GMRT-R, GORT-3, and WIAT Other skills measured: word recognition/decoding; oral language; rapid serial naming; full-scale IQ; verbal memory; attention *Statistical Approach*: hierarchical multiple regression analyses	• Relative contributions of word recognition/decoding and oral language skills to comprehension varied from test to test. • Simple model plus reading speed appears to predict RC, regardless of the measure of comprehension used. • Inclusion of reading speed in regression analyses improved prediction significantly, accounting for an additional 1% to 6% of the variance on the three measures of RC.
Cutting et al. (2009)	*Research Purpose*: to further understand, within a neuropsychological framework, the role of fluency of reading words in isolation and in context, oral language proficiencies, and executive function on RC performance in TD students, those with GRD, and those with S-RCD. *Theoretical Framework*: neuropsychological framework *Definition of ORF*: word reading speed (i.e., passage reading rate and isolated word reading rate)	*Sample Characteristics: n* = 56 nine- to 14-year-old children (21 TD, 18 GRD, and 17 S-RCD) *Measures*: ORF: TOWRE Sight Words and Phonemic Decoding subtest (isolated word reading), GORT-4 Fluency (Rate and Accuracy subtests combined) RC: Comprehension subtests from the GORT-4 and WRMT-R/NU Other skills measured: oral language; executive function; full-scale IQ *Statistical Approach*: MANOVAs, hierarchical regression, and ANCOVA	• TD and S-RCD participants read isolated words at a faster rate than GRD participants; however, both RD groups had contextual word fluency and oral language weaknesses. • GRD participants were low across all reading skills. • While isolated word fluency deficits are a sufficient cause of impaired context word fluency, it does not necessarily result in context word fluency proficiency. • With all the variables entered simultaneously in the model, oral language was the only significant predictor.
Dennis (2012)	*Research Purpose*: to determine the patterns of reading abilities of struggling adolescent readers *Theoretical Framework*: None provided *Definition of ORF*: rate/speed at which a person reads words regardless of accuracy (i.e., isolated word reading rate)	*Sample Characteristics: n* = 94 sixth to eighth graders who failed state assessments in reading *Measures*: ORF: TOWRE Sight Word Efficiency subtest; QRI-4 WCPM RC (meaning construct): QRI-4; WJ-III Basic Reading Battery; Peabody Picture Vocabulary; Intermediate Spelling Inventory Other skills measured: decoding *Statistical Approach*: Factor and hierarchical cluster analyses	• Data showed a heterogeneous population of struggling readers. • Based on three factors (meaning, rate, and word knowledge), four salient clusters emerged from the cluster analysis. • Adolescents who struggle with reading are largely capable of multifaceted processes of reading. • Factor that least caused variance on failing performance on the state assessment was fluency.

(continued)

Table 2. (continued)

Author(s), year	Study platform	Method	Results
Denton et al. (2011)	*Research Purpose*: to examine (a) the relations among multiple measures of oral and silent reading fluency and RC for students in Grades 6, 7, and 8 and (b) the use of fluency measures to identify students at risk for failure on a high stakes RC test who may need supplemental reading intervention Research questions were also provided in the study. *Theoretical Framework*: None provided *Definition of ORF*: number of WCPM in a passage (i.e., passage reading rate and accuracy)	*Sample Characteristics:* n = 1,421 sixth to eighth graders: 54% were classified as struggling readers and 46% as typical readers *Measures*: ORF: TOWRE Sight Word Efficiency subtest, ORF CBM Passage Fluency; ORF CBM Word Fluency RC: Texas Education Agency (TAKS) Reading Accountability Test; Passage Comprehension subtests from the GRADE; WJ-III Other skills measured: silent reading fluency; verbal knowledge (vocabulary) *Statistical Approach*: correlation, z tests in differences in correlations, and linear regression, and ROC curve (AUC representing probability and classification accuracy)	• Moderate positive relations (r = .50–.51) between measures of fluency and comprehension, which is generally weaker than often reported for younger students. • ORF in context has higher correlations than ORF for words in isolation to comprehension.
Eason et al. (2013)	*Research Purpose*: to further clarify the relationship between WRE and ORR by examining the overarching question of what (if anything) distinguishes WRE from ORR *Theoretical Framework*: SVR inferred by their reference of Hoover and Gough *Definition of ORF*: (called Oral Reading Rate) fast, accurate reading of a story or paragraph aloud (i.e., passage reading rate and accuracy)	*Sample Characteristics:* n = 88 children, ages 10 to 14 years, poor and average readers *Measures*: ORF: GORT-4 Fluency (Rate and Accuracy subtests combined); SARA Battery RC: Comprehension subtests from GMRT-4 and GORT-4; RC subtests from SDRT-4, DAB; WRMT Passage Comprehension subtest Other skills measured: word reading efficiency; rapid naming; language *Statistical Approach*: hierarchical regressions and repeated measures analyses of variance (RM-ANOVAs)	• Participants with poor comprehension performed below average on measures of ORF, despite average word reading efficiency. • While always providing variance, the amount changed for ORF and word reading efficiency depending on the RC measure. • ORF contributes unique variance to RC beyond word reading efficiency, and that this unique variance, in part, can be explained by oral language abilities, specifically vocabulary/semantics.
Gelbar et al. (2018)	*Research Questions*: Have secondary students with dyslexia achieved RC scores that are comparable with average peers? How much variance in RC for secondary students with dyslexia is explained by cognitive ability, ORF, and study strategies? Which predictors are statistically significant predictors of RC in secondary students with dyslexia? *Theoretical Framework*: None provided *Definition of ORF*: WCPM (i.e., passage reading rate and accuracy)	*Sample Characteristics:* n = 51 ninth to 12th graders with dyslexia *Measures*: ORF: WCPM with passages from high school textbooks RC: Comprehension subtests from GMRT-4 Other skills measured: cognitive ability and study strategies *Statistical Approach*: regression	• Some secondary students with dyslexia can achieve RC scores that are comparable with their same-age peers (57% of sample) • Cognitive ability was the only statistically significant predictor of RC: 1.67 ($p < .001$). • ORF and study strategies were not significant predictors.
Hock et al. (2009)	*Research Purpose*: to examine the component reading skills of adolescent struggling readers attending urban high schools *Theoretical Framework*: Discourse Processing Theory *Definition of ORF*: pace, accuracy, and rate of passage reading and isolated word reading Note: The above definition was inferred by how the reading fluency construct was measured by three assessments.	*Sample Characteristics:* n = 345 late eighth graders and early ninth graders (34 students with a specific learning disability) Measures: ORF: TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests; GORT-4 Rate and Accuracy subtests RC: WLPB-R Passage Comprehension subtest, GORT-4 Passage comprehension subtest; Kansas State Assessment reading subtest Other skills measured: listening comprehension; reading achievement; word level (decoding and word identification); vocabulary (receptive and expressive) *Statistical Approach*: PCA	• Reading component skills of proficient readers vary; however, the same skills for ASRs have similar means. • Pattern of results comparing struggling readers (comp score <40th percentile) and proficient readers are similar, whereas fluency is the lowest score and word level is the highest; however, the range of means is narrower for ASR than proficient readers.

