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NAEP
NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

The 2018 NAEP Oral Reading Fluency Study

NCES 2021-025
U.S. DEPARTMENT OF EDUCATION

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The 2018 NAEP Oral Reading Fluency Study

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Executive Summary

The 2018 NAEP Oral Reading Fluency (ORF) study, the first NAEP ORF study since the 2002 study, was administered to a nationally representative sample of over 1,800 fourth-graders from 180 public schools. Oral reading fluency was defined as the ability to read text aloud with speed, accuracy, and proper expression.

Students first completed the NAEP fourth-grade reading assessment and then read four short passages out loud to assess their oral reading fluency. Also, to understand the likely underlying sources of poor fluency—inefficient word recognition and phonological decoding—students were timed and scored for accuracy as they read lists of words and pseudowords (e.g., *jad*). Pseudowords were used to demonstrate students' ability to phonologically decode unfamiliar words.

Fourth-graders performing below *NAEP Basic* were evenly divided into three subgroups (below *NAEP Basic* Low, Medium, and High) based on the distribution of NAEP reading scale scores. This is the first time that students performing below *NAEP Basic* have been grouped in this manner, allowing a closer examination of the variation within this important group.

Key Findings

- Across all of the data described in this report, there was a consistent and positive relationship between NAEP reading assessment performance and oral reading fluency and between NAEP reading assessment performance and word and pseudoword reading.
- Oral reading fluency, word reading, and pseudoword reading skills declined at each step down the NAEP reading achievement levels, from *NAEP Advanced* to *NAEP Proficient* to *NAEP Basic,* and then again for each step down through the three below *NAEP Basic* subgroups—below *NAEP Basic* High, Medium, and Low.
- There were noticeable variations in performance among the below *NAEP Basic* subgroups for every dimension of oral reading fluency (reading with proper speed, accuracy, and expression) and for each of two "foundational skills," recognizing familiar written words and decoding unfamiliar ones.
- For fourth-graders in the below *NAEP Basic* subgroups, particularly those in the below *NAEP Basic* Low subgroup, fluent reading of connected text, such as paragraphs and passages, was challenging.
- About 27 percent of White, 51 percent of Black, and 46 percent of Hispanic fourth-graders fell into the below *NAEP Basic* group. Black students were also overrepresented in the below *NAEP Basic* Low subgroup.

For a brief version of this report, see its companion publication, *Highlights of the 2018 NAEP Oral Reading Fluency Study* (White et al. 2021), which is available at https://nces.ed.gov/nationsreportcard/studies/orf/.

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Introduction

The 2018 National Assessment of Educational Progress (NAEP) Oral Reading Fluency (ORF) study was conducted to examine the oral reading performance of fourth-grade public school students. The study was administered to a nationally representative sample of 1,800 students between January and March of 2018. It measured students' oral reading fluency in terms of speed, accuracy, and expression.

The NAEP ORF study was administered by the National Center for Education Statistics (NCES) first in 1992 and later in 2002. In several ways, the rationale and aims of the previous studies are reflected in the current study. As described by Daane et al. (2005), the study was "designed to examine several important components of literacy development that are integrated in proficient reading—reading accuracy, reading rate, and reading fluency—and to compare these to overall reading comprehension as measured in the main NAEP Reading Assessment." (p. 2). These aims will be revisited in this report.

NCES administers the main NAEP reading assessment (hereafter referred to as NAEP reading assessment) every 2 years to students at grade 4. The NAEP reading assessment only assesses passage comprehension. In recent years, the results of this assessment have shown that a large portion of public-school students performed below *NAEP Basic* in reading (32 percent in 2015, 33 percent in 2017, and 35 percent in 2019).[1] In this report, we focus attention on the oral reading fluency, word reading, and pseudoword reading skills of the students performing below *NAEP Basic.* To provide a more nuanced picture, we report results for three subgroups of students scoring below *NAEP Basic*—below *NAEP Basic* Low, Medium, and High.

There are no comparisons of results between the current and earlier NAEP ORF studies in this report because the design of the 2018 NAEP ORF study has been improved in several important ways (and it does not contain the same tasks to allow a link back to the previous NAEP ORF studies). First, the current ORF was administered using the new e-NAEP platform on tablets[2] to small groups of students at the same time in a single room, rather than with one-on-one administration. Second, the 2018 NAEP ORF student responses were scored for accuracy and rate utilizing state-of-the-art, natural language processing scoring algorithms based on spoken language processing (see the NAEP ORF website for administrative details, https://nces.ed.gov/nationsreportcard/studies/orf/.

Finally, in the earlier studies, students had another chance to read the passage silently before they read it aloud (as part of the NAEP reading assessment). In the current study, students read aloud a set of four passages that they had not seen in the NAEP reading assessment session. This "cold read" procedure is now common practice in oral reading fluency probes used in school-based screening and progress monitoring assessments (Wayman et al. 2007). The expression scale has also been refined in terms of levels and description in consideration of recent developments

[1] See the Nation's Report Card at https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4 for additional details about the grade 4 NAEP reading achievement level.
[2] See the NAEP digitally based assessments at https://nces.ed.gov/nationsreportcard/dba/.

in the literature in this area (e.g., Kuhn, Schwanenflugel, and Meisinger 2010; Schwanenflugel and Benjamin 2017). Finally, the 2018 NAEP ORF study oversampled low-performing students in order to provide a more nuanced picture of the fourth-graders in the below *NAEP Basic* level of achievement.

Importance of Measuring Oral Reading Fluency

Students who have appropriate speed, accuracy, and expression when reading aloud (i.e., students who have oral reading fluency) are more likely to comprehend connected text (Fuchs et al. 2001; Sabatini, Wang, and O'Reilly 2019). This is because they are able to conserve cognitive resources that can be applied to comprehension of meaning. More specifically, because they have developed high-quality lexical representations, they can retrieve word meanings quickly (Perfetti 2007).

Most administrators and teachers understand that speed, accuracy, and expression when reading aloud are essential in support of reading comprehension and learning in subject areas. Educators also understand that ORF is a strong indicator of overall reading competence (Fuchs et al. 2001). Therefore, ORF has become the primary measurement technique for determining which students may be on track toward meeting state reading standards and which students would benefit from additional services and intervention (Crawford, Tindal, and Stieber 2001; McGlinchey and Hixson 2004; Reschly et al. 2009; Silberglitt and Hintze 2005; Stage and Jacobsen 2001).

Oral reading has been found to be effective in helping students become better readers (Chard, Vaughn, and Tyler 2002; Kuhn and Stahl 2003; National Reading Panel 2000; Rasinski and Hoffman 2003; Samuels and Farstrup 2006; Shanahan 1998; Therrien 2004). In addition, regular classroom assessment of oral reading, also known as curriculum-based measurement by some (e.g., Fuchs et al. 2001) and progress monitoring by others, has been widely implemented and used to place students into different tiers within response-to-intervention models of instruction and intervention (Griffiths et al. 2009).

With so much at stake in terms of the increasing importance of ORF in reading assessments and the heightened policy and practice role that it plays in learning accountability systems across states, NCES decided to examine again the oral reading performance of a nationally representative sample of fourth-graders in 2018. The key idea was to compare several metrics of ORF measures to policy-relevant achievement levels from the NAEP reading assessment.

By providing common profiles of low-fluency fourth-grade readers based on rich evidence from the 2018 NAEP ORF data, teachers may be further encouraged to (a) identify students who face fluency and foundational skill challenges (i.e., word reading and phonological decoding) and (b) create enhanced instructional practices for those readers who are falling behind grade-level expectations. The findings may also send an important signal to policymakers and educators: It cannot be assumed that all students have achieved oral reading fluency and adequate foundational skills by the fourth grade.

Purpose of the 2018 NAEP ORF Study

The main purpose of the 2018 NAEP ORF study is to gain a fuller understanding of how fourth-grade students perform on ORF and the relationship of ORF performance to NAEP reading assessment performance. Accordingly, this report has the following aims. The first is to explain the measures and procedures of this new study. The second is to report on overall results for the nation's fourth-grade public school students and on key group differences, as is typical of NAEP reports. The third is to explore the relationship of reading comprehension as measured by the NAEP reading assessment to the ORF measures, with special attention to students performing below *NAEP Basic,* which comprise larger percentages of racial/ethnic minority, language and linguistic minority, and low socioeconomic status (SES) students. The final aim is to improve the interpretation of the NAEP reading assessment scores at the lowest end of the achievement spectrum—those below *NAEP Basic.*

To anticipate our discussion, most children who score below *NAEP Basic* on the NAEP reading assessment also show various profiles of lower performance on the oral reading measures, which emphasizes the importance of word-level accuracy and rate to reading comprehension. Clearly, as evidenced in their oral reading, not all children have mastered their foundational skills by the fourth grade. Ignoring these problems is not a remedy, as longitudinal studies show that poor foundational skills result in stagnant comprehension growth in the middle grades (Wang et al. 2019). There is the further issue of student motivation and interest in reading. If reading is always effortful and understanding is incomplete, then students will choose to read less, creating a vicious circle denying students who need practice and experience with texts the most from engaging in reading widely.

Definition of Oral Reading Fluency

Following the National Reading Panel's definition of fluency (National Reading Panel 2000, p. 3-1), the 2018 NAEP ORF study operationally defined fluent readers as those who can "*read text with speed, accuracy, and proper expression.*" The theory underlying this operational definition is captured by Kuhn and colleagues (2010), who state that fluency is demonstrated during oral reading of passages through ease of word recognition and appropriate pacing, phrasing, and intonation (i.e., expressiveness), which indicates the extent to which these prosodic features match the structure and meaning of the text.

As can be seen from the above definition, the 2018 NAEP ORF combines accuracy, speed, and expression, which, taken together, facilitate the reader's understanding of textual meaning. When there is weakness in oral reading fluency (evidenced by errors in reading, hesitation, or inappropriate pauses that signal the student is challenged by the text), it is often explainable in terms of the difficulties a child is experiencing in word reading, phonological decoding, vocabulary, or grammatical structures of the English language.

We call attention here to the rate and accuracy of word reading and phonological decoding because they are *foundational* for fluency and subsequent development of reading comprehension. The more words children can recognize in print quickly and without effort, the more efficiently they can acquire new vocabulary and knowledge through reading. This, in turn, helps in the comprehension of each new text they encounter.

For children with weak word reading and phonological decoding skills, it is challenging and effortful to learn new words from printed sources. Demands for learning subject area vocabulary and content knowledge increase across the late elementary, middle, and secondary grades. An increasing number of new words must be learned to enable the learning of standards-based factual and conceptual content knowledge; more sophisticated comprehension skills and strategies are also required to keep pace with content learning demands (McNamara 2007).

Method

Measures

The 2018 NAEP ORF measures were conceptualized, constructed, and labeled in the following manner:

- ***Passage reading (Oral Reading Fluency):*** The ability to read connected text with appropriate rate, accuracy, and expression—revealing the ability to use knowledge of language to understand texts and draw appropriate inferences. The skills to understand and interpret text, in turn, depend on knowledge of vocabulary, sentence structure, sentence meaning, genres, and topics, world knowledge, personal experience, and conceptual reasoning.
- ***Word reading*** (also known as *word recognition*): Following the Literacy Information and Communication System (https://lincs.ed.gov), which defines word reading as "the ability of a reader to recognize written words correctly and virtually effortlessly," we define word reading as the ability to recognize familiar written words with appropriate speed and accuracy—relying primarily on orthographic memory (i.e., where the spelling of words triggers memory for meaning and phonology). Children in the primary school grades must recognize the printed words they already know when listening or speaking, and they must learn to do this with little conscious effort.
- ***Phonological decoding:*** The ability to pronounce a printed sequence of letters based on knowledge of spelling-sound correspondences. Unlike word reading, which relies on orthographic memory, phonological decoding depends on the association of letter and sounds or letter patterns and sound patterns. Many words that are initially pronounced by decoding (or "sounding out") eventually become automatically recognized as words with minimal conscious effort.

Each of the above measures were operationalized in terms of two performance aspects or scores—rate and accuracy—as well as the product of the two (words correct per minute).

- ***Words correct per minute:*** The total number of words correctly read divided by the amount of time taken to read each passage and word-level lists; that is, the words correct per minute (WCPM) score. Note that this variable is dependent on the two measurements, rate and accuracy.
- ***Accuracy:*** he percentage of words that was read accurately. For passages, the total number of attempted words in the passage was the denominator, and for word lists, the total number of words presented to students was the denominator.
- ***Rate:*** The total number of words students attempted to read (i.e., how far in the text they reached from the first attempted word) divided by the amount of time taken to read the text, yielding a words per minute (WPM) score. Attempted words included words read correctly or incorrectly as well as those that were skipped.

Passage reading was operationalized in terms of one additional measure—expression—defined below:

- ***Expression:*** Appropriate intonation, rhythm, emphasis, and pausing that groups words into phrasal and larger units in ways that express the meaning and structure of the text and enhance understanding and enjoyment in a listener.

Description of the Tasks

The following text materials were given in English to students to be read aloud. See appendix B for a more detailed description of stimulus materials and how they were created.

- Four text passages, each consisting of 152–162 words, providing a measure of fourth-graders' ability to read words aloud in connected texts.
- Two comparable forms of word lists of 24 English words arranged in increasing order of complexity, providing a measure of individual students' ability to recognize familiar words.
- Two comparable forms of pseudoword lists of 18 non-occurring English forms (e.g., wike), providing a pure measure of students' ability to decode or produce pronunciations of words they are unfamiliar with.

All instructions were given in English and students were expected to provide oral responses in English.

Study Sample and Administration of the Tasks

A nationally representative sample of 1,800 fourth-graders from 180 public schools participated in the 2018 NAEP ORF study with a response rate of 88 percent. Public schools with 75 percent of students eligible for the National School Lunch Program (NSLP) were oversampled. Students in this sample were weighted to represent the total population of U.S. fourth-grade public school students.

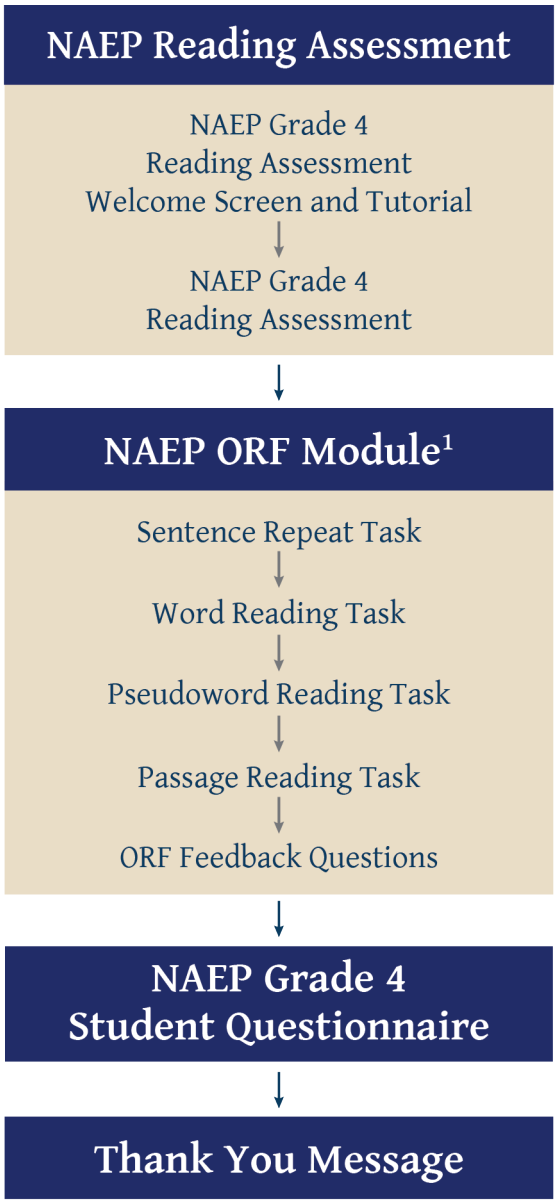
The 2018 NAEP ORF assessment started with a NAEP grade 4 reading assessment tutorial followed by the NAEP reading assessment. As is typical in NAEP reading assessments, each student received two blocks of items.[3] Then they responded to the study task module with four ORF feedback questions. Lastly, they answered the NAEP fourth-grade reading student questionnaire.[4]

The study task module consisted of four types of tasks in the following order: (1) repeating four sentences aloud to measure students' speaking skills, (2) reading a word list aloud, (3) reading a pseudoword list aloud, and (4) reading four passages aloud with a single yes/no

[3] In total, there were 10 blocks of items in the 2017 NAEP reading assessment at grade 4 (the most recent assessment available at the time of the study). Two of the 10 blocks were released; therefore, the ORF study used the remaining eight blocks of items to assess students' reading comprehension.
[4] Students' demographic data were obtained from the NAEP reading student questionnaire.

passage meaning question for each passage.[5] Before students were administered each task type, they were shown a tutorial that provided instructions with task-specific examples of a student demonstrating each upcoming task. The average time to complete the actual operational ORF module was 15 minutes. Figure 1 demonstrates the ORF assessment procedure.