(continued)

Table 2. (continued)

Author(s), year	Study platform	Method	Results
Kershaw and Schatschneider (2012)	*Research Purpose*: to investigate the added contribution of passage fluency, working memory, and IQ to a model of reading *Theoretical Framework*: SVR *Definition of ORF*: ability to accurately and efficiently read words in a list or a passage (i.e., passage reading rate and accuracy and isolated word reading rate and accuracy)	*Sample Characteristics: n* = third, seventh, and 10th grades (*N* = 215, 188, and 180, respectively) range of reader skill levels *Measures*: ORF: AIMSweb grade-level standardized ORF passages; WCPM on passages from textbooks and released Florida State Accountability Test passages RC: Florida State Accountability Test reading assessment; SAT-9 Other skills measured: decoding; linguistic comprehension; verbal intelligence; working memory; performance intelligence *Statistical Approach*: SEM	In third grade, passage fluency (after controlling for decoding and linguistic comprehension) is highly correlated with RC (.83) and that this relationship decreases as children progress to Grade 10 (.69).
Lesaux and Kieffer (2010)	*Research Purpose*: explores the nature of RC difficulties among early adolescent LM learners and native English speakers in urban schools *Theoretical Framework*: several frameworks were referenced (e.g., SVR, Discourse Processing Theory, and RAND Reading Theory) *Definition of ORF*: read words accurately and efficiently (i.e., passage reading rate and accuracy and isolated word reading rate and accuracy)	*Sample Characteristics: n* = 262 sixth graders (201 LM learners and 61 native English speakers) with a score at or below the 35th percentile on a standardized RC measure *Measures*: ORF: DIBELS ORF subtest, WLPB-Revised Word Attack subtest, and TOWRE RC: GMRT-4 Other skills measured: general vocabulary, decoding accuracy, working memory, and academic vocabulary knowledge *Statistical Approach*: LCA	• Two populations were evenly distributed among three skill profiles of struggling readers. • Despite relative differences in word reading accuracy and fluency, each profile was characterized by low vocabulary knowledge. • Majority of struggling readers were found to have developed basic fluency skills. • Models fitted with increasing numbers of latent classes indicated substantial heterogeneity within the population of struggling readers.
Nomvete and Easterbrooks (2020)	*Research Questions*: 1. Are there correlations among phrase-reading ability, syntactic awareness, passage-reading rate, and RC among adolescent readers? 2. Do language-related variables account for more of the variance in RC than passage-reading rate? 3. Does phrase-reading ability provide a mechanism that mediates or at least partially mediates how syntactic awareness affects RC? 4. Does phrase-reading ability mediate how passage-reading rate affects RC? *Theoretical Framework*: structural precedence, information processing, and automaticity theories *Definition of ORF*: passage reading rate, accuracy, prosody	*Sample Characteristics: n* = 70 students with and without disabilities who were 13 to 21 years of age *Measures*: ORF: GORT-4 and an adapted version of the NAEP ORF Scale which separated phrase-level prosody from the other aspects of prosody measurement RC: WJ-III Other skills measured: syntactic awareness *Statistical Approach*: correlations, hierarchical linear modeling, and mediation regression modeling	• Phrase-reading ability, syntactic awareness, passage-reading rate, and RC are significantly, positively correlated and language-related variables account for additional variance in RC beyond that of passage-reading rate
Paige (2011)	*Research Purpose*: to investigate the relationship among extrinsic motivation for reading, ORF, comprehension, and academic achievement *Theoretical Framework*: automaticity theory, verbal efficiency theory, connectionist model of reading *Definition of ORF*: the ability to adequately read connected text, as represented by the indicators of speed, accuracy, and prosody, so as to foster the comprehension of text (i.e., passage reading rate, accuracy, and prosody)	*Sample Characteristics: n* = 112 sixth graders and 115 seventh graders (range of reading skills) *Measures*: ORF: combinations of TOWRE Sight Word Efficiency and Phonemic Decoding subtests with the GORT-4 Fluency subtest RC: TORC-3 Other skills measured: reading motivation, academic achievement *Statistical Approach*: SEM	• All paths from extrinsic motivation to oral reading proficiency to comprehension to academic achievement for both independent samples of sixth and seventh graders are significant ($t > 2.00$), the majority of whom were struggling readers (below 40th percentile on ORF).

(continued)

Table 2. (continued)

Author(s), year	Study platform	Method	Results
Paige et al. (2012)	*Research Purpose*: to explore the link between fluency and comprehension through an examination of the importance of prosodic reading in secondary students *Theoretical Framework*: None provided *Definition of ORF*: word recognition automaticity and prosody (i.e., passage reading rate, accuracy, and prosody)	*Sample Characteristics:* $n = 108$ ninth graders attending a high school that has struggled with reading and academic achievement for more than a decade *Measures*: ORF: Multi-Dimensional Fluency Scale (prosody); automaticity with narrative and expository grade-level passages RC: TORC-4 Other skills measured: silent reading fluency *Statistical Approach*: correlation	• As students' average scores for oral prosody increased, comprehension improved. • Students with the highest prosody scores were the same students with the highest comprehension scores; reverse was true as well.
Paige et al. (2014)	*Research Questions*: 1. What are the relationships among the fluency indicators of accuracy, automaticity, and prosody with vocabulary and silent RC in secondary students? 2. To what extent do the indicators of accuracy, automaticity, and prosody form a reliable scale reflecting the construct of ORF in secondary students? 3. To what extent do vocabulary and the fluency indicators of accuracy, automaticity, and prosody contribute unique variance to silent RC in secondary students? *Theoretical Framework*: SVR, Tandem Theory, and Construction-Integration Model *Definition of ORF*: word recognition accuracy, word recognition automaticity, and prosody (i.e., passage reading rate, accuracy, and prosody)	*Sample Characteristics:* $n = 108$ ninth-grade students within a school that has 79% readers according to National Center for Education Statistics (2010) that are not reading with proficiency *Measures*: ORF: GORT-4 Fluency (Rate and Accuracy subtests combined); Multi-Dimensional Fluency Scale (prosody); automaticity with narrative and expository grade-level passages RC: TORC-4 Other skills measured: silent RC; vocabulary *Statistical Approach*: bivariate correlation, PCA, and hierarchical regression	• Average scores on all measures were representative of struggling readers. • All reading skill components correlated with the author's measure of silent RC. • Accuracy, prosody, and vocabulary explained from 50.1% to 52.7% of the variance in silent RC. • Word recognition automaticity did not contribute to silent RC although prosody was found to act as a partial mediator between automaticity and comprehension. • Accuracy, automaticity, and prosody were found to form a highly reliable scale reflecting ORF.
Ritchey et al. (2015)	*Research Purpose*: to investigate predicting reading status from fourth to sixth grades; to identify fourth-grade measures that predict sixth-grade reading problems *Theoretical Framework*: None provided *Definition of ORF*: ability to read connected text quickly and accurately (i.e., passage reading rate and accuracy)	*Sample Characteristics:* $n = 173$ sixth graders (range of reading skills, including SWD) *Measures*: ORF: WCPM RC: GMRT and CBM Maze Other skills measured: oral language, phonological processing, decoding, spelling, word identification, word attack, teacher rating scales of behavior and reading skills *Statistical Approach*: exploratory principal axis factor analysis, logistic regression, and ROC curve analyses	• Passage reading fluency was the only individually administered measure that added significant variance (6.97%) to the model. • Together, Spelling Fluency, Teacher Rating of Reading Problems, and Passage Reading Fluency accounted for 44.38% of the variance (adjusted $R^2 = .4339$) • Two of the three variables were statistically significant (AUC = .91) to predicting identification as having reading difficulties (passage reading fluency and spelling fluency).
Savage (2006)	*Research Purpose*: To evaluate the SVR model and to explore the reading performance of 15-year-olds with severe reading delays *Theoretical Framework*: SVR *Definition of ORF*: accurate and effortless reading of both individual words and connected text (i.e., passage reading rate and accuracy and isolated word reading rate and accuracy)	*Sample Characteristics:* $n = 56$ adolescents (average age of 15) with a history of identified literacy-related difficulties *Measures*: ORF: NARA-Revised for accuracy and rate RC: NARA-Revised for comprehension Other skills measured: spelling, decoding of nonsense words, listening comprehension, verbal ability, writing fluency *Statistical Approach*: correlation, factor analysis, principal components factor analysis, regression analyses	• decoding and linguistic comprehension described RC better than decoding and verbal cognitive ability as long as nonword reading was used to measure decoding. • If text reading *accuracy* was used to index decoding, then verbal ability, not linguistic comprehension, provided the best fit. Reading *rate* did not correlate with verbal ability and listening comprehension. Regression analyses showed that decoding and listening comprehension together at best explained around 66% of the variance in RC, suggesting there may be many other factors that might explain unique variance in RC in poor readers.

(continued)

Table 2. (continued)

Author(s), year	Study platform	Method	Results
Tighe and Schatschneider (2014)	*Research Purpose*: to investigate and rank order by importance the contributions of various cognitive predictors to RC in third, seventh, and 10th graders *Theoretical Framework*: SVR *Definition of ORF*: the ability to accurately and efficiently read a passage aloud (i.e., passage reading rate and accuracy)	*Sample Characteristics:* n = 215 third graders, 188 seventh graders, and 182 tenth graders (total N = 585), range of reader skill levels *Measures*: ORF: AIMSweb grade-level standardized ORF passages; WCPM on passages from textbook passages and released Florida State Accountability Test passages RC: SAT-9 and the Sunshine State Standards RC subtest of the FCAT-SSS Other skills measured: decoding; listening comprehension; working memory; reasoning (verbal and nonverbal IQ) *Statistical Approach*: exploratory factor analysis and dominance analysis	• The fluency component was the most predictive of RC in third grade. By seventh grade, fluency and reasoning were both important predictors of RC. By 10th grade, among reading component skills assessed, reasoning was the only important predictor of RC.
Tilstra et al. (2009)	*Research Questions*: 1. What is the contribution of the SVR (decoding and listening comprehension) to RC outcomes for fourth-, seventh- and ninth-grade readers? 2. Does verbal proficiency contribute to RC beyond decoding and listening comprehension for readers at those three grade levels? 3. Does a measure of reading fluency (defined as text reading rate and accuracy) explain additional variance for the models when entered after decoding, listening comprehension and verbal proficiency for students at those three grade levels? *Theoretical Framework*: SVR *Definition of ORF*: termed *reading fluency*, text reading rate and accuracy; also explained as the ability to group words into meaningful grammatical units and to read quickly, effortlessly and with expression (i.e., passage reading rate and accuracy)	*Sample Characteristics:* n = 89 fourth-, 89 seventh-, and 93 ninth-grade struggling, average, and good readers *Measures*: ORF: CBM Oral Reading, WCPM from grade-level passages RC: GMRT RC test; CBM Maze Other skills measured: verbal proficiency; listening comprehension; intelligence; decoding *Statistical Approach*: sequential multiple regression	• Adding verbal proficiency and reading fluency as additional predictors represented a 13% increase in total variance for fourth- and seventh-grade students and a 22% increase in explained variance in RC for ninth-grade students compared with the explanatory power of the original model containing only decoding and listening comprehension
Tolar et al. (2014)	*Research Objectives*: 1. To provide evidence about the predictive validity of progress monitoring slope for gains in reading outcomes among older, more experienced readers. 2. To evaluate the effects of progress monitoring alignment, administration condition, initial versus final progress monitoring status, reading ability level, and level of reading intervention on progress monitoring slop predictive validity. Theoretical Framework: None provided Definition of ORF: WCPM in connected text (i.e., passage reading rate and accuracy) Note: The above definition was inferred by how ORF was measured.	*Sample Characteristics:* n = 1,343 sixth-eighth graders: 588 typical, 284 struggling, not receiving intervention, 471 struggling, receiving intervention *Measures*: ORF: ORF CBM-Passage Fluency; TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests RC: AIMSweb Maze CBM RC subtest; WJ III Passage Comprehension subtest Other skills measured: word fluency *Statistical Approach*: multigroup structural equation models (SEM)	• Significant linear growth ($p < .05$) in ORF-PF for all groups and significant variance in linear growth among all familiar groups • No significant variance in growth among novel groups for ORF-PF ($p < .05$) • ORF-PF was generally not a significant predictor of reading achievement