Figure 1. NAEP Oral Reading Fluency (ORF) study assessment administration procedure: 2018



[1] At the beginning of the NAEP ORF module, students were given general directions for the module including how to use the headset properly. Then, for each study task, students were given task-specific instructions with a demonstration before performing the task. For example, for the pseudoword reading task, students were told, "Now, you will read out loud from a list of made-up words" and then the tablet screen showed a few examples of made-up words. Four ORF feedback questions about the students' experience in oral reading were presented by voice-over with four choices shown on the screen: (1) In this school year, how often have you read out loud in school or at home, or anywhere? (2) Who did you read to? (3) Where were you? and (4) How difficult was this reading out loud test?

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

[5] Each passage was followed by a single yes/no passage meaning question to encourage reading for meaning, but these questions were not scored.

The 2018 NAEP ORF assessment was administered on the 2018 e-NAEP platform on tablets, which presented text and tasks on the screen and recorded the student's reading aloud. Student recordings were transferred from the tablets to a NAEP database for scoring (see "Scoring of ORF Measures" below).

The ORF assessment was administered in groups. Approximately 10 students, spaced at least two meters apart, took the assessment in the same room, and students were provided cardboard carrels to reduce the noise from the surroundings. Each student wore a headset with a boom-mounted noise-canceling microphone to complete the ORF module. The potential impact of the number and spacing of multiple students reading aloud on the quality of other students' read-aloud performance and on the suitability of the resulting audio recordings for scoring was studied extensively in cognitive laboratory testing and during the feasibility test and pilot study. The subsequent operational implementation of the study in 2018 fully addressed all issues and concerns identified previously.

Scoring

In this study, NCES used a new automatic speech analysis/scoring system[6] that calculated accuracy, rate, and WCPM variables to score student passage reading recordings. This system transcribed the student recordings of passage reading and then aligned the resulting orthographic transcripts with the passage text. The system recognizes accepted pronunciations of each word, taking into account dialect and second language variations as long as the speaking pattern remains consistent throughout the reading. A validation experiment provided evidence that the system can score oral readings as well as human scorers do, and that automated scoring is not biased against English language learners (ELLs) or Black students (Balogh et al. 2012). In addition, students were not penalized for problems unrelated to reading, such as stuttering.

To evaluate the reliability of the automatic speech analysis system, a sample of the passage recordings were transcribed by both the system and a trained human scorer. Each of the two transcriptions was aligned with reference to the passage text such that the alignment minimized insertions, deletions, and substitutions. Then, within the span of passage text that the student attempted to read, the system counted the number of words that were correctly read in the correct order. The correlation between the counts of words correctly read using the machine transcriptions vs. the human transcriptions of the same recordings was 0.96.

For recordings of word reading and pseudoword reading, trained human scorers transcribed students' oral responses. Then the analysis/scoring system produced a time alignment of each transcript with the corresponding student recording, calculated the duration of the student's list reading, and counted the number of words or pseudowords that were correctly read. These counts and the corresponding reading durations were combined to calculate the word reading and pseudoword reading WCPM variables. A sample of the students' oral response recordings

[6] See Scoring tab on the NAEP ORF website, https://nces.ed.gov/nationsreportcard/studies/orf/scoring.aspx.

was transcribed by two different scorers to evaluate the reliability of human transcripts of the two list types. The correlation between the two human transcriptions was 0.99 and 0.97 for word reading and pseudoword reading, respectively.

Passage reading expression was scored by trained human scorers using a 6-point scoring rubric (see figure 2). Again, a sample of students' passage reading responses were scored for expression by two scorers to examine human scoring reliability. Between two human scorings, the exact agreement rate (i.e., the percentage of scores that were exactly the same) was 58 percent and the adjacent agreement (i.e., the percentage of scores that were only one level different) was an additional 39 percent.[7] For more information about the automatic speech analysis system and scoring reliability, see the NAEP ORF website, https://nces.ed.gov/nationsreportcard/studies/orf/.

The scoring of the passage reading expression measure reflected a holistic judgment that was based on the reader's predominant pattern of performance in expressing structure and meaning. Speaking rate within a normal range and word reading accuracy were not considered part of expression. Similarly, pronunciation quality was not part of expression. And, in general, if the reader skipped a word, inserted a word, or substituted a similar word for a text word, and the meaning was reasonably expressed, then the misreading was not counted against expression.

[7] Exact agreement lower than 61 percent was flagged to indicate mild concern; exact agreement lower than 57 percent was flagged to indicate greater concern. This criterion was based on the NAEP Writing assessment, which has six scoring categories. See https://nces.ed.gov/nationsreportcard/tdw/scoring/scoring_within.aspx for more detail.

Figure 2. NAEP Oral Reading Fluency passage reading expression rubric: 2018

Score	Level	Description
0	Insufficient Sample	○ Insufficient sample for rating (fewer than 12 words read aloud correctly).
1	Word by Word	○ Less than ¼ of the words read aloud with appropriate expression. ○ Reading focuses on individual words (not phrases, sentences, or the passage). ○ Reading is all or mostly monotone.
2	Local Grouping	○ More than ¼ and less than ½ of the words read aloud with appropriate expression. ○ Reading focuses on local word groups (with little to no focus on phrases, sentences, or the passage). ○ Reading may be mostly arrhythmic or monotone.
3	Phrase & Clause	○ More than ½ of the words read aloud with appropriate expression. ○ Reading expresses the structure or meaning of words, phrases, clauses, and a few sentences (with little or no focus on the passage). ○ Intonation may sometimes reinforce rhythmic grouping, or reading may be monotone.
4	Sentence Prosody	○ More than ¾ of the words read aloud with appropriate expression. ○ Reading correctly expresses text and sentence structure and meaning (which may include non-local text connections). ○ Reading can be occasionally inconsistent, but not monotone. ○ Reading rate is at least 55 words per minute (at least 80 text-words-read to merit this level or above).
5	Passage Expression	○ Passage read as if for a listener—of the passage portion read aloud, all or nearly all (at least 90 percent) is read with appropriate expression. The reading consistently expresses the structure and meaning of sentences, paragraphs, and the passage as a whole (which may include non-local text connections). ○ Reading may include a few word stumbles or misreading, but it is expressive throughout. ○ Reading rate is at least 80 words per minute (at least 120 text-words-read to merit this level).
8	Silent Reader	○ Recording has audio signal, but no near-field speech from the student. ○ Audible background sounds, breathing, or microphone touching may suggest the reader did not speak throughout the recording period.
9	Anomaly	○ Not 0, 1, 2, 3, 4, 5, or 8. Not a silent reader, nor any near-field reading aloud. ○ Possibly with off-task or irrelevant speech, evidence of confusion, or anything else unexpected, including electronic crackle or dead flat-line signal.

NOTE: Passage reading expression ratings of 8 and 9 were treated as missing as these students' expression level could not be determined because of the quality/content of the audio file.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Results

Average Oral Reading Fluency Performance and Foundational Skills

Average scores for each of the oral reading fluency measures are shown in table 1. Typical U.S. fourth-graders read passages at 120 words correct per minute (WCPM) and 126 words per minute with an accuracy of 94 percent (which is about 1 out of every 17 words read incorrectly). The average expression score was approximately at Level 4 indicating that, overall, these fourth-graders could "correctly express text and sentence structure and meaning" of continuous text through appropriate intonation, rhythm, emphasis, and pauses despite occasional inconsistency.

The average WCPM score was 51 for word reading and 22 for pseudoword reading. This indicates that phonological decoding is a slower process, as expected, because reading words letter-by-letter or in chunks of letters is distinct from the ability to read words as a whole or read continuous text.

Table 1. Average oral reading performance of U.S. fourth-graders: 2018

ORF measure	Description	Average
Oral reading fluency	Passage reading words correct per minute (WCPM)	120
	Passage reading rate: Words per minute	126
	Passage reading accuracy: Percentage of words read correctly	94
	Passage reading expression	4
Word reading	Word list reading: WCPM	51
Phonological decoding	Pseudoword list reading: WCPM	22

NOTE: Pseudoword is a made-up but pronounceable word.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

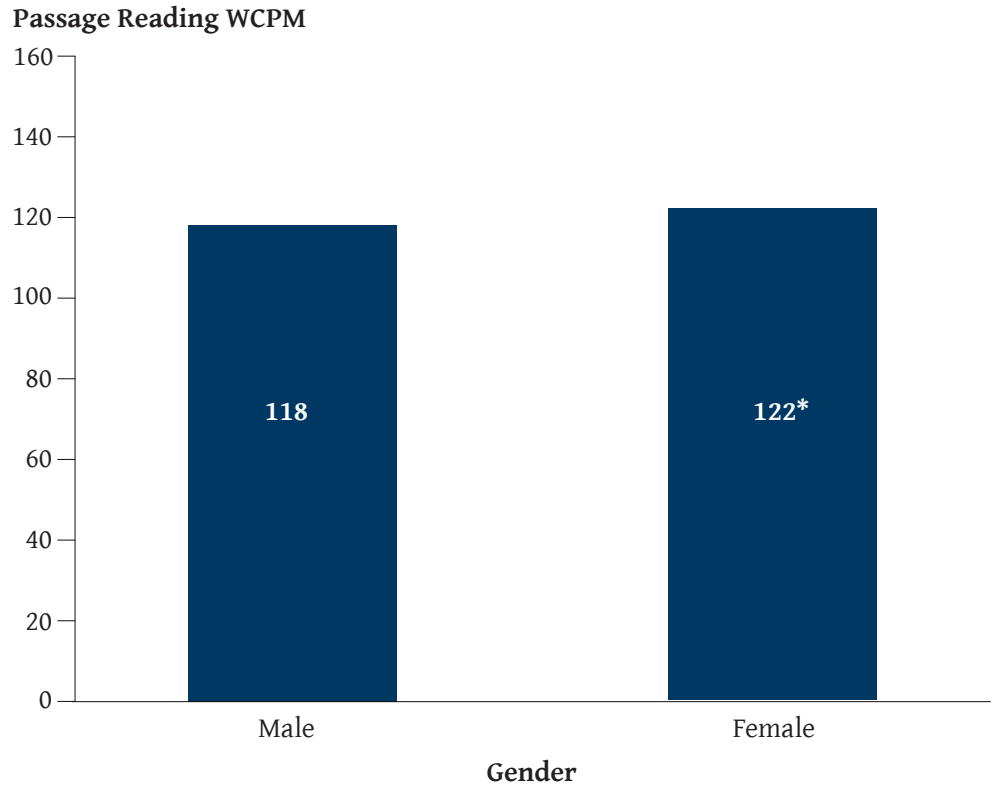
Average Oral Reading Fluency Performance by Demographic Subgroups: Passage Reading WCPM

The following figures (figures 3 to 7) visually show the comparison of passage reading WCPM scores by gender, race/ethnicity, eligibility status for the National School Lunch Program, ELL status, and disability status. Comparisons[8] for all other passage reading measures and foundational skills show similar patterns and can be found in appendix tables C-2 to C-6.

[8] All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied when needed using the False Discovery Rate (FDR) procedure.

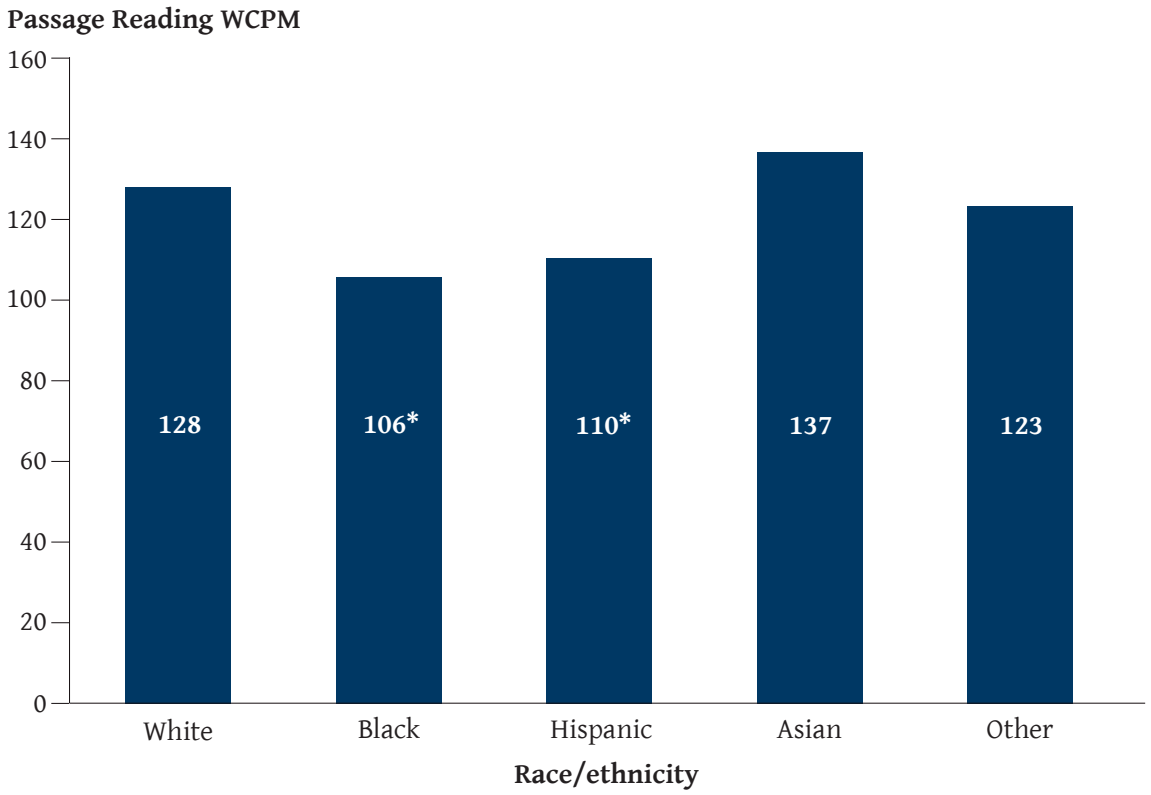
As shown in figure 3, female students significantly outperformed their male peers in passage reading (122 vs. 118 WCPM). Among all race and ethnicity groups (see figure 4), the average passage WCPM score for White students (128) was significantly higher than that for Black (106) and Hispanic (110) students. No significant difference was found between White and Asian students (137) or between White students and students of other races/ethnicities (123), including students who were American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and of Two or more races.

Figure 3. Average passage reading WCPM by gender: 2018



* Statistically significant score difference compared to male students, $p < .05$.
NOTE: WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

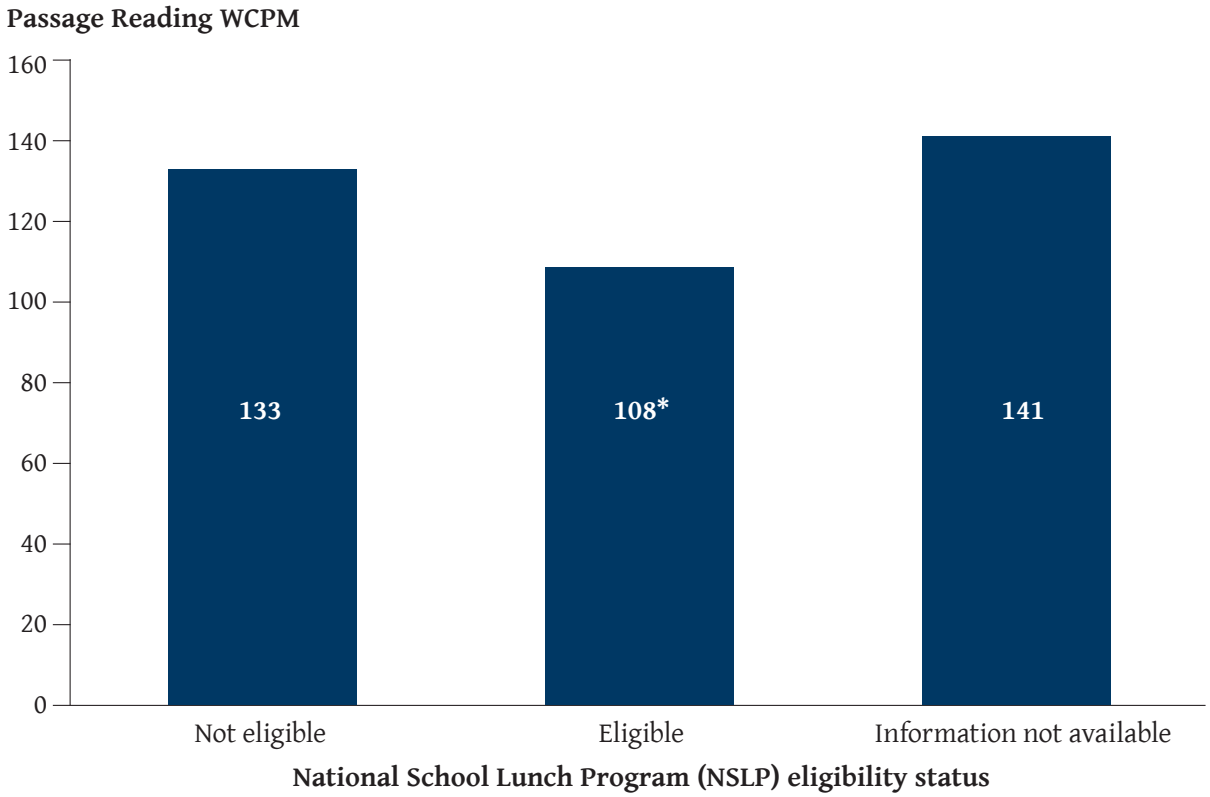
Figure 4. Average passage reading WCPM by race/ethnicity: 2018