Note. SVR = simple view of reading; ORF = oral reading fluency; NARA = Neale Analysis of Reading Ability; GORT = Gray Oral Reading Test; TOWRE = Test of Word Reading Efficiency; RC = reading comprehension; WRMT-R = Woodcock Reading Mastery Test–Revised; QRI = Qualitative Reading Inventory; SEM = structural equation modeling; WLPB = Woodcock Language Proficiency Battery; LCA = latent class analysis; GRADE = Group Reading Assessment and Diagnostic Evaluation; FCAT-SSS = Florida Comprehensive Assessment Test–Science Sunshine State Standards; WJ = Woodcock Johnson; SWE = Sight Word Efficiency; GMRT = Gates-MacGinitie Reading Test; SWD = students with disabilities; ELL = English Language Learners; WIAT = Wechsler Individual Achievement Test; IQ = intelligence quotient; TD = typically developing; GRD = general reading disability; S-RCD = specific RC deficits; WRMT-R/NU = Woodcock Reading Mastery Tests–Revised/Normative Update; MANOVAs = multivariate analyses of variance; ANCOVA = analysis of covariance; CBM = curriculum-based measurement; ROC = receiver operating characteristic; AUC = area under the curve; WCPM = words read correctly per minute; SDRT = Stanford Diagnostic Reading Test; DAB = Diagnostic Achievement Battery; SAT = Stanford Achievement Test; PCA = principal components analysis; LM = language minority; DIBELS = Dynamic Indicators of Basic Early Literacy Skills; NAEP = National Assessment of Educational Progress; TORC = Test of Reading Comprehension; ORF-PF = ORF-Passage Fluency; CCT = Comprehension Circuit Training intervention; ORR = oral reading rate; SARA = Study of Adult Reading Acquisition Battery; ASR = Adolescent Struggling Readers.

assess ORF with passage reading and, sometimes, also included measures of isolated word reading. For passage reading, researchers used the GORT Fluency Index (Brasseur-Hock et al., 2011; Cutting et al., 2009; Eason et al., 2013; Hock et al., 2009; Paige et al., 2014) and varied curriculum-based measurements (CBM; Clemens et al., 2017, 2019; Denton et al., 2011; Gelbar et al., 2018; Kershaw & Schatschneider, 2012; Lesaux & Kieffer, 2010; Ritchey et al., 2015; Tighe & Schatschneider, 2014; Tilstra et al., 2009; Tolar et al., 2014). The GORT Fluency Index is the combined scores of the rate and accuracy subtests. In some studies, researchers used CBM with selected passages from varied sources, such as narrative and expository textbook passages, released passages from state standardized reading assessments, and Jamestown Timed Reading passages. For isolated word reading, researchers most often selected the TOWRE to measure word recognition automaticity (Adlof et al., 2006; Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al., 2019; Cutting et al., 2009; Dennis, 2012; Denton et al., 2011; Hock et al., 2009; Lesaux & Kieffer, 2010; Ritchey et al., 2015; Tolar et al., 2014). As an illustration of an observed discrepancy across the definition, measurement, and analysis, in Savage's (2006) comprehensive analysis of the SVR with 15-year-olds with limited reading proficiency, he defined and measured fluency as accuracy and rate, and used the term *fluency* in one of five hypotheses; however, he only used the results of the rate measure in descriptive statistics, and when testing for the hypothesis involving fluency, he only analyzed the results of the accuracy measure.

ORF as accuracy, rate, and prosody. Least common were ORF definitions that included prosody (i.e., reading with expression; Nomvete & Easterbrooks, 2020; Paige, 2011; Paige et al., 2012, 2014; Tilstra et al., 2009). In addition to using WCPM with passages and other standardized measures of rate and accuracy, Paige et al. (2012, 2014) included the Multi-Dimensional Fluency Scale to assess prosody in both studies. This scale, adapted from Zutell and Rasinski (1991), is a rubric measuring expression and volume, phrasing, smoothness, and pace while reading aloud. Nomvete and Easterbrooks (2020) used the NAEP (National Assessment of Educational Progress) Oral Reading Fluency Scale (Pinnell et al., 1995) to measure phrase-level prosody. Although Tilstra and colleagues (2009) included prosody in their ORF definition, they assessed it as WCPM only and did not include prosody in their research questions. In Paige's (2011) earlier study, he combined three indicators of sight word efficiency, phonemic decoding, and passage reading to represent the construct of oral reading proficiency.

In all studies, the researchers measured ORF during passage reading, but some also included rate of words read in lists. Clemens et al. (2017), Tighe and Schatschneider (2014), and Tilstra et al. (2009) defined ORF as reading connected text, and they measured and analyzed results as such. Several researchers measured word reading and passage reading as distinct skills and examined their study results in like fashion (Adlof et al., 2006; Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al., 2019; Denton et al., 2011; Eason et al., 2013; Hock et al., 2009; Paige et al., 2014; Ritchey et al., 2015; Tolar et al., 2014). In reviewing three of the studies, I discovered why distinguishing between these definitional parts is important. Cutting and Scarborough (2006) viewed assessment results of these parts separately and determined that rate and accuracy of words read in isolation (as they call bottom-up skills) can be predictive of comprehension, depending on the format and requirements of the comprehension measure. Their findings indicated that most variance in RC was consumed by word recognition and decoding as well as oral language proficiency (i.e., linguistic comprehension); however, reading speed added a small, but still significant, additional variance of 1% to 6% on their three selected measures of comprehension. Ritchey et al. (2015) found only Passage Reading Fluency and Spelling Fluency among many reading skills, including words read in isolation, as measured in fourth grade added variance to their model predicting reading difficulties in sixth grade. However, in a study on the skill moderators of a reading intervention, Clemens et al. (2019) found that students with lower ORF (not lower word reading nor vocabulary) at pretest reaped the benefits of an intervention teaching word reading, reading fluency, and vocabulary as shown by higher RC scores than their classmates with higher ORF at pretest or comparison students receiving no intervention.

In contrast, there were some inconsistencies between the provided definition, selected measures, and how relations among variables were analyzed, specifically related to whether ORF represents reading word lists and reading passages or only reading passages. For example, the definition provided by Cutting et al. (2009) could be interpreted as passage reading or word list reading; they measured both facets, but their results distinguished word recognition and contextual ORF. Yet, Kershaw and Schatschneider (2012) defined ORF as both reading in isolation and in passages, and only measured ORF with passage reading. While the definitions provided by Dennis (2012) and Lesaux and Kieffer (2010) could also be interpreted as either or both passage reading or words in isolation, they measured both skills with different measures, and combined the skills under one construct in their analysis. An example potentially causing semantic confusion for readers, Paige et al. (2012) addressed ORF as "word recognition automaticity, the ability to recognize words in text so effortlessly. . ." (p. 68) and prosody. They measured the former as automaticity in passage reading (not words read in a list as other researchers seem to mean when they use the terminology *word recognition*). Words read in isolation as a means to

measure ORF may be problematic as it is representative of word recognition.

Reading comprehension. As with fluency execution, multiple mental tasks are taking place simultaneously to comprehend text. The RC includes the interaction of thinking skills and knowledge while deciphering text independently to make meaning. Some researchers in these reviewed studies included linguistic or language comprehension in addition to RC as a separate construct; by contrast, Dennis (2012) combined these reading skill components into one construct she entitled *meaning*. Clemens et al. (2019), however, used three distinct assessments, each measuring RC. Performance on traditional, commercial tests of RC commonly includes answering questions or recalling key parts after reading a passage, which are criticized to represent only simple or surface-level comprehension (Snow, 2018).

Means for assessing RC varied widely in the reviewed studies (see Table 2); however, two measures were most common. In eight studies, researchers used the Passage Comprehension subtest of the Gray Oral Reading Test (GORT) as one of their standardized assessments of RC (Adlof et al., 2006; Brasseur-Hock et al., 2011; Clemens et al., 2017, 2019; Cutting et al., 2009; Cutting & Scarborough, 2006; Eason et al., 2013; Hock et al., 2009). In many of these same studies, plus a few others, researchers used the Gates-MacGinitie Reading Test, known to have more inferential questions and a better balance between narrative and expository than other standardized RC assessments (Clemens et al., 2017, 2019; Cutting & Scarborough, 2006; Gelbar et al., 2018; Lesaux & Kieffer, 2010; Ritchey et al., 2015; Tilstra et al., 2009).

Thematic Findings

Unclear role of ORF in the SVR for ALRP. Hoover and Gough delineated SVR as a model in their 1990 study that found when early readers have partially developed reading skills, two overt components—decoding and linguistic comprehension—have an additive and multiplicative effect on RC. According to Hoover and Gough, decoding is efficient word recognition, and linguistic comprehension includes other skills that exist outside reading, such as skills required in thinking, analyzing, reflecting, and problem-solving. Researchers for more than half of the reviewed studies (13 of 23) relied on the SVR as their theoretical framework, and the research purpose for five of these studies was to examine the role of ORF within the SVR model (Adlof et al., 2006; Cutting & Scarborough, 2006; Kershaw & Schatschneider, 2012; Savage, 2006; Tilstra et al., 2009). Theoretical frameworks identified in each study can be found on Table 2.

Reviewed studies with early and older readers found mixed results related to the role of ORF within the model. The study by Adlof et al. (2006) suggested ORF (as measured by rate in passage and isolated word reading) did not need to be added to the model. In contrast, Cutting and Scarborough (2006) found that contributions of decoding and linguistic comprehension to RC varied by the type of RC measure used; however, they found additional variance once passage ORF (as measured by rate) was added to the model for first through 10th graders with reading and language deficits. Similarly, Kershaw and Schatschneider (2012) found that passage fluency (accuracy and rate) correlated with RC after controlling for decoding and linguistic comprehension, and that this correlation decreased with the age of subjects (third, seventh, and 10th graders).

Depending on how decoding is measured, the subparts within the SVR and other potential variables may predict RC differently. Tunmer and Chapman (2012) recommend that decoding within the SVR equation is a developmentally constrained construct best assessed as accurate reading of nonword lists in the earliest stages of reading development, isolated word reading with accuracy during later stages of reading growth, and isolated word reading with efficiency and accuracy at more advanced stages. Case-in-point, Savage (2006) found if decoding is measured as nonword reading, then the SVR model holds, but if decoding is measured as oral reading *accuracy* in passage reading, then verbal ability (rather than linguistic comprehension) along with decoding is a better predictor of RC, disrupting the model. Additional regression analysis from this study showed that decoding and linguistic comprehension together explained around 66% of the variance in RC, suggesting there may be other factors to explain unique variance in RC in ALRP.

Given the intention of decoding to be measured as isolated word reading, the question about the role of ORF in the SVR should be whether passage reading automaticity would add variance and, better still, whether ORF as automatic, prosodic reading would add variance. For instance, Tilstra et al. (2009) showed that the combined variance provided by verbal proficiency and oral passage reading automaticity increased the explanatory power of the SVR model. To note, none of the studies examining the role of ORF in the SVR included prosody in their definition and measurement of ORF. Interestingly, although Paige et al. (2014) defined and measured ORF as including rate, accuracy, and prosody in their study, their explained interpretation of the SVR included ORF as an assumed facet of decoding.

ALRP have distinct reader profiles. Across several studies, most of the reading component scores for ALRP were below average, with individual differences in reading skills (e.g., passage reading automaticity, decoding, vocabulary) likely leading to their lack of proficiency with RC (Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al., 2017, 2019; Cutting et al., 2009; Dennis, 2012; Lesaux & Kieffer, 2010;

Table 3. Examples of Distinct Profiles for Adolescent With Limited Reading Proficiency.

Four clusters (Dennis, 2012)	Five clusters (Brasseur-Hock et al., 2011)
Slow and Steady Comprehenders: much higher than the mean of the sample for comprehension, but slightly lower than the mean for decoding and rate	*Severe Global Weakness*: low across all reading skill components
Slow Word Callers: much higher than the mean for decoding, slightly higher than the mean for comprehension, and much lower than the mean for rate	*Moderate Global Weakness*: slightly higher reading accuracy and reading fluency, but similar language comprehension
Automatic Word Callers: much lower than the mean for comprehension, much higher than the mean for decoding and slightly higher than the mean for rate	*Dysfluent Readers*: below average on all reading component skills, but fluency is lowest
Struggling Word Callers: slightly lower than the mean for comprehension, much lower than the mean for decoding, and slightly higher than the mean for rate	*Weak Language Comprehenders*: average reading accuracy and fluency, but low comprehension
	Weak Reading Comprehenders: average fluency, but low language comprehension

Tilstra et al., 2009). Researchers of two studies using similar methods of cluster and latent class analysis (Brasseur-Hock et al., 2011; Dennis, 2012) categorized nonproficient readers into four or five distinct profiles (see Table 3), respectively, suggesting heterogeneity in the strengths and weaknesses of ALRP (e.g., low accuracy, yet average rate). When considering the results of these two studies side-by-side, it is important to note that Dennis's study compared struggling readers with each other rather than with normed standard scores as was the case in the Brasseur-Hock et al. (2011) study. This means that the four clusters outlined by Dennis (2012) revealed reader profiles for higher or lower than the mean of the sample. As a point of emphasis, when considering the profiles of readers with *higher than the mean* for comprehension, these readers were nevertheless comprehending below average in comparison with all readers. Whereas, Brasseur-Hock et al. (2011) included a profile for readers who were low across all reading skill components when compared with normative scores for readers of all skill levels, finding adolescents with (a) significant skill weaknesses, (b) global skill weaknesses, (c) dysfluent readers, (d) knowledge weaknesses, and (e) reading strategy weaknesses.