* Statistically significant score difference compared to White students, $p < .05$. All comparisons were conducted with an alpha level of 0.05 with White students as a reference group. The False Discovery Rate (FDR) procedure was used to adjust for multiple pairwise comparisons between White and four other racial/ethnic groups (i.e., 4 comparisons).
NOTE: Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. Other includes American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races. WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

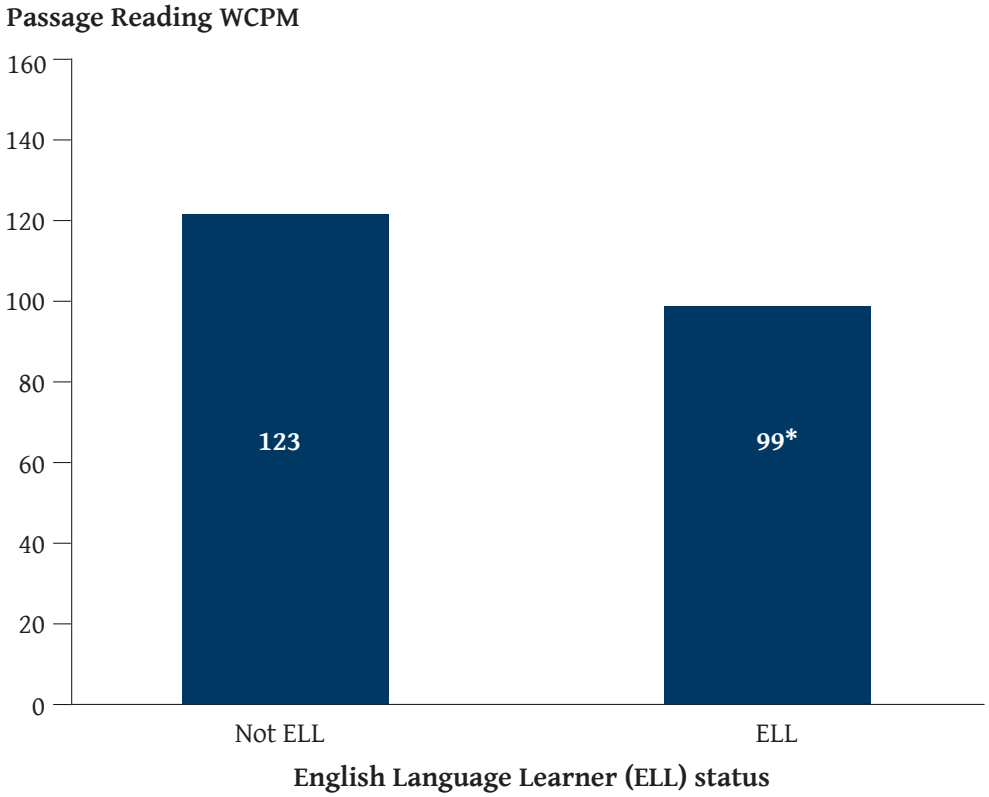
As figure 5 shows, the average passage WCPM score of fourth-graders who were eligible for free/reduced-price lunch under the NSLP (108) was significantly lower than that of students who were not eligible (133). The score gap between ELL and non-ELL students was found to be statistically significant (see figure 6). The total number of words read correctly per minute by fourth-grade ELLs (99) was, on average, 23 words fewer than their counterparts who were not ELLs (123). Lastly, the score gap between students with a disability and students without a disability was statistically significant (see figure 7) and even greater than the gap between ELL and non-ELL students. On average, the passage WCPM score for students with a disability (92) was 31 words fewer than that for those without a disability (124).

Figure 5. Average passage reading WCPM by National School Lunch Program (NSLP) eligibility status: 2018



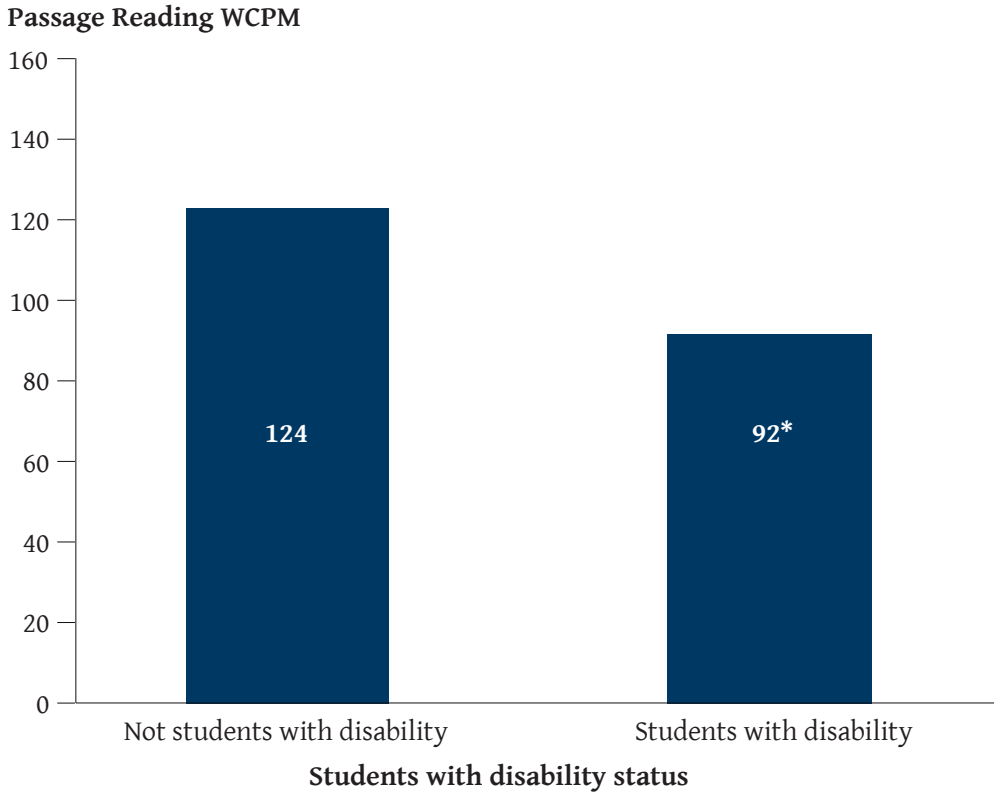
* Statistically significant score difference compared to students not eligible for NSLP, $p < .05$. All comparisons were conducted with an alpha level of 0.05 with students not eligible for NSLP as a reference group. The False Discovery Rate (FDR) procedure was used to adjust for multiple pairwise comparisons between students not eligible NSLP and two other NSLP status groups (i.e., 2 comparisons).
NOTE: WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Figure 6. Average passage reading WCPM by English language learner (ELL) status: 2018



* Statistically significant score difference compared to non-ELL students, $p < .05$.
NOTE: WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Figure 7. Average passage reading WCPM by students with disabilities status: 2018



* Statistically significant score difference compared to students without disabilities, $p < .05$.
NOTE: WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Average Oral Reading Fluency Performance by NAEP Reading Achievement Levels: Passage Reading WCPM

Description of achievement levels

To better understand the relationship between students' oral reading skills and their NAEP reading achievement levels, it is helpful to understand what the levels measure. One of the ways NAEP reports students' reading performance results is through achievement levels. The NAEP grade 4 reading achievement levels are set by the National Assessment Governing Board based on the collective judgment of a representative panel of teachers, education specialists, and the general public. The achievement levels are based on the NAEP reading scale scores, ranging from 0 to 500. The current NAEP reading framework provides descriptions for what students should know and be able to do at the *NAEP Basic, NAEP Proficient,* and *NAEP Advanced* levels, as shown in figure 8.

Figure 8. NAEP grade 4 reading achievement-level descriptions

Achievement level	Cut score	Description
NAEP Basic	208	Fourth-grade students performing at the *NAEP Basic* level should be able to locate relevant information, make simple inferences, and use their understanding of the text to identify details that support a given interpretation or conclusion. Students should be able to interpret the meaning of a word as it is used in the text.
NAEP Proficient	238	Fourth-grade students performing at the *NAEP Proficient* level should be able to integrate and interpret texts and apply their understanding of the text to draw conclusions and make evaluations.
NAEP Advanced	268	Fourth-grade students performing at the *NAEP Advanced* level should be able to make complex inferences and construct and support their inferential understanding of the text. Students should be able to apply their understanding of a text to make and support a judgment.

NOTE: For additional details about the NAEP grade 4 reading achievement-level descriptions, see here.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Although below *NAEP Basic* is not one of the three NAEP reading achievement levels reported by NAEP, it is the focus of the 2018 NAEP ORF study. Among other reasons noted in the Introduction of this report, over a third of fourth-grade children may still lack the fluency and foundational skills necessary to support continued progress in reading comprehension across their school years.

Percent distribution by NAEP reading achievement levels and selected student characteristics

As table 2 shows, 36 percent of all fourth-graders were in the below *NAEP Basic* group. About 27 percent of White, 51 percent of Black, and 46 percent of Hispanic fourth-grade students fell into the below *NAEP Basic* level. In other words, over half of the nation's Black fourth-graders and nearly half of Hispanic fourth-graders performed below *NAEP Basic.* It is noteworthy that the reverse was true at the upper achievement levels. At the *NAEP Advanced* level, the proportion of White fourth-graders to Black or Hispanic fourth-graders was about 3:1.

Among students who were eligible for the NSLP, 50 percent performed below *NAEP Basic,* compared to 19 percent of non-eligible students. At the *NAEP Advanced* level, only 2 percent of NSLP-eligible students performed at this level while 17 percent of students who were not NSLP-eligible performed at this level.

Table 2. Percentage of fourth-graders by NAEP achievement level and selected student characteristics: 2018

Student characteristics	below *NAEP Basic*	*NAEP Basic*	*NAEP Proficient*	*NAEP Advanced*	Total
All students	**36**	**30**	**25**	**9**	**100**
Race/ethnicity					
White	27	30	31	12	100
Black	51	30	15	4	100
Hispanic	46	32	18	4	100
NSLP eligibility					
Eligible	50	32	16	2	100
Not eligible	19	28	36	17	100

NOTE: Results are not reported for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) because sample sizes were too small to meet the NAEP reporting standard for robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. For National School Lunch Program (NSLP) eligibility, about 2 percent of students lacked valid eligibility information. These students were also excluded because of small sample size. Learn more about the NAEP achievement levels here.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Percent distribution by below *NAEP Basic* subgroup and selected student characteristics

We then dug deeper into the distribution of racial/ethnic groups among students performing below *NAEP Basic.* To examine this group more closely, students performing below *NAEP Basic* were evenly divided into three groups based on the NAEP reading score distribution.[9] The three groups were labeled below *NAEP Basic* Low (i.e., the bottom one-third of students performing below *NAEP Basic*), below *NAEP Basic* Medium (i.e., the middle one-third of students performing below *NAEP Basic*), and below *NAEP Basic* High (i.e., the top one-third of students performing below *NAEP Basic*) to indicate the reading skill variation within the below *NAEP Basic* subgroup. Students' oral reading performance was then compared across these subgroups.

As shown in table 3, Black students were also overrepresented in the lowest below *NAEP Basic* subgroup—below *NAEP Basic* Low. While 26 percent of the below *NAEP Basic* White students performed at the below *NAEP Basic* Low level, 40 percent of the below *NAEP Basic* Black fourth-graders fell into this group. Because 51 percent of Black students were in the below *NAEP Basic* group, it means that 20 percent (or 1 out of every 5 Black fourth-graders) were at the lowest end of the below *NAEP Basic* level (51 percent x 40 percent = 20 percent). Similarly, 37 percent of Hispanic fourth-grade students who performed below *NAEP Basic* were in the below *NAEP Basic* Low subgroup. The opposite pattern is observed for the below *NAEP Basic* High group (i.e., 39 percent White, 28 percent Black, and 30 percent Hispanic).

[9] See appendix A for details about how below *NAEP Basic* subgroups are constructed.

Regarding NSLP eligibility, about 41 percent of non-eligible students performed at the below *NAEP Basic* High level. NSLP-eligible students were nearly equally divided among the three below *NAEP Basic* subgroups. About 35 percent of the NSLP-eligible students performed at the below *NAEP Basic* Low level (table 3).

Table 3. Percentage of fourth-graders performing below *NAEP Basic* by below *NAEP Basic* subgroup and selected student characteristics: 2018

Student characteristics	below *NAEP Basic* Low	*NAEP Basic* Medium	*NAEP Basic* High	Total
All students	**33**	**33**	**33**	**100**
Race/ethnicity				
White	26	35	39	100
Black	40	31	28	100
Hispanic	37	33	30	100
NSLP eligibility				
Eligible	35	34	31	100
Not eligible	27	32	41	100

NOTE: Rows may not sum to totals because of rounding. Refer to Table 2 for the percentage of fourth-graders performing below *NAEP Basic*. Results are not reported for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) because sample sizes were too small to meet the NAEP reporting standard for robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. For National School Lunch Program (NSLP) eligibility, about 2 percent of the students lacked valid eligibility information. These students were also excluded because of small sample size. Learn more about the NAEP achievement levels here.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Passage reading WCPM by NAEP achievement level and selected student characteristics

Here, we report the average oral reading performance by student group and NAEP achievement level to examine whether the relationship between students' oral reading skills and NAEP reading performance varied across student groups. In this section, only results by race/ethnicity for passage reading WCPM are reported. Results of other key student groups and the other five ORF measures are reported in appendix tables C-9 to C-14.

As noted earlier (see table 1), on average, students read 120 words correctly in one minute—about the level of those who performed at the *NAEP Basic* level. Students performing at the *NAEP Proficient* and *NAEP Advanced* levels read about 142 words and 160 words correctly in one minute, respectively (see table 4). In contrast, students who performed below *NAEP Basic* on average read 91 words correctly in one minute, significantly lower than those students who performed at the *NAEP Basic* level (123 WCPM).

Some of these results were similar to the national ORF percentile norms for the winter administration[10] (Hasbrouck and Tindal 2017), which are often used in schools and districts as a threshold to determine students who need additional instructional support. The average passage reading WCPM scores for students performing at the *NAEP Basic* (123) and *NAEP Proficient* (142) levels were similar to the scores of students performing at the 50th (120) and 75th (143) percentiles. However, the average passage reading WCPM for students performing below *NAEP Basic* (91) fell below the 25th percentile (96) as did the average passage reading WCPM for students performing at *NAEP Advanced* (160) compared to the 90th percentile (168) of the national norm.

When students' oral reading skills were compared by student subgroup, the results indicated that Black and Hispanic students read passages at a lower rate and accuracy than White students across the entire distribution. Importantly, at the below *NAEP Basic* level, the average WCPM for Black students (84) was lower than the average WCPM for White students (96), as displayed in table 4. Furthermore, the pattern of slowdown was consistent across NAEP levels within each demographic group. For other ORF measures by NAEP achievement level, see appendix table C-7.

Table 4. Average passage reading words correct per minute by NAEP reading achievement level and selected student characteristics: 2018

Student characteristics	below *NAEP Basic*	*NAEP Basic*	*NAEP Proficient*	*NAEP Advanced*	Total
All students	**91**	**123**	**142**	**160**	**100**
Race/ethnicity					
White	96	125	145	162	100
Black	84	122	133	146	100
Hispanic	90	120	137	152	100
NSLP eligibility					
Eligible	90	121	137	148	100
Not eligible	95	126	145	161	100

NOTE: Results are not reported for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) because sample sizes were too small to meet the NAEP reporting standard for robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. For National School Lunch Program (NSLP) eligibility, about 2 percent of the students lacked valid eligibility information. These students were also excluded because of small sample size. Learn more about the NAEP achievement levels.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

[10] The researchers compiled a set of national ORF norms for grades 1–6 that identified performance benchmarks at the beginning (fall), middle (winter), and end (spring) of the year. An individual student's WCPM score can be compared to these benchmarks and determined to be either significantly above the benchmark, at the expected benchmark, below the benchmark, or significantly below the benchmark. The winter ORF norm is reported in this study because the NAEP 2018 ORF study was conducted during the first quarter of 2018 and they both measured the same construct (i.e., passage reading WCPM).

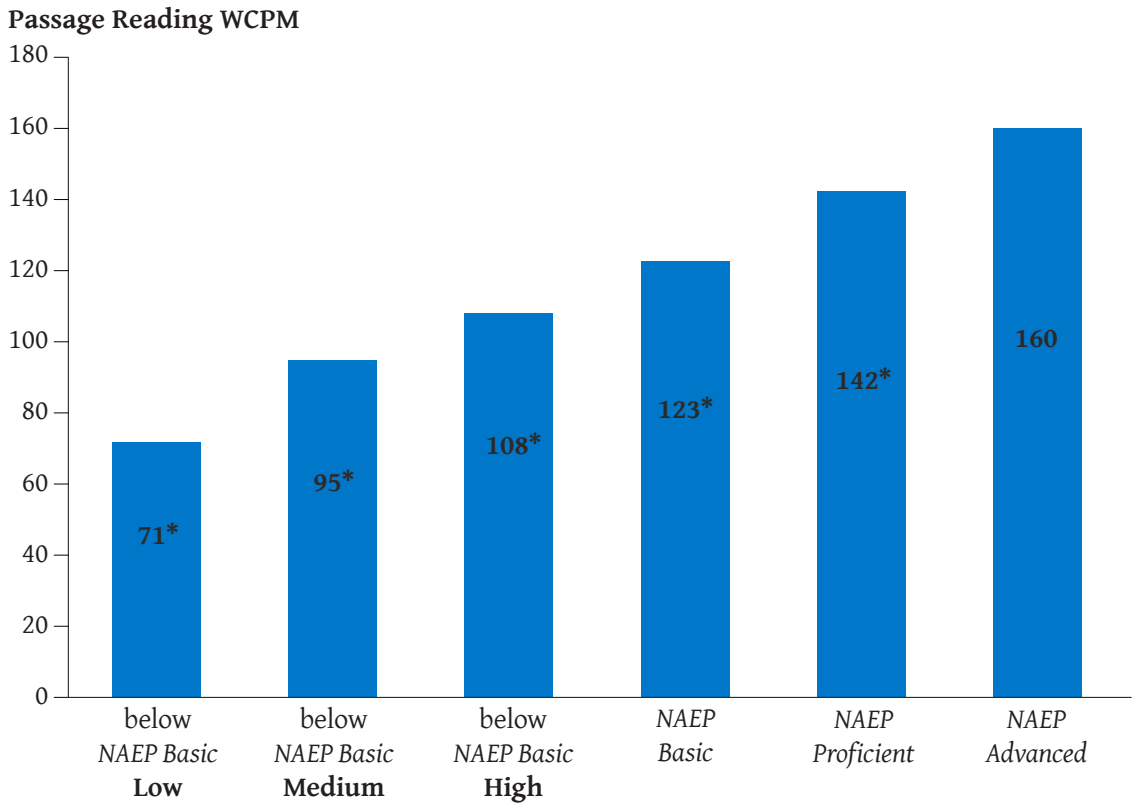
Oral Reading Fluency Performance and Foundational Skills by below *NAEP Basic* Subgroups

The following figures (figures 9 to 14) show that, moving from the highest achievement level (*NAEP Advanced*) down to *NAEP Basic* and then through the three below *NAEP Basic* subgroups, there was a pattern of steadily decreasing performance on each measure of oral reading fluency, word reading, and phonological decoding. The means for passage reading WCPM, passage reading rate, passage reading accuracy, passage reading expression, and pseudoword reading WCPM were statistically different for each adjacent group.[11] For word reading WCPM, all adjacent group comparisons were significant except for the difference between *NAEP Advanced* and *NAEP Proficient* (figure 13).

As figure 9 shows, the difference in passage reading WCPM between below *NAEP Basic* High and below *NAEP Basic* Low was 38,[12] which was similar to the difference between *NAEP Advanced* and *NAEP Basic* (37 WCPM). The average passage reading WCPM across all levels was 120. To help put this number in perspective, based on the 2003 National Assessment of Adult Literacy (NAAL) ORF data, a skilled adult reader reads orally at 166 to 178 words correctly per minute (Baer et al. 2009). This indicates that there is room for improvement even for fourth-grade students performing at the *NAEP Proficient* level (142 WCPM) and considerable room for improvement for fourth-grade students performing at the *NAEP Basic* level (123 WCPM).

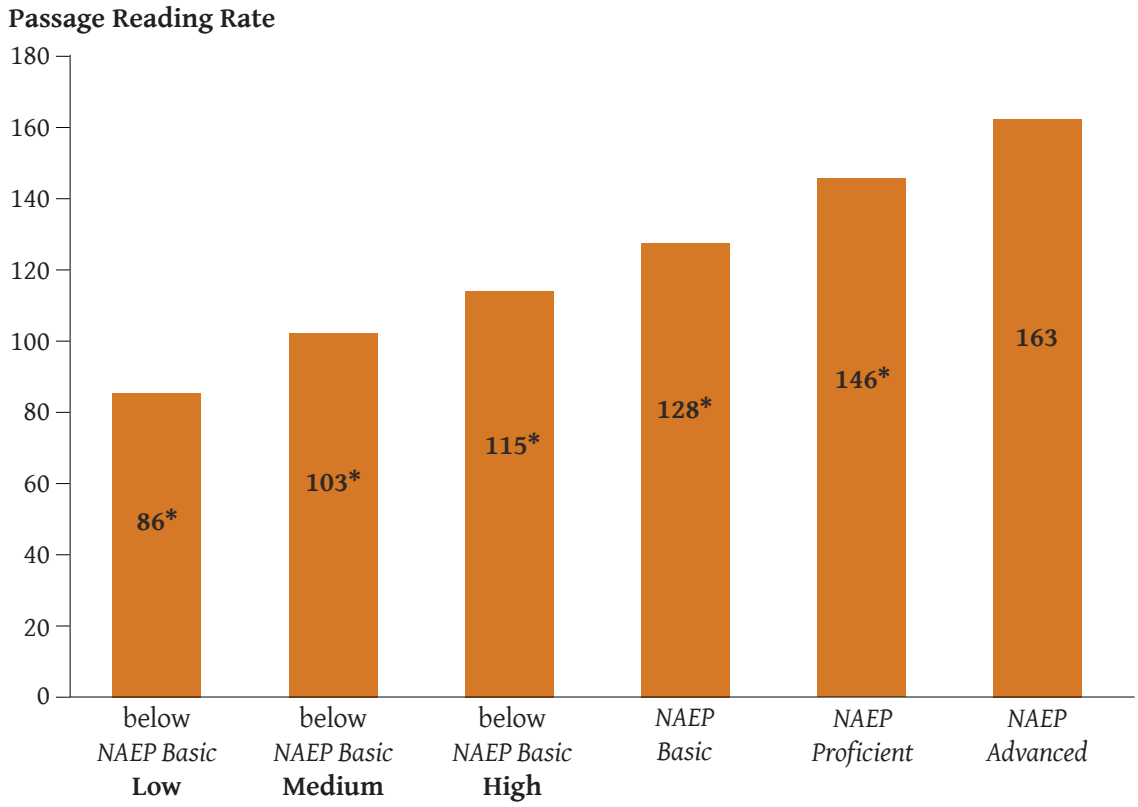
[11] All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied when needed using the False Discovery Rate (FDR) procedure.
[12] Unrounded numbers were used for calculating the differences between the estimates.

Figure 9. Average passage reading WCPM by NAEP reading achievement level and below *NAEP Basic* subgroup: 2018



* Statistically significant difference compared to the next higher NAEP reading achievement level category, $p < .05$. All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied using the False Discovery Rate (FDR) procedure.
NOTE: WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Figure 10. Average passage reading rate by NAEP reading achievement level and below *NAEP Basic* subgroup: 2018



* Statistically significant difference compared to the next higher NAEP reading achievement level category, $p < .05$. All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied using the False Discovery Rate (FDR) procedure.
NOTE: The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

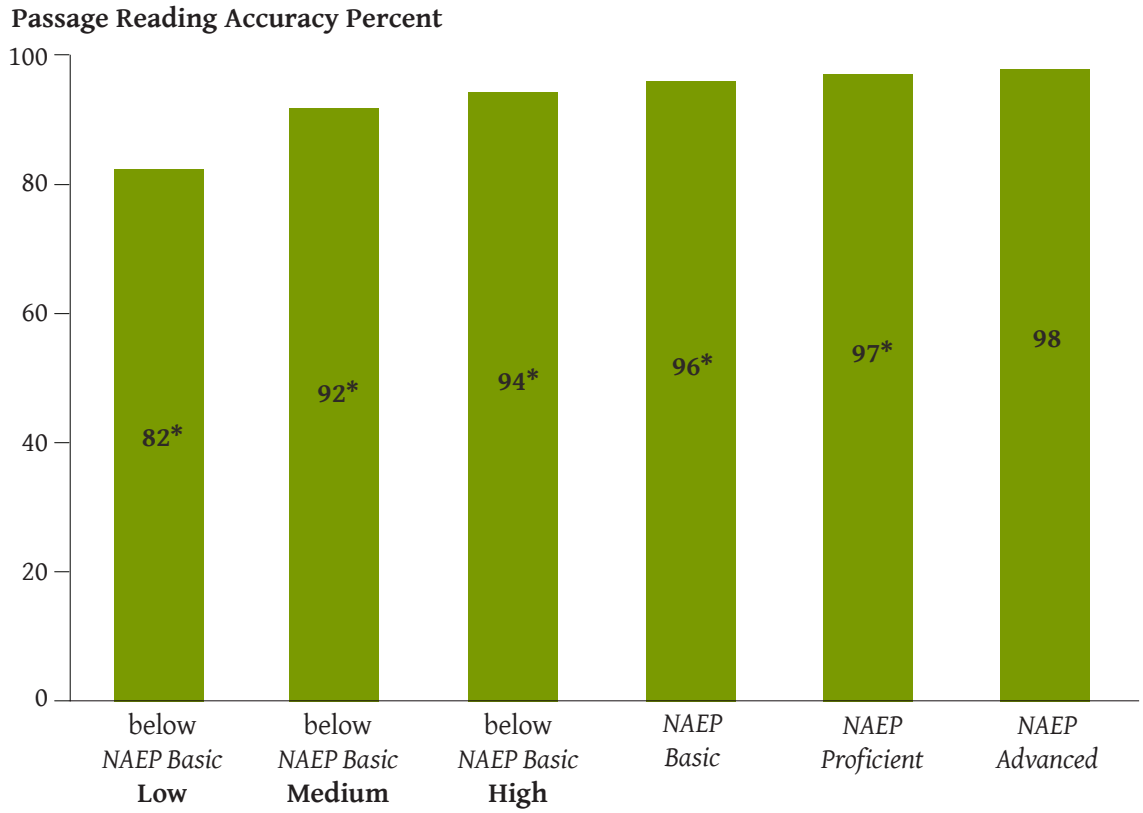
Perhaps the most noticeable difference among students performing below *NAEP Basic* was passage reading accuracy (figure 11). The below *NAEP Basic* Low students' passage reading accuracy was 82 percent, about 9 percentage points[13] and 12 percentage points lower than the below *NAEP Basic* Medium and High subgroups, respectively. Eighty-two percent accuracy may not seem problematic, but in practical terms, it means that students misread 1 out of every six words. Students with such a frequent misreading of words most likely will have difficulty understanding the text they read because misread words tend to be content words necessary for text comprehension, not function words[14] (e.g., the, and, on). Furthermore, at 92 percent correct, the below *NAEP Basic* Medium group was missing 1 out of every 11 words, which is one word in nearly every sentence, since the average sentence length for the passages was about 14 words.

Passage reading expression scores (figure 12) showed the same pattern as the passage reading WCPM. Performance declined steadily from *NAEP Advanced* to *NAEP Proficient* to *NAEP Basic* and continued to decline from below *NAEP Basic* High to below *NAEP Basic* Medium and below *NAEP Basic* Low. The average passage reading expression score for all fourth-grade students was at Level 4 on a scale of 0–5. That indicated that their oral reading expressed sentence structure and meaning, and that more than three-quarters of the words in the passage were read with appropriate expression.

For all readers performing below *NAEP Basic,* the average score was in the Level 3 range. That meant that their oral reading expressed the meaning of words, phrases, clauses, and a few sentences, and that they read more than half of the words in the passage with appropriate expression. For the lowest below *NAEP Basic* subgroup, below *NAEP Basic* Low, the average expression score fell below Level 3. That indicated that these students tended to focus on local word groupings, which means that they often paused in the middle of a phrase. For example, the sentence "Hawaii is a warm place, but parts of it are cold" would be read as *[Hawaii] [is a] [warm place], [but parts of] [it are] [cold].*[15]

[13] Unrounded numbers were used for calculating the differences between the estimates.
[14] To hear an audio recording that illustrates the kind of words that were misread or read with difficulty, see https://nces.ed.gov/nationsreportcard/studies/orf/illustrative_audio.aspx.
[15] Passage expression by a student in the below *NAEP Basic* Low subgroup is illustrated in an audio recording that can be found here: https://nces.ed.gov/nationsreportcard/studies/orf/illustrative_audio.aspx.

Figure 11. Average passage reading accuracy by NAEP reading achievement level and below *NAEP Basic* subgroup: 2018

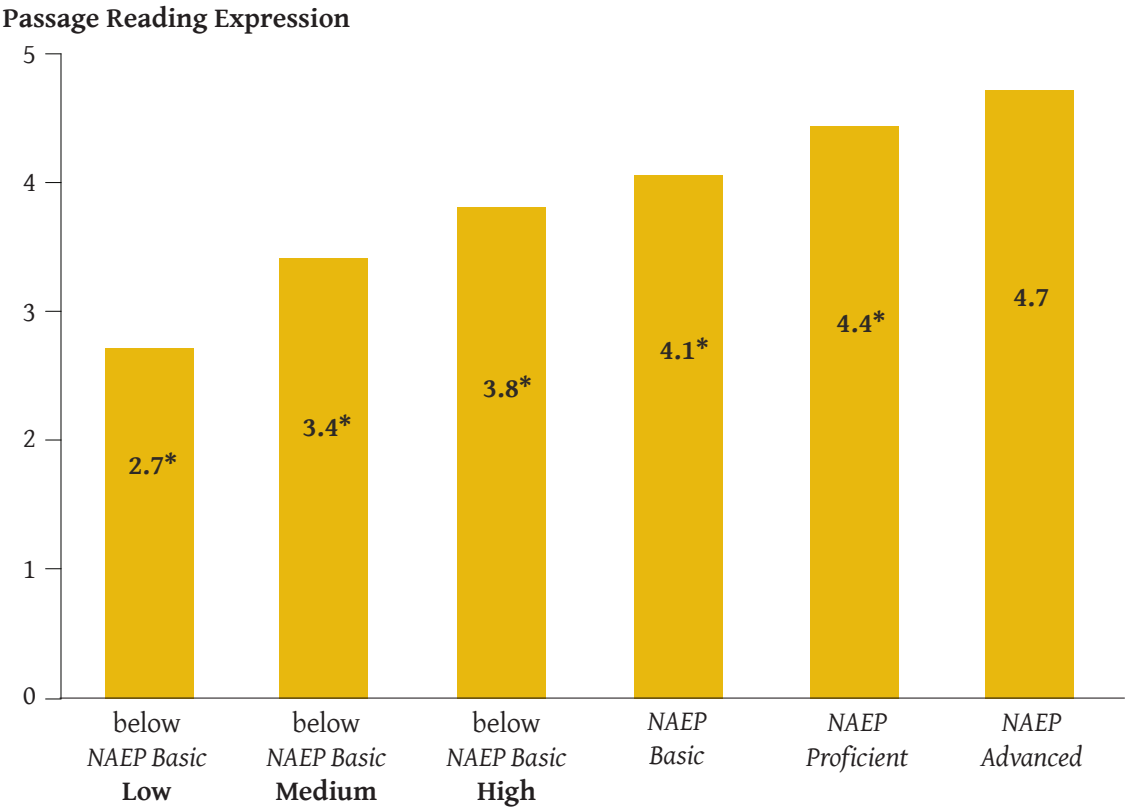


* Statistically significant difference compared to the next higher NAEP reading achievement level category, $p < .05$. All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied using the False Discovery Rate (FDR) procedure.

NOTE: Accuracy refers to the percentage of words that was read accurately. The positions of the data points in the graphics are based on the unrounded numbers.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Figure 12. Average passage reading expression by NAEP reading achievement level and below *NAEP Basic* subgroup: 2018



* Statistically significant difference compared to the next higher NAEP reading achievement level category, $p < .05$. All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied using the False Discovery Rate (FDR) procedure.