In other studies, also using latent class analysis, ALRP had varied scores across multiple reading skill components. Lesaux and Kieffer (2010) found that ALRP classified as language-minority learners and native English speakers were evenly distributed among three skill profiles of struggling readers (i.e., slow word callers, globally impaired readers, and automatic word callers), all of whom were characterized by low vocabulary scores and having achieved basic ORF skills (i.e., automaticity). Yet, Clemens et al. (2017) found that almost all ALRP have deficits in either or both passage reading automaticity or vocabulary knowledge with the largest subgroup having deficits in both. In another study indicating the influence of multiple variables, Tilstra et al. (2009), using multiple regression models with a sample of varied reader abilities, found verbal proficiency and passage reading automaticity added a 22% increase in explained unique variance, beyond that of decoding and linguistic comprehension, in RC. The compilation of these studies suggests the predictive nature of ORF to RC is ambiguous due to the range of ORF scores and interaction of multiple reading component skills.

ORF consists of more than automaticity. Several studies suggest that if ORF is measured solely by automaticity (i.e., accuracy and rate combined) to predict RC, then its predictive power is limited or confounded by extraneous variables. In some studies, researchers included other variables or facets of ORF (e.g., extrinsic motivation, linguistic comprehension, prosody). Paige (2011), using structural equation modeling, showed all paths from extrinsic motivation to ORF (as measured by accuracy and rate only, not prosody) to RC to academic achievement for ALRP are significant. Later, Paige and colleagues (2012, 2014) examined the importance of prosodic reading to RC in secondary students and found that as students' average scores for oral prosody increased, so did their comprehension scores. Prosody simultaneously influences and reflects a reader's level of understanding while reading aloud or silently (Paige et al., 2012, 2014). These researchers' findings suggest accuracy and prosody maximize comprehension possibilities, whereas rate's benefit is solely the reader's choice to optimize their comprehension.

Similarly, two studies addressed the influence of linguistic comprehension on ORF. Eason and colleagues (2013) found that oral language, particularly vocabulary and semantics, provides unique variance to passage reading automaticity. Separately, Kershaw and Schatschneider (2012) pointed out the possibility that "variance associated with the passage fluency construct could be associated with the construct of linguistic comprehension, as passage fluency is likely influenced by both the ability to decode and the ability to understand the text as it is being read" and recommended checking for a correlation between these two constructs prior to assuming their unique variance (p. 462).

The role of ORF varies. Oral passage reading automaticity predicts RC to varied degrees for different stages in reading development. For example, Tilstra et al. (2009) found that the predictability of oral passage reading automaticity for RC was similar across upper elementary through high school readers, yet the role of decoding decreased across

the years. They asserted that the purpose of fluency for younger readers is to accurately and quickly decode words, yet for older readers, fluency helps them understand text as well, "reflecting proficiency in both decoding and comprehension" (p. 397). On the contrary, Tighe and Schatschneider (2014) found that oral passage reading automaticity was most predictive of RC for third graders; both fluency and reasoning served as similar predictors for seventh graders; and reasoning was the only significant predictor for tenth graders. Moderate correlations between oral reading automaticity and comprehension were found for older readers, which are weaker correlations than those reported for younger readers (Denton et al., 2011; Kershaw & Schatschneider, 2012). Based on their findings, Gelbar and colleagues (2018) suggested that oral reading automaticity may not be a significant predictor of RC for adolescent readers because of the increased number of multisyllabic words in grade-level text and an increased influence of prior knowledge.

Several studies found that relations among reading component skills varied when researchers itemized variables for text type and when researchers used multiple measures for RC (Cutting et al., 2009; Cutting & Scarborough, 2006; Denton et al., 2011; Eason et al., 2013; Paige et al., 2014). For example, Eason et al.'s (2013) research team, in their study to clarify the relationship between oral isolated word reading and passage reading automaticity to RC, included varied measures of RC. They found that the amount of variance changed for word reading efficiency and passage reading efficiency depending on the RC measure used. Furthermore, in a study by Cutting et al. (2009), groups of students with *specific RC deficits* and *general reading disability* scored higher or lower than each other on reading component skills based on the RC measure used. Finally, a study by Tolar and colleagues (2014), examining the predictability of varied progress monitoring slopes to different outcome measures (e.g., oral passage reading automaticity, comprehension), found that slope validity was greatest when progress monitoring measures were aligned with the outcome measure. More specifically, their results showed that oral passage reading automaticity was generally not a significant predictor of RC.

Oral reading automaticity has tenuous predictive value for ALRP. All reviewed studies included academically diverse readers, and results of some studies suggested that proficient and nonproficient readers have heterogeneous profiles. Adolescents with low RC performance had below-average scores across multiple reading skill components, sometimes including oral reading automaticity (Adlof et al., 2006; Cirino et al., 2013; Clemens et al., 2017; Cutting et al., 2009). More specifically, Cirino and colleagues (2013) examined connections between decoding and oral reading automaticity across readers with varied comprehension abilities, and their findings indicated "that fluency is more related to decoding in struggling readers, whereas it is more related to comprehension in typical readers" (p. 1079). Their study found that only 12% of readers struggling with comprehension had only a comprehension issue and that 68.2% had difficulty in more than one domain (e.g., decoding, ORF, silent reading fluency, comprehension). Furthermore, results from Clemens et al. (2017) showed a small portion (20%) of their sample to be readers with adequate fluency and low comprehension. Nomvete and Easterbrooks's (2020) investigation on the interrelationship among phrase-reading ability, syntactic awareness, passage reading rate, and RC for ALRP showed that these skills are positively correlated, but that language-related variables accounted for additional variance in RC beyond passage reading rate. The convergence of results from these studies may mean that if adolescents can read passages with automaticity and further still with fluent phrase-reading ability, then they will likely have average comprehension.