NOTE: The positions of the data points in the graphics are based on the unrounded numbers. Expression score 0 = Insufficient passage reading sample for accurate rating; 1 = Reading is word by word; less than a quarter of the words are read with appropriate expression; 2 = Reading focuses on local grouping; less than half of the words are read with appropriate expression; 3 = Reading expresses the meaning of words, phrases, clauses, and a few sentences; more than half of the words are read with appropriate expression; 4 = Reading expresses sentence structure and meaning; more than three-quarters of the words are read with appropriate expression; 5 = Passage is read as if for a listener and is expressive throughout. For detailed passage reading expression score description, see figure 2.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

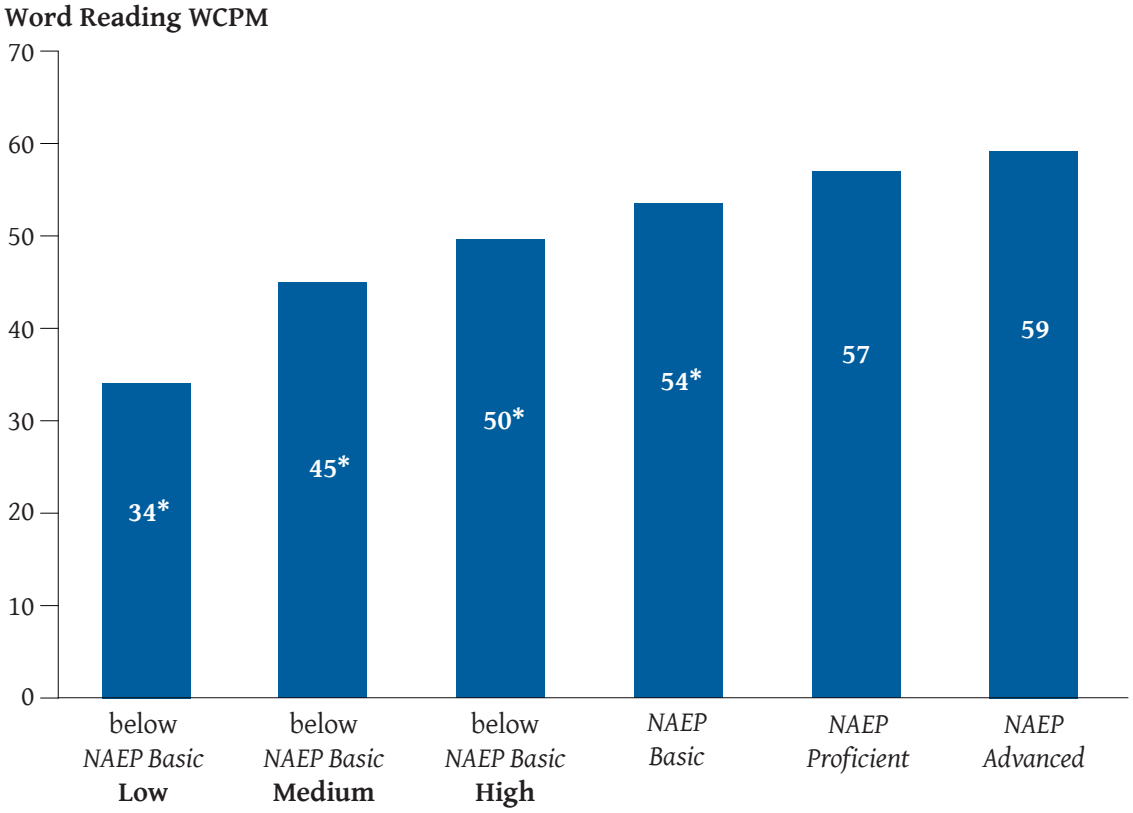
By examining word-level reading apart from a passage, we could better understand the word-level processes that underlie fluency and passage comprehension. What we learned is that the foundational skills—word reading and phonological decoding—also varied widely within the below *NAEP Basic* subgroups (figures 13 and 14).

In word list reading, students read high-frequency words that have known meanings to most students in fourth grade. Performance on this task was regarded an indicator of accumulating knowledge of printed words and an increasing ability to read words rapidly and automatically without effortful decoding. As shown in figure 13, word reading declined across the *NAEP Basic* level through all the below *NAEP Basic* subgroups. The sharpest decline was between the below *NAEP Basic* Medium and below *NAEP Basic* Low subgroups.

In pseudoword list reading (i.e., reading lists of made-up, but pronounceable words), students read made-up words that required them to use phonological decoding skills, the skills that enable a reader to pronounce sequences of letters based on knowledge of spelling-sound correspondences and orthographic patterns.

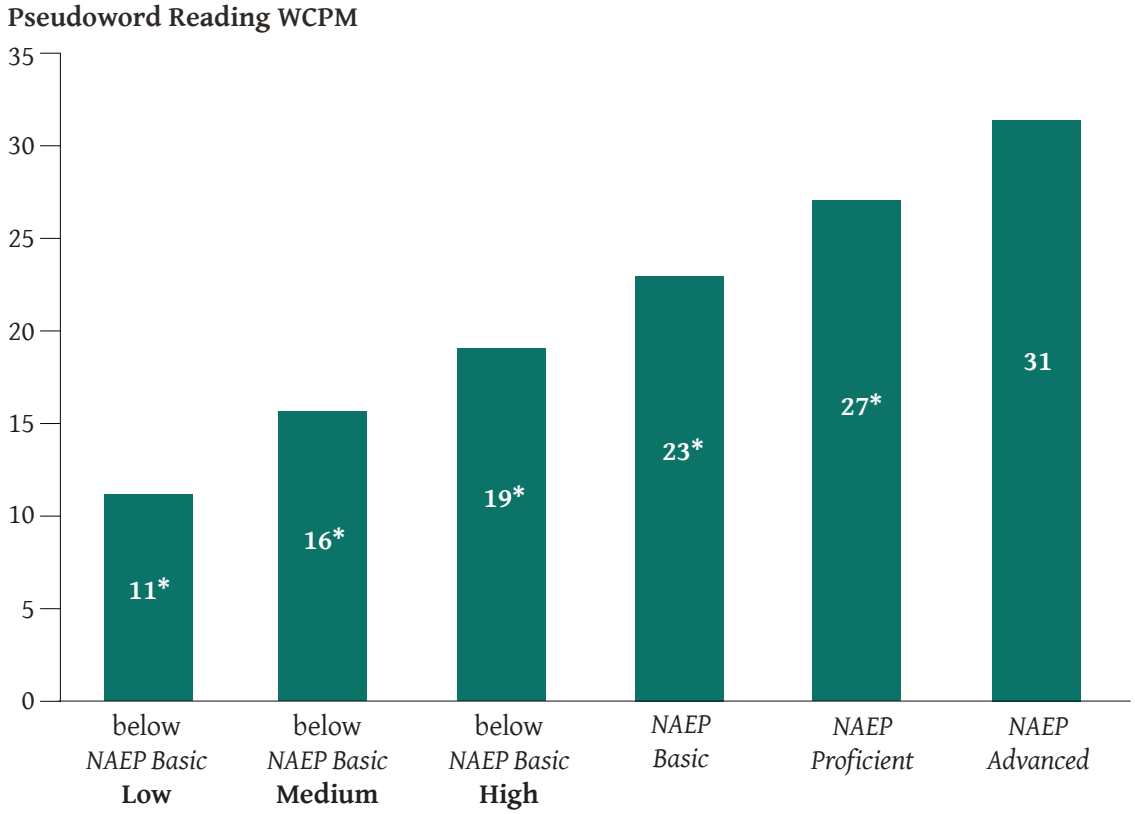
Like word reading skills, pseudoword reading skills declined across the NAEP reading achievement levels, including the below *NAEP Basic* subgroups (figure 14). The decline in mean performance was especially sharp between the below *NAEP Basic* Medium and below *NAEP Basic* Low subgroups. Moreover, there was a wide range within the below *NAEP Basic* subgroups. Fourth-graders in the below *NAEP Basic* High group read almost twice as many words correctly per minute (19) as those in the below *NAEP Basic* Low group (11), as shown in figure 14. The average number of pseudowords read correctly per minute was 22 for all fourth-grade students.

Figure 13. Average word reading WCPM by NAEP reading achievement level and below *NAEP Basic* subgroup: 2018



* Statistically significant difference compared to the next higher NAEP reading achievement level category, $p < .05$. All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied using the False Discovery Rate (FDR) procedure.
NOTE: WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Figure 14. Average pseudoword reading WCPM by NAEP reading achievement level and below *NAEP Basic* subgroup: 2018



* Statistically significant difference compared to the next higher NAEP reading achievement level category, $p < .05$. All comparisons were conducted with an alpha level of 0.05, with multiple pairwise comparison adjustments applied using the False Discovery Rate (FDR) procedure.

NOTE: Pseudoword is a made-up but pronounceable word. WCPM is an abbreviation for words correct per minute. The positions of the data points in the graphics are based on the unrounded numbers.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Estimated Number of Fourth-Grade Students Performing below *NAEP Basic* and in the below *NAEP Basic* Low Subgroup by Race/Ethnicity

The 2018 NAEP ORF study provided information about skills that are needed for successful oral reading fluency at grade 4—as well as skills that are foundational for fluent oral reading—namely, word reading and phonological decoding. The results of this study indicated that more than a third (36 percent) of the U.S. fourth-grade students in public schools were at the lowest end of the NAEP achievement spectrum, performing below *NAEP Basic* (table 2). This percentage translates to an estimated 1.27 million[16] fourth-graders who were below *NAEP Basic* in American public schools (3.54 million x 0.36 = 1.27). Of these 1.27 million students performing below *NAEP Basic,* an estimated 0.42 million were in the below *NAEP Basic* Low subgroup (1.27 x 0.33 = 0.42), as shown in table 5.

By race/ethnicity groups, 51 percent of all Black and 46 percent of all Hispanic fourth-graders performed below *NAEP Basic.*[17] Diving deeper, the results for the three subgroups of students scoring below *NAEP Basic*—Low, Medium, and High—revealed that of the 51 percent of Black students who were below *NAEP Basic,* 40 percent were in the lowest of the three subgroups. Similarly, of the 46 percent of Hispanic students who were below *NAEP Basic,* 37 percent were in the lowest subgroup (table 3).

Table 5. Estimated number of fourth-grade public school students below *NAEP Basic* Low: 2018

Student group	Number of students
Number of public-school fourth-graders represented in the 2018 NAEP ORF study	3.54 million
Number of students performing below *NAEP Basic* by race/ethnicity	
All students	1.27 million (36 percent of all students)
White	0.46 million (27 percent of all White students)
Black	0.28 million (51 percent of all Black students)
Hispanic	0.45 million (46 percent of all Hispanic students)

See notes at end of table.

[16] According to the *Digest of Education Statistics* (2019), the number of fourth-grade public school students is 3.7 million. According to the 2019 NAEP Reading Report Card, 35 percent of the fourth-grade public school students performed below *NAEP Basic*, representing 1.29 million fourth-grade students. See https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4.

[17] The percentage of Black and Hispanic students in this study is 16 percent and 27 percent, respectively. See appendix table A-2.

Table 5. Estimated number of fourth-grade public school students below *NAEP Basic* Low: 2018—continued

Student group	Number of students
Number of students performing below *NAEP Basic* Low by race/ethnicity	
All students	0.42 million (33 percent of all students performing below *NAEP Basic*)
White	121,000 (26 percent of White students in below *NAEP Basic*)
	1 out of 14 White students in fourth grade
Black	115,000 (40 percent of Black students in below *NAEP Basic*)
	1 out of 5 Black students in fourth grade
Hispanic	165,000 (37 percent of Hispanic students in below *NAEP Basic*)
	1 out of 6 Hispanic students in fourth grade

NOTE: Detail may not sum to totals because of rounding. Only three race/ethnicity groups (White, Black, and Hispanic) are reported in this report because the sample size for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) by NAEP reading achievement level did not meet the NAEP reporting standard for robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. The percentages and numbers presented in the table are estimates based on the 2018 NAEP ORF study participants. NAEP student sampling weights were applied when analyzing the data to represent the population of U.S. fourth-grade public school students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Profile of America's Fourth-Graders Performing below *NAEP Basic* Low

Figure 15 is a summary of the oral reading fluency and foundational skill characteristics of fourth-graders performing at the below *NAEP Basic* Low level. In particular, reading connected text—sentences and passages—appears to be a major challenge for these students. They read correctly at about half the rate of a fourth-grader performing at the *NAEP Proficient* level; they misread about 1 out of every 6 words and they read in a mostly arrhythmic or monotone voice that indicates a lack of comprehension. Instead, they tend to focus on individual words or phrases.

The other two subgroups performing below *NAEP Basic*—below *NAEP Basic* Medium and below *NAEP Basic* High—trail the *NAEP Basic* level averages on almost every measure of oral reading fluency.

Regarding foundational skills, students in the below *NAEP Basic* Low group had difficulty recognizing whole words that they are likely to know when they are listening or speaking. Also, students in the below *NAEP Basic* Low group showed limited knowledge of spelling-sound correspondences, as shown by the pseudoword reading task involving made-up but pronounceable words.

It is not surprising then that fourth-graders performing in the below *NAEP Basic* Low group do not meet the requirements for the *NAEP Basic* level, such as figuring out the main idea of a text.

Figure 15. Oral reading and foundational skill characteristics of fourth-graders performing at the below *NAEP Basic* Low level: 2018

What below *NAEP Basic* Low fourth-graders do

- Read connected text with difficulty—at half the WCPM of a fourth-grader performing at the *NAEP Proficient* level
- Misread 1 out of every 6 words
- Focus on individual words, phrases, or clauses instead of the meanings of sentences and passages
- Read in a voice that is arrhythmic or monotone, indicating lack of text comprehension
- Recognize with difficulty whole words they are likely to know when listening or speaking
- Show limited knowledge of spelling-sound correspondences

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Discussion

The 2018 NAEP ORF study provides important new information about the difficulties faced by students performing below *NAEP Basic* on the NAEP reading assessment, a group that represents a third of the students in the country. We evenly divided this below *NAEP Basic* group into three subgroups based on their NAEP scale scores distribution and closely examined oral reading fluency and two aspects of fluency that have been studied before: passage reading rate and passage reading accuracy. We added three new measures compared to the previous NAEP ORF studies: passage reading expression (based on expanded rubric), word list reading WCPM, and pseudoword list reading WCPM.

What we learned is that the vast majority of these skills declined at each level down the NAEP reading achievement levels from *NAEP Advanced* to *NAEP Proficient* to *NAEP Basic,* and then again for each level down through the three below *NAEP Basic* subgroups.

Passage Reading and Performance Levels

Passage reading: Words correct per minute (WCPM)

As figure 9 shows, passage reading WCPM on the NAEP reading assessment was lower for students performing at the *NAEP Proficient* level than at the *NAEP Advanced* level and lower for students performing at the *NAEP Basic* level than at the *NAEP Proficient* level. These findings replicated the results of the 2002 NAEP Oral Reading Fluency study (Daane et al. 2005).

In this study, we see that passage reading WCPM also declined in moving from the below *NAEP Basic* High subgroup to the below *NAEP Basic* Medium subgroup and then to the below *NAEP Basic* Low subgroup, so there is a lot of variation within the below *NAEP Basic* subgroup. It is striking that the difference between the lowest below *NAEP Basic* subgroup (71 WCPM) and the highest below *NAEP Basic* subgroup (108 WCPM) was just as large, 37 WCPM, as the difference between students performing at *NAEP Basic* and *NAEP Advanced* levels.

Passage reading: Rate and accuracy

Passage reading rate (words per minute) and passage reading accuracy (percent of words read correctly) were also related to NAEP reading assessment performance, but they showed somewhat different patterns of decline. Like passage reading WCPM, passage reading rate declined through the *NAEP Advanced, NAEP Proficient,* and *NAEP Basic* groups and then through the three below *NAEP Basic* subgroups (figure 10).

For passage reading accuracy, as shown in figure 11, the *NAEP Basic, Proficient,* and *Advanced* groups had average passage accuracy of 96, 97, and 98 percent, respectively, which, although similar, were statistically different. We call attention especially to the finding of 82, 92, and 94 percent correct, respectively, for the below *NAEP Basic* subgroups. These may not seem like large or important differences. But in practical terms, the difference between 95 percent correct (needed for comprehension) and 90 percent (typical instructional material) is the difference

between missing one word out of every 20 (about one word in every two sentences) versus missing one word out of every 10 (or about one word in every sentence). Because the words missed are likely to be content- or meaning-laden words that are important for comprehension, not function words (e.g., the), missing them may have a large impact on comprehension performance. Missing words disrupts reading rate and expressivity, which are indicators of language and comprehension processing.

Passage reading: Expression

Finally, passage reading expression scores (figure 12) showed the same pattern as the passage reading WCPM and passage reading rate. Performance declined steadily from *NAEP Advanced* to *NAEP Proficient* to *NAEP Basic* and continued to decline from below *NAEP Basic* High to below *NAEP Basic* Medium and to below *NAEP Basic* Low. As noted earlier, the average passage reading expression scale score was at Level 4, indicating that, overall, fourth-graders could "correctly express text and sentence structure and meaning" of continuous text.

However, the average score was at the Level 3 range for students performing below *NAEP Basic*—meaning that these students could "correctly express the meaning of phrases and clauses but not the passage as a whole." In fact, for the lowest below *NAEP Basic* subgroup, the average expression score fell in the Level 2 range—suggesting that these fourth-graders tended to focus on individual words, not phrases, sentences, or the passage as a whole. Thus, as reading accuracy and reading rate decreased, evidence of appropriate expression likewise decreased.

Overall, there was a strong and consistent relationship between the NAEP reading assessment performance and passage reading WCPM, passage reading rate, passage reading accuracy, and expressivity. Fourth-graders performing at the *NAEP Proficient* and *NAEP Advanced* levels (a) read grade-level texts with accuracy (97 percent), (b) read at a rate that resulted in oral reading fluency scores of more than 140 WCPM, and (c) read with good expressivity. In contrast, students in the below *NAEP Basic* Low, Medium, and High groups (a) read grade-level texts with 82–94 percent accuracy, (b) read at a rate that resulted in oral reading fluency scores of less than 110 WCPM, and (c) read with poor expressivity. There were also marked differences among the below *NAEP Basic* subgroups.

Word-Level Reading, Performance Levels, and Race/Ethnicity

Unlike previous studies, this study looked at word and pseudoword reading in lists. By examining word and pseudoword reading apart from a passage, we could better understand the word-level processes that underlie passage reading, oral reading fluency, and passage comprehension. In word list reading, students read high-frequency words that had known meanings to most students in fourth grade. Performance on this task is an indicator of accumulating knowledge of printed words and an increasing ability to read words rapidly and automatically without effortful decoding. In pseudoword (i.e., made-up, but pronounceable words) list reading, students read novel words that required them to use phonological decoding skills, the skills that enable a reader to pronounce a sequence of letters based on knowledge of spelling-sound correspondences.

Both the word and pseudoword lists showed declines across the NAEP reading achievement levels, including the below *NAEP Basic* subgroups (figures 13 and 14). The declines in mean performance were especially sharp at below *NAEP Basic* Low. Moreover, there was a wide range within the below *NAEP Basic* subgroups. For example, fourth-graders in the below *NAEP Basic* High group read almost twice as many pseudowords correctly per minute (19) as those in the below *NAEP Basic* Low group (11).

In short, this study showed that fourth-grade students who performed below the *NAEP Basic* level on the NAEP reading assessment—that is, over a third of all fourth-graders—lacked the fluency and foundational skills necessary to support continued progress in reading comprehension across their school careers (Wang et al. 2019). Among the analyzed racial/ethnic groups, these performance characteristics were particularly pronounced among Black and Hispanic students. Inadequate development of fluency, as revealed in slow and effortful reading, is associated with less enjoyment, confidence, and motivation to read, slower vocabulary growth, less learning from text, and less application of the more complex reading strategies that are necessary for learning in the content areas and academic disciplines (Mol and Bus 2011; Stanovich 1986; van Bergen, Vasalampi, and Torppa 2020).

Limitations

First, this report is descriptive and correlational in nature. Readers should not draw causal inferences based on the results presented here. It is important to note that while the variables examined in this report are related to one another, complex interactions and relations have not been explored here.

Second, our study does not include a separate measure (or measures) of *language comprehension.* That would require, for example, an orally administered vocabulary test in which students hear the target words without having to read them, or a listening comprehension test that taps, among other things, students' knowledge of sentence structure. Despite this omission, we readily acknowledge that language comprehension plays a critical role in reading comprehension. Both language comprehension and word reading are necessary for reading comprehension, where word reading is defined as fast and accurate word reading (Foorman, Petscher, and Herrera 2018; Hoover and Gough 1990).

Third, the content coverage of the NAEP reading assessment in the 2018 NAEP ORF study is smaller than the NAEP operational assessment because the 2018 NAEP ORF study did not use two of the 10 reading blocks from that were released in 2017. Therefore, readers should not compare the NAEP reading assessment scores from this study to the reading scores from the operational NAEP reading assessments administered to fourth-grade students every 2 years.

Conclusion and Implications

Conclusion

The 2018 ORF study reveals that for an estimated 1.27 million[18] fourth-grade public school students performing below *NAEP Basic,* and particularly for an estimated 0.42 million[19] fourth-grade students in the below *NAEP Basic* Low subgroup, fluent reading of connected text—sufficiently fast and accurate reading of sentences and passages—can be a major challenge. The study also shows that word reading and phonological decoding skills are underdeveloped in students performing below *NAEP Basic,* particularly for students in the below *NAEP Basic* Low subgroup.

Students in the below *NAEP Basic* Low subgroup not only have difficulty reading the words in the text quickly and accurately but also show a lack of appropriate expression in reading out loud, which is an indicator of poor comprehension. This makes it difficult for them to engage in the cognitive processes described in the 2017 NAEP reading framework. For an illustrative audio recording, see https://nces.ed.gov/nationsreportcard/studies/orf/illustrative_audio.aspx.

Implications

The NAEP reading framework and future assessments

First, the current reading framework does not describe any specific reading behaviors that characterize fourth-grade students performing below *NAEP Basic.* It states only that "These students are not necessarily nonreaders; many can complete some tasks on the assessment but are not able to attain the minimum score required for *Basic*" (National Assessment Governing Board 2017, p. 44). Based on the findings of this study, the new framework should incorporate a description of readers performing below *NAEP Basic.* It should acknowledge the fact that, compared to students performing at the *NAEP Basic* level or higher, students performing below *NAEP Basic* are more likely to have underdeveloped fluency, word reading, and phonological decoding skills. There should also be additional testing of fourth-grade students' oral reading fluency and foundational skills with a subsample of the students who take the main NAEP reading assessment. Such testing would provide much-needed information about the students who are performing below *NAEP Basic.*

Second, the framework (p. 4) notes that text comprehension is influenced by phonics knowledge and fluency; and, importantly, it recognizes that "without these foundational skills, comprehension will not occur." It goes on to state a goal or aspiration for fourth-grade students that is universally accepted by reading experts and reading educators: "By grade 4, when the NAEP Reading

[18] This number refers to 36 percent of 3.54 million (number of public school fourth-graders represented in the 2018 ORF study) = 1.27 million.
[19] This number refers to a third of 1.27 million fourth-grade students who performed below *NAEP Basic.* Recall that students performing below *NAEP Basic* were evenly divided into three groups based on the NAEP reading score distribution.

Assessment is first administered, students should have a well-developed understanding of how sounds are represented alphabetically and should have had sufficient practice in reading to achieve fluency with different kinds of texts" (p. 4). But what if this goal has not been met?

In the future, the framework should acknowledge that: "Although the majority of fourth-grade students do not have problems with fluency, word reading, and phonological decoding, these skills are not adequately developed for a significant percentage of readers performing below *NAEP Basic,*" as shown by the findings of the 2018 NAEP ORF report (White et al. 2021).

Policy and research

First, the problems of fourth-grade students performing below *NAEP Basic* highlighted by this report call for a solution-oriented discussion among education policymakers. The discussion may begin with recognition of the large income-based gaps in prereading skills that exist at kindergarten entry (Quinn 2015; Reardon and Portilla 2016) and proceed to a fresh and intensive look at programs of instruction in preschools and the early elementary grades, especially programs that enroll large numbers of Black and Hispanic children. Second, research is needed to determine the extent to which elementary schools teach accurate and efficient word reading skills, in systematic ways that improve oral reading fluency and reading comprehension, as supported by a large body of reading research (e.g., Castles, Rastle, and Nation 2018). This is a topic that is being vigorously debated in policy circles at the present time.

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Appendix A. Technical Notes

This appendix provides additional details about (a) the task development framework, (b) sampling, (c) weighting and variance estimation, (d) statistical testing procedures used to analyze the data for the 2018 NAEP ORF study, (e) the scoring procedures for the ORF data, and (f) the procedures used to construct the below *NAEP Basic* subgroups.

Task Development Framework

The word and pseudoword lists described below were a subset of a larger list developed for use in the Fluency Addition to the National Assessment of Adult Literacy (FAN). They were designed for adults with very low reading skills and were not intended to address the full range of adult abilities. Our own cognitive laboratory studies confirmed that these words were within fourth graders' ability. These word lists were developed by Dr. Richard Venezky, based on principles derived from clinically-valid measures of children's acquisition of phonological decoding and word recognition—specifically measures such as the Woodcock Johnson Word Attack and Letter-Word Identification (Woodcock, Mather, and Schrank 2004) and the Tests of Word Reading Efficiency (Torgesen, Wagner, and Rashotte 1999).

Framework for word lists

Three classes of real words were selected from the Kucera and Francis (1967) corpus: (1) 2- to 5-letter, single-syllable words, (2) 2-syllable words, and (3) 3- to 5-syllable words. These words were then combined to form three lists. The goal was to construct lists in which the structure of words became progressively more complex, while maintaining a relatively high word frequency and familiarity to a general population. The number of letters and syllables were the primary indices of complexity, as they have been repeatedly shown to be the chief indicators of word naming accuracy and rates. In forming parallel lists, an attempt was made to separate any words that appeared closely related with respect to phonology, orthography, or semantics and therefore might cause confusion for respondents or scorers (it/at, then/than, yes/no, more/most). The highest frequency words, hence those most likely to be familiar to fourth-grade students, were chosen from the three lists for use in this study.

Framework for pseudoword lists

Three classes of pseudowords were developed, with subclasses within each: (1) simple, invariant; (2) simple, variant; and (3) multisyllabic. In each of these classes, a variety of pseudowords were constructed to test decoding ability. All of the pseudowords follow strict structural rules for English words. For example, no single-vowel item ends in a single s, l, or f, since these letters usually double in such positions (e.g., class, call, off). That is, the class of consonant-vowel-consonant (CVCs) with a final s, f, or l is restricted to a small group of mostly function words and shortened forms: of, al, is, as, el, us. Less frequently occurring letters (e.g., j, x, z) are used sparingly and no items have pronunciations that sound like common English words. (It is nearly

impossible to totally avoid pseudowords that sound like rarer dictionary entries.) The simplest sound and spelling patterns, hence most decodable by fourth-grade students, were chosen from the three lists for use in this study.

Sampling

The 2018 NAEP ORF study includes fourth-graders attending public schools. About 2,000 students from 220 schools from across the country were sampled. Public schools with over 75 percent of students eligible for the National School Lunch Program (NSLP) were sampled at twice the rate of the chance of selection of school of the same size with a lower percentage of NSLP eligible students. The sample was weighted to represent the total population of U.S. public school fourth-graders. Table A-1 presents the school and student response rates.

Table A-1. NAEP Oral Reading Fluency study participant sample size and response rate: 2018

Sample	Number of samples participated	Weighted response rate (percent)
School	180	85
Student	1,800	88

NOTE: The number of schools is rounded to the nearest ten, and the number of students is rounded to the nearest hundred.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Among the sampled students, about 60 students were excluded from the NAEP reading assessment and the NAEP ORF assessment because they took an alternate assessment[1] or NAEP did not allow the accommodations they requested. An additional 100 students were excluded from the sample used for the analysis because their audio responses were not captured properly due to technical failure. None of the other students were excluded from the oral reading assessment because of difficulty completing the oral reading tasks presented to them.

The statistical standards of the National Center for Education Statistic (NCES) require a nonresponse bias analysis to be completed if the weighted response rate for a sample is less than 85 percent. Because both the weighted school and student response rates are above this threshold, a nonresponse bias analysis was not conducted.

Demographic characteristics of the 2018 NAEP ORF sample

Table A-2 displays the percentage distribution of the key subgroups included in the 2018 NAEP ORF study.

[1] Students who take alternate assessments based on alternate achievement standards for states' high stakes achievement tests were excluded from the 2018 NAEP ORF study following the NAEP exclusion policy. For details, see https://www.nagb.gov/content/nagb/assets/documents/policies/naep_testandreport_studentswithdisabilities.pdf.

Table A-2. Weighted percentage distribution of key subgroups: 2018 NAEP Oral Reading Fluency study sample

Variable	Weighted percentage (percent)
Gender	
Male	51 (0.7)
Female	49 (0.7)
Race/ethnicity	
White	48 (1.9)
Black	16 (1.2)
Hispanic	27 (1.7)
Asian	4 (0.7)
Other	5 (0.5)
National School Lunch Program (NSLP) status	
Not eligible	44 (2.5)
Eligible	54 (2.3)
Information not available	2 (1.2)
English Language Learner (ELL) status	
Non-ELL	89 (1.1)
ELL status	11 (1.1)
Students with disability (SD) status	
Non-SD	88 (1.0)
SD	12 (1.0)

NOTE: Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. Other includes American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races. Standard errors are in parenthesis.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Treatment of missing data

All six measures of oral reading had some missing data for one of the following reasons:

- Administrative error: These errors include any technical failure with a recording device.
- Insufficient audio responses: If there is insufficient student speech (e.g., not enough words read by a student), scores were not estimated because the available oral reading data could not yield reliable estimates.
- Response anomaly: These cases include (a) extremely quiet reading, which prevented the automatic speech analysis system and human scorers from transcribing the audio reading; (b) possible off-task or irrelevant speech; and (c) anything unusual or unexpected in the recording that prevented the speech analysis system and human scorers from transcribing it.

Missing data on five out of six oral reading variables (i.e., word reading WCPM, pseudoword reading WCPM, passage reading WCPM, passage reading rate, and passage reading accuracy) were imputed using students' demographic characteristics (i.e., gender, race/ethnicity, National School Lunch Program eligibility status, English language learner status, and disability status), two oral reading feedback questions,[2] and all available observed oral reading data by the multivariate imputation by chained equations (MICE) method (van Buuren and Groothuis-Oudshoorn 2011). Imputed data were used for all analyses involving these five oral reading variables (n = 1,800). However, it is important to note that variance associated with multiple imputation was not accounted for when computing the standard errors; therefore, the standard errors obtained from the final analyses were likely underestimated.

Missing data for the passage reading expression variable were not imputed; instead the missing data on the expression variable were excluded from the analysis (n = 20) involving passage reading expression.

Scaling of NAEP Reading Assessment

The NAEP reading assessment used for the 2018 NAEP ORF study consisted of eight reading blocks from the 2017 grade 4 NAEP reading assessment. There had been 10 blocks of reading items in the 2017 NAEP assessment, but two were released to the public as part of the Nation's Report Card. Therefore, only eight blocks were available for use by the ORF study in 2018. Those eight blocks of items were assembled into eight booklets, each of which included two blocks. To assemble the booklets, each block appeared once in the first position and once in the second position. Every student participating in the ORF study received one reading booklet of two blocks of items.

Similar to the analyses of other operational NAEP reading assessment data, because each student did not answer all the reading items, a simple average percent correct would not allow reporting results that are comparable for all students; therefore Item Response Theory (IRT) was used to estimate average proficiency of various groups of students using their item responses and item characteristics such as difficulty and discrimination. IRT models the probability of answering a question correctly as a mathematical function of proficiency or skill. The main purpose of IRT analysis is to provide a common scale on which the performance of students receiving different booklets of items can be placed.

During the NAEP scaling process, item parameters (e.g., difficulty and discrimination) are typically estimated for each item based on student response data and item type. Given the small sample size of the ORF study (about 500 students per item) and the fact that the same blocks of items from 2017 were administered, item parameters were not estimated for the 2018 ORF study. Instead, the item parameter estimates of the 2017 NAEP grade 4 reading assessment were directly applied to the ORF data.

To estimate the distributions of the reading scale scores, population-structure models were used along with IRT models to appropriately estimate population and subgroup distributions of

[2] Two feedback questions used for the imputation are: (a) How often have you read out loud in school or at home or anywhere in this school year? and (b) How difficult was this reading-out-loud test?

reading scale scores. The group-defining variables used in the ORF population-structure model included major demographic variables (i.e., gender, race/ethnicity, NSLP status, ELL status, and IEP status) and all ORF variables as main effects, as well as the one-way interactions between demographic variables and the ORF variables.

Because the 2017 grade 4 NAEP reading item parameter estimates were used in the scaling of the ORF NAEP reading assessment data, the same transformation constants used in the 2017 NAEP reading assessment were then applied to the ORF data, thus linking the ORF reading assessment results to the previously established NAEP grade 4 reading scale. In a nutshell, ORF reading data analyses largely followed the NAEP data analysis procedure. For details about NAEP analyses and scaling, refer to NAEP Technical Documentation on the Web.

Weighting and Variance Estimation

A complex sample design was used to select the students to participate in the 2018 NAEP ORF study. The properties of a sample selected through a complex sample design could be different from a sample that is chosen randomly, in which every student in the target population has an equal chance of selection and in which the observations from different sampled students can be considered to be statistically independent of one another. Therefore, to account for the fact that the probabilities of selection were not identical for all students using this data collection design, sampling weights were used during the analysis of the assessment data. These weights included adjustments for school and student nonresponse. Use of such sampling weights yielded appropriate estimates of population characteristics. In addition to obtaining population-appropriate estimates, two components of uncertainty associated with these estimates were obtained. First, sampling errors of estimates were calculated using a set of 62 replicate weights and the jackknife repeated replication method to account for the degree of uncertainty associated with the sample. Second, the degree of imprecision associated with the reading assessment measure was also taken into consideration by using a set of 20 plausible values drawn from a conditional ability distribution for each student. Using student final sampling weights, a set of 62 replicate weights, and a set of 20 plausible values yielded results with an accurate population estimate and standard error that takes into account the sampling and measurement error.

All reported average scores and percentages are estimates and subject to a level of uncertainty. The degree of uncertainty is reflected in the standard errors for each of the estimates included in the report, which accounts for the sampling errors and measurement errors described above (see appendix C for standard errors for the reported estimates).

Statistical Testing Procedures

For all statistical comparisons, statistical significance was determined at the alpha level of .05; that is, there is no more than a 5 percent chance that differences could be attributed to chance. Significant results were calculated using the False Discovery Rate (FDR) procedure, a standard multiple-comparison procedure used for NAEP, based on the number of significance tests made. For details about the FDR procedure, refer to NAEP Technical Documentation on the Web.