In addition, two studies suggested that ORF may predict general reading ability and a need for reading intervention in some regard. Ritchey et al. (2015) investigated which fourth-grade measures predicted sixth-grade reading problems and found that among many reading component skills assessed in fourth grade, passage reading automaticity and spelling fluency were statistically significant (area under the curve [AUC] = .91) to predicting identification as having reading difficulties in sixth grade as shown by later RC scores. In a study by Clemens et al. (2019) to examine whether pretest skills moderated the effects of a multicomponent reading intervention, their results suggested that readers with low oral reading automaticity scores at pretest benefit more from an intervention targeting word reading, reading fluency, and vocabulary, as shown by increased RC scores at posttest. Of import, these same readers did not show improvement in their oral reading automaticity. Thus, this study informs readers about the potential for oral reading automaticity scores to alert educators to a general reading ability issue.

However, it is important to emphasize that one cannot assume low RC when ORF is low. Hock et al. (2009) found that ALRP had similarly below-average means for several reading skill components and that proficient readers also had varied profiles. In a more recent study, Gelbar et al. (2018) found that some secondary students with dyslexia (i.e., low phonological processing abilities and average linguistic comprehension) achieved RC scores comparable with their same-age peers. Their study examined three predictors—study strategies, ORF, and cognitive ability—and found only cognitive ability as a significant predictor. Adlof et al.'s (2006) study also showed readers with rate deficits yet average comprehension. These findings suggest that a proficient reader can score below average for oral reading automaticity and average for RC.

Discussion

This systematic literature review is the first synthesis of empirical findings on the relations between ORF and RC for ALRP. Although a correlation between ORF and RC exists, the extent to which ORF predicts RC (RQ1) and to which its measurement can be used to determine adolescents' needs and growth (RQ2) is limited. Across studies, researchers did not measure all dimensions of ORF (i.e., prosody was rarely measured), and this omission influences the predictive power of any ORF construct measured in cross-sectional research and reported in the literature. The predictive power of ORF depends not only on the way it is measured (e.g., rate, accuracy, prosody, during isolated word reading or passage reading), but also on the RC measure used (e.g., maze/cloze, multiple choice, recall). The intersection of results from reviewed studies indicates several complications with allowing ORF, measured with WCPM, to play a dominant role in making instructional decisions related to an adolescent reader's comprehension abilities.

A first complication is ORF is one reading component skill among many that interact to result in RC, and this one facet likely consists of more than accuracy and rate. Outside the results of this review, there is agreement that an intact ORF construct includes prosody (e.g., Chomsky, 1978; Rasinski, 1990). If three component skills—decoding, fluency, and linguistic comprehension—contribute to RC, then by definition, measurement of oral accuracy and rate cannot be relied upon as a sole predictor for comprehension. By this point in their reading experience, adolescents may have learned varied skills related to the reading process, some with success and some with challenges; therefore, the potential exists for there to be multifaceted strengths and weaknesses in their reader profile. Struggling readers were found to be low across multiple reading skill components (e.g., Brasseur-Hock, 2011; Dennis, 2012; Lesaux & Kieffer, 2010), and, for some proficient readers, oral reading automaticity is the lowest score in their reader profile (Hock et al., 2009).

A second complication is due to the complexity of RC. The RC is a complex process and demands across-text change. Eason et al. (2013) found that while passage reading automaticity provided unique variance, the amount changed depending on the RC measure. Given the varied texts adolescents are expected to read as part of disciplinary literacy expectations representative of the middle and high school learning experience (e.g., academic vocabulary and text structure; Shanahan & Shanahan, 2008) and the complexity of comprehension (e.g., higher-level thinking, self-regulatory monitoring, and executive functioning skills), then the rate component of fluency may fluctuate with necessity. Different task demands and purposes for reading require a reader's emphasis on varied aspects of ORF (International Literacy Association [ILA], 2018). This may mean prosody is a facet of ORF that more closely represents a reader's comprehension; however, as shown in this review, only three studies, two by Paige et al. (2012, 2014) and one by Nomvete and Easterbrooks (2020), included prosody as a subpart of ORF, bringing into question the construct validity of ORF in nearly all other studies. Finally, in consideration of Tolar et al.'s (2014) finding that progress monitoring tools closely aligned with outcome measures have greater predictive value, measures used at the secondary-level need to match the realistic demands of reading tasks.

A third complication is related to the causes and effects of below-average ORF. The causes of below-average ORF will help drive instructional decisions, yet effects of below-average ORF vary. When ORF does contribute to RC, it may be explained by oral language abilities, specifically vocabulary and semantics (Eason et al., 2013). For example, other variables may influence an older reader's ORF and RC because multisyllabic words require abstract understanding beyond the ability to pronounce them, such as vocabulary knowledge, prior knowledge, and cognitive ability (Gelbar et al., 2018), and motivation for reading contributes to ORF (Paige, 2011). Low ORF may indicate a need for continued general reading skill development (Clemens et al., 2019; Ritchey et al., 2015); however, a reader may develop RC proficiency and continue to lack ORF proficiency (Gelbar et al., 2018). Finally, the uniqueness of a reader's profile increases as their experiences with reading increase. As proficient readers have varied profiles as do struggling readers (Hock et al., 2009), an oral reading automaticity score alone is not enough to indicate an RC issue nor monitor progress.

Limitations

A limitation of this review is many reviewed studies also involved the examination of other predictors (e.g., Cutting et al., 2009), but their findings were not synthesized here. While it is impossible to include all extraneous variables predicting RC in a statistical model, in these studies, it was possible to view the influence of some other variables believed to attribute to the outcome. In studies with older readers, there is room for variance to be explained by other factors beyond decoding and language comprehension (Kershaw & Schatschneider, 2012; Savage, 2006). Thus, for ALRP in particular, another more relevant and efficient sole predictor of RC may be found. For example, Snow (2018) asserted that the outcome variable for the SVR (i.e., RC) is difficult to measure and would add "indicators of skill in the three domains identified by LaRusseo et al. (2016) as predictors of comprehension: academic language, perspective taking, and argumentation" (p. 316) as well as indicators of the reader's skills to employ different reading strategies per varied discipline-specific texts.

Finally, there were excluded studies that used researcher-adapted passages and researcher-made multiple-choice questions (e.g., Saenz & Fuchs, 2002) with potential insights on this topic.

Implications

Given the distinct contextual factors unique to middle and high schools and developmental literacy needs of adolescents, this review provides direction to researchers, assessment developers, practitioners, and school administrators on the use of ORF to predict RC and to determine adolescent readers' needs.