To compare oral reading performance among key subgroups (see figures 3–7) and by NAEP achievement levels (see figures 9–14), a two-tailed independent sample *t* test was conducted. The formula used to compute the *t* statistic is follows:

$$t = \frac{P1 - P2}{\sqrt{(\mathrm{SE}_1{}^2 + \mathrm{SE}_2{}^2)}}$$

where *P*1 and *P*2 are the average oral reading scores (e.g., average passage WCPM scores for male and female or average passage WCPM for students performing at *NAEP Basic* and *NAEP Proficient*) to be compared and SE_1 and SE_2 are their corresponding standard errors. Note that for the NAEP achievement level comparisons, only adjacent groups were compared instead of making all possible comparisons.

Scoring of Passage Variables

The 2018 NAEP ORF study used a new automatic speech analysis system that transcribed students' oral reading and calculated their accuracy, rate, and words correct per minute (WCPM) by aligning the transcription to the passage text. That is, the automatic speech analysis system transcribed from the first to the last word what a student read aloud, then it calculated the number of words read by the student (i.e., span length). It also calculated the duration of students' oral reading relevant to the passage (i.e., span duration). Lastly, the system counted the number of words that were correctly read in the correct order within the span length (i.e., number of correctly read words in text span). These three pieces of information were used to calculate passage rate, accuracy, and words correct per minute (WCPM).

For example, a student attempted to read 90 words (span length) from the Guided Dogs passage that is 152 words long (see figure B-1), which took the student 49 seconds (span duration). Among the 90 words, 86 words were read correctly in the correct order (number of correctly read words in text span). Given this,

- Passage reading rate (words per minute): 90 (span length) / 49 (span duration in seconds) x 60 (seconds) = 110 words per minute;
- Passage accuracy (percent of words read correctly): 86 (number of correctly read words in text span) / 90 (span length) x 100 = 96 percent accuracy;
- Passage WCPM: 86 (number of correctly read words in text span) / 49 (span duration in seconds) x 60 (seconds) = 105 words correctly read per minute.

Table A-3. Interrater reliability for passage scoring: 2018

Passage	Maximum number of words	Number of audio recordings	Interrater reliability
Passage 1	162	279	.99
Passage 2	153	275	.98
Passage 3	162	283	.93
Passage 4	152	283	.94

NOTE: Passage interrater reliability is a correlation between the counts of words correctly read using the machine transcriptions and those using the human transcriptions of the same audio recording. The final passage interrater reliability (.96) is the average correlation across the four passages.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Constructing below *NAEP Basic* Subgroups

To examine the relationship between oral reading fluency and reading comprehension skills with an emphasis on the students performing below *NAEP Basic* (see the Average ORF Performance by NAEP Reading Achievement Levels section), these students were divided into three quantile groups based on students' scores from the NAEP reading assessment (i.e., each group represents one-third of the students performing below *NAEP Basic*). As seen in table A-4, each of the below *NAEP Basic* subgroups includes 12 percent of the grade 4 public school students. The average NAEP reading score for each of the three below *NAEP Basic* subgroups ranged from 155 to 202.

Table A-4. Interrater reliability for passage scoring: 2018

Achievement level	Unweighted percentage (percent)	Weighted percentage (percent)	Weighted sample size	Average NAEP reading score
below *NAEP Basic* Low	14	12 (1.0)	422,300	155 (3.3)
below *NAEP Basic* Medium	13	12 (0.9)	424,000	184 (2.2)
below *NAEP Basic* High	13	12 (0.9)	422,700	202 (1.9)
NAEP Basic	30	30 (1.6)	1,070,000	223 (1.2)
NAEP Proficient	23	25 (1.6)	880,600	249 (1.4)
NAEP Advanced	8	9 (1.1)	323,700	273 (2.9)
Total	**100**	**100 (†)**	**3,543,300**	**219 (1.4)**

† Not applicable.
NOTE: Standard errors are in parentheses. Detail may not sum to totals because of rounding. The weighted sample size is rounded to the nearest hundred.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

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Appendix B: Sample Oral Reading Passage

This appendix presents a sample oral reading passage used in the NAEP 2018 Oral Reading Fluency study. This is one of the four reading passages administered to students in the study. This passage, as well as the other three passages, represents the complexity level of the texts that fourth-graders typically read, according to several readability measures we used, including the Flesch-Kincaid Grade Level measure (Kincaid et al. 1975).

The average scores for this passage, including words correct per minute, rate, accuracy and expression, are provided in table B-1 below. More information about the sample reading passage, such as sample digital recordings of student oral reading responses, can be found on the NAEP ORF website at https://nces.ed.gov/nationsreportcard/studies/orf/illustrative_audio.aspx.

Figure B-1. Sample oral reading passage: 2018

Guide Dogs (152 words)

Guide dogs lead very interesting lives. For 10 or 12 years, they are in charge of guiding a blind person. To do this job they must be smart, gentle, and very well trained

Most guide dogs are born at a kennel. Since dogs are gentler when raised by a family, the dogs are given to families soon after they are born. When the dogs are about 14 months old, they return to the kennel to be trained.

The dogs train in large groups for about three months, and they know more at the end of that time than most dogs will ever learn. But the training isn't over yet. Their new masters arrive and they train together as a team for one more month.

At the end of that time they are ready for the world. Guide dogs form strong bonds with their masters, and they keep them company all the time.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Fourth grade children are expected to read passages that introduce them to a topic they are unfamiliar with and/or passages that build on and extend existing knowledge. In the case of the Guide Dogs passage, most children already know something about dogs, and they understand the general meaning of the word guide. In reading the passage, they learn that there are dogs trained specifically to help blind people called guide dogs, even if this concept has not been part of their day to day experience. Note that the second sentence essentially provides the meaning of guide dog: "For 10 or 12 years, they are in charge of guiding a blind person."

Fourth grade children are also expected to use their phonological decoding skills and context to infer the meaning of words that they have not encountered in print and perhaps not even heard. In the case of the word "kennel," for example, the word is regular and decodable. The passage has two sentences: "Most dogs are born at a kennel." And "When the dogs are about 14 months old, they return to the kennel to be trained." These sentences provide enough context to infer what a kennel is. The inferred word meaning may not be as deep or as precise as the child could get from looking up the word in a dictionary, but enough to make sense of the passage.

Table B-1. Average oral reading performance for the "Guide Dogs" passage: 2018

Measure	Average	
Passage reading words correct per minute (WCPM)	113	(1.2)
Passage reading rate: words per minute	119	(1.1)
Passage reading accuracy: percentage of words read correctly	94	(0.3)
Passage reading expression	3.8	(0.03)

NOTE: Standard errors are in parentheses.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Appendix C: Estimates and Standard Errors for Tables and Figures

This appendix contains the standard errors for the estimated averages and percentages in all tables and figures throughout this report. Some additional data not discussed in detail in the report are also included here.

Table C-1. Estimates and standard errors for figure 3. Average oral reading performance of U.S. fourth-graders by gender: 2018

ORF measure	Description	Average	
Oral reading fluency	Passage reading words correct per minute (WCPM)	120	(1.2)
	Passage reading rate: Words per minute	126	(1.1)
	Passage reading accuracy: Percentage of words read correctly	94	(0.2)
	Passage reading expression	4.0	(0.03)
Word reading	Word list reading: WCPM	51	(0.5)
Phonological decoding	Pseudoword list reading: WCPM	22	(0.3)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-2. Estimates and standard errors for figure 3. Average oral reading performance of U.S. fourth-graders by gender: 2018

Measure	Measure description	Male		Female	
Oral reading fluency	Passage reading words correct per minute (WCPM)	118	(1.6)	122*	(1.3)
	Passage reading rate: Words per minute	125	(1.4)	128	(1.3)
	Passage reading accuracy: Percentage of words read correctly	94	(0.3)	95*	(0.3)
	Passage reading expression	3.9	(0.03)	4.0*	(0.03)
Word reading	Word list reading: WCPM	51	(0.6)	51	(0.7)
Phonological decoding	Pseudoword list reading: WCPM	23	(0.4)	21*	(0.4)

* Statistically significant score difference when compared to male students, $p < .05$.
NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-3. Estimates and standard errors for figure 3. Average oral reading performance of U.S. fourth-graders by gender: 2018

Measure	Measure description	White		Black		Hispanic		Asian		Other	
Oral reading fluency	Passage reading words correct per minute (WCPM)	128	(1.6)	106*	(2.2)	110*	(1.6)	137	(6.1)	123	(4.9)
	Passage reading rate: Words per minute	133	(1.4)	114*	(2.1)	118*	(1.4)	144	(5.5)	130	(4.5)
	Passage reading accuracy: Percentage of words read correctly	96	(0.3)	92*	(0.6)	93*	(0.4)	94	(1.3)	95	(0.9)
	Passage reading expression	4.1	(0.04)	3.7*	(0.06)	3.7*	(0.04)	4.2	(0.11)	4	(0.13)
Word reading	Word list reading: WCPM	53	(0.6)	47*	(0.9)	50*	(0.7)	52	(2.3)	49	(2.6)
Phonological decoding	Pseudoword list reading: WCPM	24	(0.5)	18*	(0.7)	21*	(0.5)	26	(1.9)	23	(1.4)

* Statistically significant score difference compared to White students, $p < .05$. All comparisons were conducted with an alpha level of 0.05 with White students as a reference group. The False Discovery Rate (FDR) procedure was used to adjust for multiple pairwise comparisons between White and four other racial/ethnic groups (i.e., 4 comparisons).
NOTE: Pseudoword is a made-up but pronounceable word. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. Other includes American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races. Standard errors are in parentheses.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-4. Estimates and standard errors for figure 5. Average oral reading performance of U.S. fourth-graders by National School Lunch Program (NSLP) eligibility status: 2018

Measure	Measure description	NSLP non-eligible		NSLP eligible		Information not available	
Oral reading fluency	Passage reading words correct per minute (WCPM)	133	(1.4)	108*	(1.3)	141	(4.2)
	Passage reading rate: Words per minute	138	(1.3)	116*	(1.2)	145	(3.9)
	Passage reading accuracy: Percentage of words read correctly	96	(0.3)	93*	(0.3)	97*	(0.4)
	Passage reading expression	4.2	(0.03)	3.7*	(0.03)	4.5*	(0.04)
Word reading	Word list reading: WCPM	54	(0.7)	48*	(0.7)	58*	(0.7)
Phonological decoding	Pseudoword list reading: WCPM	25	(0.5)	19*	(0.4)	29*	(0.9)

* Statistically significant score difference compared to students not eligible for NSLP, $p < .05$. All comparisons were conducted with an alpha level of 0.05 with students not eligible for NSLP as a reference group. The False Discovery Rate (FDR) procedure was used to adjust for multiple pairwise comparisons between students not eligible NSLP and two other NSLP status groups (i.e., 2 comparisons).
NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-5. Estimates and standard errors for figure 6. Average oral reading performance of U.S. fourth-graders by English Language Learner (ELL) status: 2018

Measure	Measure description	Non-ELL		ELL	
Oral reading fluency	Passage reading words correct per minute (WCPM)	123	(1.2)	99*	(2.6)
	Passage reading rate: Words per minute	128	(1.1)	109*	(2.3)
	Passage reading accuracy: Percentage of words read correctly	95	(0.2)	90*	(0.8)
	Passage reading expression	4.0	(0.03)	3.5*	(0.07)
Word reading	Word list reading: WCPM	52	(0.5)	46*	(1.2)
Phonological decoding	Pseudoword list reading: WCPM	23	(0.3)	18*	(0.6)

* Statistically significant score difference when compared to non-ELL students, $p < .05$.
NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. The results for English language learners are based on students who were assessed and cannot be generalized to the total population of such students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-6. Estimates and standard errors for figure 7. Average oral reading performance of U.S. fourth-graders by students with disabilities status: 2018

Measure	Measure description	Without disabilities		With disabilities	
Oral reading fluency	Passage reading words correct per minute (WCPM)	124	(1.2)	92*	(2.6)
	Passage reading rate: Words per minute	129	(1.1)	103*	(2.3)
	Passage reading accuracy: Percentage of words read correctly	95	(0.2)	88*	(0.8)
	Passage reading expression	4.0	(0.02)	3.3*	(0.08)
Word reading	Word list reading: WCPM	53	(0.5)	41*	(1.5)
Phonological decoding	Pseudoword list reading: WCPM	23	(0.3)	15*	(0.9)

* Statistically significant score difference when compared to students without disabilities, $p < .05$.
NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. The results for students with disabilities are based on students who were assessed and cannot be generalized to the total population of such students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-7. Estimates and standard errors for table 2. Percentage of fourth-graders by NAEP achievement level and by selected student characteristics: 2018

Student characteristics	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*		Total
All students	**36**	**(1.7)**	**30**	**(1.6)**	**25**	**(1.6)**	**9**	**(1.1)**	**100**
Race/ethnicity									
White	27	(2.2)	30	(2.6)	31	(2.4)	12	(1.9)	100
Black	51	(4.2)	30	(3.8)	15	(2.7)	4	(1.6)	100
Hispanic	46	(2.6)	32	(2.7)	18	(2.4)	4	(1.4)	100
NSLP eligibility									
Eligible	50	(2.0)	32	(2.1)	16	(1.6)	2	(0.7)	100
Not eligible	19	(2.1)	28	(2.4)	36	(2.6)	17	(2.0)	100

NOTE: Standard errors are in parentheses. Detail may not sum to total because of rounding. Only three race/ethnicity groups (White, Black, and Hispanic) are reported in this report because the sample size for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) by NAEP reading achievement level did not meet the NAEP reporting standard for a robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. For National School Lunch Program (NSLP) eligibility, about 2 percent of the students lacked valid eligibility information. These students were not reported because of a small sample size. Learn more about the NAEP achievement levels.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-8. Estimates and standard errors for table 3. Percentage of fourth-graders performing below *NAEP Basic* by below *NAEP Basic* subgroup and selected student characteristics: 2018

Student characteristics	below *NAEP Basic* Low		*NAEP Basic* Medium		*NAEP Basic* High		Total
All students	**33**	**(2.1)**	**33**	**(2.0)**	**33**	**(2.1)**	**100**
Race/ethnicity							
White	26	(4.1)	35	(4.8)	39	(5.0)	100
Black	40	(5.1)	31	(5.5)	28	(4.9)	100
Hispanic	37	(3.9)	33	(4.4)	30	(3.9)	100
NSLP eligibility							
Eligible	35	(2.5)	34	(2.7)	31	(2.5)	100
Not eligible	27	(5.2)	32	(6.0)	41	(6.0)	100

NOTE: Standard errors are in parentheses. Detail may not sum to total because of rounding. Only three race/ethnicity groups (White, Black, and Hispanic) are reported in this report because the sample size for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) by NAEP reading achievement level did not meet the NAEP reporting standard for a robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. For National School Lunch Program (NSLP) eligibility, about 2 percent of the students lacked valid eligibility information. These students were not reported because of a small sample size. Learn more about the NAEP achievement levels.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-9. Estimates and standard errors for table 4 and figures 9–14. Average oral reading performance by NAEP reading achievement level: 2018

Measure	ORF variable	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*	
Oral reading fluency	Passage reading words correct per minute (WCPM)	91	(1.5)	123	(1.5)	142	(1.6)	160	(2.4)
	Passage reading rate: Words per minute	101	(1.3)	128	(1.5)	146	(1.6)	163	(2.4)
	Passage reading accuracy: Percentage of words read correctly	90	(0.5)	96	(0.2)	97	(0.2)	98	(0.2)
	Passage reading expression	3.3	(0.04)	4.1	(0.03)	4.4	(0.03)	4.7	(0.04)
Word reading	Word list reading: WCPM	43	(0.9)	54	(0.6)	57	(0.8)	59	(1.2)
Phonological decoding	Pseudoword list reading: WCPM	15	(0.5)	23	(0.6)	27	(0.7)	31	(1.0)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. All adjacent comparisons are statistically significant except for the difference in word list reading WCPM between *NAEP Proficient* and *NAEP Advanced,* $p < .05$. For instance, there was statistically significant difference in passage reading WCPM between below *NAEP Basic* and *NAEP Basic, NAEP Basic* and *NAEP Proficient,* and *NAEP Proficient* and *NAEP Advanced.* The cut scores for *NAEP Basic, NAEP Proficient,* and *NAEP Advanced* are 208, 238, and 268, respectively. The NAEP reading scale ranges from 0 to 500. NAEP achievement levels are performance standards that describe what students should know and be able to do. Students performing at or above the *NAEP Proficient* level on NAEP assessments demonstrate solid academic performance and competency over challenging subject matter. *NAEP Proficient* does not represent grade-level proficiency as determined by other assessment standards (e.g., state or district assessments). Learn more about the NAEP achievement levels.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-10. Estimates and standard errors for average oral reading performance by NAEP achievement level and gender: 2018