Research and development

Theoretical frameworks. There is a need for researchers to examine how reading theories influence research design for intervention development, measurements of their effectiveness, and examinations of relations among reading variables, specifically for ALRP. The SVR is reputable for explaining conceptually the components of reading, and "hundreds of studies have used this model [the SVR] to guide their investigation and/or interpret their results" (p. 317, Catts, 2018). Researchers for more than half of reviewed studies used the SVR as their sole theoretical anchor. As it stands, the SVR does not explicitly include ORF as its entire construct, leaving space for inquiry. Given the common practice of grounding reading research on the SVR and the frequent use of ORF as a variable to measure the effectiveness of reading interventions, understanding potential connections between ORF and the SVR for adolescents will support applications of the model.

Researchers, outside of those in the reviewed studies, have proposed their iterations to the SVR and new reading models for application with adolescents. Carver (1993) added rate to the model and extended the model to college readers. In the Reading Systems Framework, Perfetti et al. (2005) cast lexicon as the key linkage between decoding and RC as part of a word-to-text integration processes. In yet another variation, Pikulski and Chard (2005) considered fluency as a bridge between decoding and RC. Deshler and Hock (2007) suggested an added executive functioning component to create a bridge between decoding and linguistic comprehension. Francis et al. (2018) proposed the Complete View of Reading (CVRi) as an extension of or an alternative to the SVR. The CVRi is based on a study showing a differential influence of text features on adolescents' oral reading automaticity at the person and passage level. Hoover and Tunmer (2018) asserted that a direct relation between the SVR and CVRi requires additional research and express value in the CVRi for enabling individualization for instructional interventions that target personalized reading profiles. Interestingly, in the study to develop the CVRi, researchers used ORF (measured as WCPM) as the outcome variable, following the assumption that oral reading automaticity correlates with RC.

The SVR is useful for designing studies and interventions; however, particularly for those focused on adolescents, there are other theoretical frameworks needed in place of or in combination with the SVR. Several reviewed studies integrated multiple reading theories (Clemens et al., 2017, 2019; Lesaux & Kieffer, 2010; Nomvete & Easterbrooks, 2020; Paige, 2011; Paige et al., 2014); some referenced no theory (Dennis, 2012; Denton et al., 2011; Gelbar et al., 2018; Paige et al., 2012; Ritchey et al., 2015; Tolar et al., 2014); and some relied on frameworks other than SVR, such as discourse processing theory (Hock et al., 2009) and neuropsychological framework (Cutting et al., 2009). Paige et al. (2014) proposed the tandem theory of reading that assumes when the goal of reading is to comprehend and sufficient meta-cognitive skills are in place, then accuracy and prosody maximize comprehension possibilities, whereas rate's benefit is solely the reader's choice to optimize their comprehension. This theory is supported by their finding that as students' average scores for oral prosody increased, so did their comprehension scores. The Tandem Theory suggests that a skilled reader will read accurately with appropriate pace (not meaning fast) and with intonation appropriate for the text type, and these qualities taken together (i.e., automaticity and prosody) may serve as a proxy for proficient RC. In relation to the SVR, adequate decoding and linguistic comprehension make appropriate pace and intonation possible. Thus, measured reading component skills are influenced by characteristics present in varied text types and difficulty levels (i.e., multisyllabic, infrequently used or discipline-specific words, and integrative thinking skills). Additional research about the mediating effect of prosody on the relations proposed in the SVR would be instructive to the field.

Measurement tools. In a recent brief by the ILA (2018), this point is clear in their title: *Reading Fluently Does Not Mean Reading Fast*. Adolescent literacy researchers and practitioners need an efficient measurement of the entire ORF construct and other predictors or methods to determine which adolescents need additional reading instruction outside the typical core classroom experience and to monitor their progress. This review shows there is limited empirical evidence on the use of prosody as a reading component skill to represent meaning-making while reading. As noted by Nomvete and Easterbrooks (2020), there is a need for researchers to investigate the feasibility of a phrase-level reading measure, representing a subskill uniquely related to reading prosody, as a tool for predicting and improving RC in adolescents. The ALRP will benefit when researchers and practitioners measure skill growth in meaningful ways linked to outcome goals at the secondary level.

Schools and practitioners. Due to varied reader profiles and the complexity of ORF and RC by adolescence, middle and high schools may consider multiple assessments to determine intervention needs. As an example, an adolescent who performs poorly on a measure of RC may or may not need word-level intervention, and only by administering additional measures would instructional needs be clarified. This reader may need a comprehensive reading intervention that includes decoding; however, this would only be known by assessing multiple reading skill components through a diagnostic process (see Washburn & Billingsley, 2018, for detailed examples of using multiple data points and a collaborative approach to decision-making related to literacy). Likewise, educators cannot assume a reader has strong RC when presented with an adequate automaticity score alone. When multiple constructs are considered and measured, then a comprehensive, holistic picture of the struggling reader becomes visible for teachers and school decision-makers.

Finally, the 2015 Every Student Succeeds Act offers states and schools some guidance about how to change their approach to literacy assessment and instruction (Niebling & Lovell, 2015), as do national efforts such as the widespread adoption of the Common Core State Standards and college and career readiness standards, which have increased the emphasis on adolescent literacy in the content areas. Experts acknowledge that systemic literacy instruction in middle and high schools needs to look different than it does in elementary grades (Ehren et al., 2004; International Reading Association, 2012). This guidance may be helpful in mitigating the organizational challenges at the secondary level, where students typically learn from discipline-specific teachers, and special educators have limited opportunities to teach foundational reading skills (Leko et al., 2018).

Conclusion

This article systematically reviews evidence on the relations between ORF and RC for ALRP in Grades 6 to 12. Results suggest that knowledge of an adolescent's ORF, as commonly defined and assessed in the literature, provides helpful information about an adolescent's reader profile but is not sufficient to evaluate instructional needs or measure progress. In addition, this review extends and confirms Kuhn et al.'s (2010) theoretically based conclusion that most educational researchers continue to measure an incomplete conceptualization of ORF. Because researchers embrace the potential to establish a basis for practices in schools and because what is emphasized over time becomes habit, there is a need for researchers to be more intentional about defining constructs, selecting measures, and interpreting results. Furthermore, even when the focus of adolescent reading theory and related intervention practices have developmental components by necessity, such as in the case of instruction for ALRP, researchers can use a theoretical lens to relate to the characteristics of adolescents, content and disciplinary literacy needs, and typical instructional approaches to reading in middle and high school. Not only is reading required for learning in all disciplines, but also for survival, self-preservation, and self-directed promotion in today's world; thus, it is imperative for schools to determine the best means for achieving their goals for adolescent readers.

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