Measure	ORF variable	Gender	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Male	90	(2.1)	124	(2.2)	141	(2.2)	161	(3.3)
		Female	92	(1.8)	123	(2.2)	143	(2.4)	159	(3.6)
	Passage reading rate: Words per minute	Male	101	(1.8)	129	(2.2)	146	(2.2)	164	(3.3)
		Female	101	(1.6)	128	(2.3)	147	(2.4)	163	(3.7)
	Passage reading accuracy: Percentage of words read correctly	Male	89	(0.7)	96	(0.3)	97	(0.2)	98	(0.2)
		Female	91	(0.6)	96	(0.3)	97	(0.3)	98	(0.3)
	Passage reading expression	Male	3.2	(0.05)	4.0	(0.04)	4.4	(0.05)	4.7	(0.05)
		Female	3.4	(0.06)	4.1	(0.05)	4.5	(0.04)	4.7	(0.06)
Word reading	Word list reading: WCPM	Male	43	(1.1)	55	(0.8)	58	(0.7)	60	(1.3)
		Female	43	(1.2)	52	(1.0)	56	(1.3)	59	(1.8)
Phonological decoding	Pseudoword list reading: WCPM	Male	16	(0.7)	24	(0.8)	28	(0.8)	32	(1.3)
		Female	14	(0.6)	22	(0.8)	26	(0.9)	31	(1.3)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. Learn more about the NAEP achievement levels.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-11. Estimates and standard errors for table 4: Average oral reading performance by NAEP achievement level and race/ethnicity: 2018

Measure	ORF variable	Race/ ethnicity	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*	
Oral reading fluency	Passage reading words correct per minute (WCPM)	White	96	(2.6)	125	(2.2)	145	(2.2)	162	(2.6)
		Black	84	(3.2)	122	(3.1)	133	(3.6)	146	(6.1)
		Hispanic	90	(2.1)	120	(2.1)	137	(2.7)	152	(6.9)
	Passage reading rate: Words per minute	White	105	(2.4)	130	(2.2)	148	(2.1)	165	(2.6)
		Black	95	(2.8)	127	(3.1)	138	(3.6)	151	(6.7)
		Hispanic	100	(1.9)	125	(2.0)	141	(2.6)	155	(6.9)
	Passage reading accuracy: Percentage of words read correctly	White	91	(0.8)	96	(0.3)	97	(0.2)	98	(0.2)
		Black	88	(1.2)	96	(0.5)	97	(0.7)	97	(0.7)
		Hispanic	89	(0.8)	96	(0.4)	97	(0.4)	98	(0.7)
	Passage reading expression	White	3.4	(0.07)	4.1	(0.05)	4.5	(0.04)	4.8	(0.04)
		Black	3.1	(0.08)	4.1	(0.07)	4.4	(0.09)	4.6	(0.15)
		Hispanic	3.3	(0.06)	4.0	(0.05)	4.4	(0.07)	4.6	(0.12)
Word reading	Word list reading: WCPM	White	44	(1.4)	54	(0.9)	57	(0.9)	59	(1.1)
		Black	40	(1.5)	52	(1.5)	56	(1.8)	58	(3.3)
		Hispanic	44	(1.4)	54	(1.0)	58	(1.3)	60	(2.3)
Phonological decoding	Pseudoword list reading: WCPM	White	16	(1.0)	23	(0.7)	27	(0.9)	32	(1.2)
		Black	13	(0.8)	22	(1.4)	26	(1.6)	28	(2.5)
		Hispanic	16	(0.7)	23	(1.0)	27	(1.3)	30	(3.0)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. Only three race/ethnicity groups (White, Black, and Hispanic) are reported in this report because the sample size for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) by NAEP reading achievement level did not meet the NAEP reporting standard for robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. Learn more about the NAEP achievement levels.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-12. Estimates and standard errors for table 4: Average oral reading performance by NAEP achievement level and National School Lunch Program (NSLP) eligibility status: 2018

Measure	ORF variable	NSLP status	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Eligible	90	(1.6)	121	(1.7)	137	(2.7)	148	(7.1)
		Not eligible	95	(3.0)	126	(2.4)	145	(1.9)	161	(2.6)
	Passage reading rate: Words per minute	Eligible	100	(1.4)	126	(1.7)	141	(2.7)	152	(7.2)
		Not eligible	104	(2.9)	131	(2.5)	149	(1.9)	165	(2.6)
	Passage reading accuracy: Percentage of words read correctly	Eligible	89	(0.6)	96	(0.2)	97	(0.3)	98	(0.6)
		Not eligible	91	(0.9)	96	(0.4)	97	(0.2)	98	(0.2)
	Passage reading expression	Eligible	3.2	(0.05)	4.0	(0.04)	4.3	(0.05)	4.5	(0.13)
		Not eligible	3.4	(0.09)	4.1	(0.04)	4.5	(0.04)	4.8	(0.04)
Word reading	Word list reading: WCPM	Eligible	43	(1.0)	53	(0.8)	55	(1.3)	56	(3.0)
		Not eligible	43	(1.7)	54	(1.1)	58	(1.0)	60	(1.3)
Phonological decoding	Pseudoword list reading: WCPM	Eligible	15	(0.5)	23	(0.7)	27	(0.9)	28	(2.6)
		Not eligible	16	(1.0)	23	(0.8)	27	(0.9)	32	(1.1)

Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. About 2 percent of the students lacked valid information about their National School Lunch Program (NSLP) eligibility. These students are not reported by NAEP reading achievement level because the small sample size did not meet the NAEP reporting standard for robust estimation. Learn more about the NAEP achievement levels.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-13. Estimates and standard errors for average oral reading performance by NAEP achievement level and English Language Learner (ELL) Status: 2018

Measure	ORF variable	ELL status	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Yes	86	(2.6)	118	(4.2)	‡	(†)	‡	(†)
		No	93	(1.7)	124	(1.6)	143	(1.6)	160	(2.3)
	Passage reading rate: Words per minute	Yes	98	(2.3)	123	(4.0)	‡	(†)	‡	(†)
		No	102	(1.5)	129	(1.6)	147	(1.6)	163	(2.3)
	Passage reading accuracy: Percentage of words read correctly	Yes	87	(1.1)	95	(0.8)	‡	(†)	‡	(†)
		No	90	(0.5)	96	(0.2)	97	(0.2)	98	(0.2)
	Passage reading expression	Yes	3.1	(0.08)	3.9	(0.09)	‡	(†)	‡	(†)
		No	3.3	(0.05)	4.1	(0.03)	4.5	(0.03)	4.7	(0.04)
Word reading	Word list reading: WCPM	Yes	41	(1.6)	53	(1.9)	‡	(†)	‡	(†)
		No	43	(1.0)	54	(0.7)	57	(0.8)	59	(1.2)
Phonological decoding	Pseudoword list reading: WCPM	Yes	15	(0.8)	21	(1.7)	‡	(†)	‡	(†)
		No	15	(0.6)	23	(0.6)	27	(0.7)	32	(1.0)

† Not applicable.
‡ Reporting standards not met.
NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. Estimates for students performing at the *NAEP Proficient* and *NAEP Advanced* levels are not reported for ELL students because the number of ELL students in these achievement level categories do not meet the NAEP reporting standards for robust estimation. Learn more about the NAEP achievement levels. The results for English language learners are based on students who were assessed and cannot be generalized to the total population of such students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-14. Estimates and standard errors for average oral reading performance by NAEP achievement level and students with disabilities status: 2018

Measure	ORF variable	Disability status	below *NAEP Basic*		*NAEP Basic*		*NAEP Proficient*		*NAEP Advanced*	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Yes	79	(2.7)	121	(6.0)	‡	(†)	‡	(†)
		No	95	(1.7)	123	(1.5)	142	(1.6)	160	(2.4)
	Passage reading rate: Words per minute	Yes	92	(2.5)	127	(5.8)	‡	(†)	‡	(†)
		No	104	(1.6)	128	(1.5)	146	(1.6)	163	(2.4)
	Passage reading accuracy: Percentage of words read correctly	Yes	85	(1.0)	95	(1.0)	‡	(†)	‡	(†)
		No	91	(0.5)	96	(0.2)	97	(0.2)	98	(0.2)
	Passage reading expression	Yes	2.9	(0.11)	4.0	(0.11)	‡	(†)	‡	(†)
		No	3.4	(0.05)	4.1	(0.03)	4.4	(0.03)	4.7	(0.04)
Word reading	Word list reading: WCPM	Yes	36	(1.8)	52	(2.9)	‡	(†)	‡	(†)
		No	45	(0.9)	54	(0.7)	57	(0.8)	59	(1.3)
Phonological decoding	Pseudoword list reading: WCPM	Yes	12	(0.8)	20	(2.2)	‡	(†)	‡	(†)
		No	16	(0.5)	23	(0.5)	27	(0.7)	32	(1.0)

† Not applicable.
‡ Reporting standards not met.
NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. Estimates for students performing at the *NAEP Proficient* and *NAEP Advanced* levels are not reported for students with disabilities because the number of students with disabilities in these achievement level categories do not meet the NAEP reporting standards for robust estimation. Learn more about the NAEP achievement levels. The results for students with disabilities are based on students who were assessed and cannot be generalized to the total population of such students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-15. Estimates and standard errors for figures 9–14. Average oral reading performance by below *NAEP Basic* subgroups: 2018

Measure	ORF variable	below *NAEP Basic* Low		below *NAEP Basic* Medium		below *NAEP Basic* High	
Oral reading fluency	Passage reading words correct per minute (WCPM)	71	(2.0)	95	(2.1)	108	(2.5)
	Passage reading rate: Words per minute	86	(2.0)	103	(2.1)	115	(2.5)
	Passage reading accuracy: Percentage of words read correctly	82	(1.1)	92	(0.7)	94	(0.5)
	Passage reading expression	2.7	(0.07)	3.4	(0.07)	3.8	(0.06)
Word reading	Word list reading: WCPM	34	(1.6)	45	(1.6)	50	(1.4)
Phonological decoding	Pseudoword list reading: WCPM	11	(0.7)	16	(0.9)	19	(0.8)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. All adjacent comparisons are statistically significant except for the difference in word list reading WCPM between below *NAEP Basic* Medium and below *NAEP Basic* High, $p < .05$. For instance, there was statistically significant difference in passage reading WCPM between below *NAEP Basic* Low and below *NAEP Basic* Medium, and below *NAEP Basic* Medium and below *NAEP Basic* High.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-16. Estimates and standard errors for average oral reading performance by below *NAEP Basic* subgroups and gender: 2018

Measure	ORF variable	Gender	below *NAEP Basic* Low		below *NAEP Basic* Medium		below *NAEP Basic* High	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Male	70	(2.7)	95	(2.7)	109	(3.4)
		Female	71	(2.9)	94	(3.4)	107	(3.4)
	Passage reading rate: Words per minute	Male	87	(2.7)	104	(2.7)	116	(3.4)
		Female	85	(3.0)	102	(3.3)	113	(3.4)
	Passage reading accuracy: Percentage of words read correctly	Male	82	(1.3)	92	(0.9)	94	(0.8)
		Female	84	(1.7)	92	(1.1)	95	(0.8)
	Passage reading expression	Male	2.6	(0.09)	3.3	(0.09)	3.7	(0.08)
		Female	2.8	(0.11)	3.5	(0.10)	3.8	(0.08)
Word reading	Word list reading: WCPM	Male	34	(1.7)	45	(2.2)	51	(1.8)
		Female	34	(2.4)	44	(2.0)	49	(1.9)
Phonological decoding	Pseudoword list reading: WCPM	Male	12	(0.9)	17	(1.3)	20	(1.3)
		Female	10	(1.0)	14	(1.0)	18	(1.1)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-17. Estimates and standard errors for average oral reading performance by below *NAEP Basic* subgroups and race/ethnicity: 2018

Measure	ORF variable	Race/ ethnicity	below *NAEP Basic* Low		below *NAEP Basic* Medium		below *NAEP Basic* High	
Oral reading fluency	Passage reading words correct per minute (WCPM)	White	73	(4.5)	99	(4.0)	110	(4.0)
		Black	64	(3.0)	90	(4.4)	107	(4.9)
		Hispanic	73	(3.2)	94	(2.8)	106	(3.5)
	Passage reading rate: Words per minute	White	88	(4.5)	106	(3.8)	116	(4.2)
		Black	80	(3.1)	98	(4.3)	113	(4.7)
		Hispanic	88	(2.8)	103	(3.1)	113	(3.7)
	Passage reading accuracy: Percentage of words read correctly	White	84	(2.3)	93	(1.1)	95	(0.8)
		Black	81	(2.1)	91	(1.3)	94	(1.1)
		Hispanic	83	(1.8)	92	(1.1)	94	(0.9)
	Passage reading expression	White	2.8	(0.15)	3.5	(0.13)	3.8	(0.10)
		Black	2.5	(0.12)	3.4	(0.11)	3.8	(0.11)
		Hispanic	2.8	(0.13)	3.4	(0.10)	3.7	(0.09)
Word reading	Word list reading: WCPM	White	34	(3.1)	46	(2.8)	50	(2.0)
		Black	31	(2.4)	44	(2.7)	50	(2.8)
		Hispanic	38	(2.4)	45	(2.0)	49	(2.1)
Phonological decoding	Pseudoword list reading: WCPM	White	11	(1.5)	16	(1.5)	20	(1.3)
		Black	9	(0.9)	14	(1.6)	18	(1.9)
		Hispanic	13	(1.3)	17	(1.3)	18	(1.4)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. Only three race/ethnicity groups (White, Black, and Hispanic) are reported in this report because the sample size for Asian students and students of other races/ethnicities (including American Indian/Alaska Native, Pacific Islander/Native Hawaiian, and Two or more races) by NAEP reading achievement level did not meet the NAEP reporting standard for robust estimation. Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-18. Estimates and standard errors for average oral reading performance by below *NAEP Basic* subgroups and National School Lunch Program (NSLP) eligibility status: 2018

Measure	ORF variable	NSLP status	below *NAEP Basic* Low		below *NAEP Basic* Medium		below *NAEP Basic* High	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Eligible	70	(2.2)	94	(2.4)	107	(2.9)
		Not eligible	72	(5.5)	94	(5.2)	110	(4.5)
	Passage reading rate: Words per minute	Eligible	86	(2.2)	103	(2.3)	113	(2.8)
		Not eligible	84	(5.0)	103	(5.0)	117	(4.7)
	Passage reading accuracy: Percentage of words read correctly	Eligible	82	(1.2)	92	(0.8)	94	(0.6)
		Not eligible	84	(2.5)	91	(1.6)	94	(1.2)
	Passage reading expression	Eligible	2.7	(0.08)	3.4	(0.07)	3.7	(0.07)
		Not eligible	2.7	(0.23)	3.5	(0.16)	3.8	(0.10)
Word reading	Word list reading: WCPM	Eligible	35	(1.7)	45	(1.7)	49	(1.6)
		Not eligible	31	(3.9)	44	(3.6)	50	(2.5)
Phonological decoding	Pseudoword list reading: WCPM	Eligible	12	(0.7)	15	(0.9)	18	(0.9)
		Not eligible	9	(2.0)	16	(2.2)	20	(1.6)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. About 2 percent of the students lacked valid information about their National School Lunch Program (NSLP) eligibility. These students are not reported by NAEP reading achievement level because of small sample size, which did not meet the NAEP reporting standard for robust estimation.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-19. Estimates and standard errors for average oral reading performance by below *NAEP Basic* subgroups and English Language Learner (ELL) status: 2018

Measure	ORF variable	ELL status	below *NAEP Basic* Low		below *NAEP Basic* Medium		below *NAEP Basic* High	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Yes	69	(3.5)	95	(4.2)	107	(4.8)
		No	71	(2.5)	95	(2.4)	109	(2.8)
	Passage reading rate: Words per minute	Yes	84	(3.3)	104	(3.9)	115	(4.7)
		No	86	(2.6)	103	(2.4)	115	(2.8)
	Passage reading accuracy: Percentage of words read correctly	Yes	81	(2.2)	91	(1.8)	93	(1.5)
		No	83	(1.3)	92	(0.7)	94	(0.6)
	Passage reading expression	Yes	2.6	(0.13)	3.3	(0.14)	3.7	(0.13)
		No	2.7	(0.09)	3.4	(0.08)	3.8	(0.07)
Word reading	Word list reading: WCPM	Yes	35	(2.3)	45	(2.6)	49	(3.0)
		No	34	(1.9)	45	(1.7)	50	(1.5)
Phonological decoding	Pseudoword list reading: WCPM	Yes	12	(1.0)	16	(1.4)	19	(2.1)
		No	11	(0.9)	16	(1.0)	19	(0.9)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. The results for English language learners are based on students who were assessed and cannot be generalized to the total population of such students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.

Table C-20. Estimates and standard errors for average oral reading performance by below *NAEP Basic* subgroups and students with disabilities status: 2018

Measure	ORF variable	Disability status	below *NAEP Basic* Low		below *NAEP Basic* Medium		below *NAEP Basic* High	
Oral reading fluency	Passage reading words correct per minute (WCPM)	Yes	64	(3.2)	91	(5.0)	103	(6.8)
		No	75	(2.7)	96	(2.3)	109	(2.6)
	Passage reading rate: Words per minute	Yes	81	(3.4)	100	(4.9)	110	(6.4)
		No	89	(2.9)	104	(2.4)	115	(2.7)
	Passage reading accuracy: Percentage of words read correctly	Yes	80	(1.6)	90	(1.7)	94	(1.9)
		No	84	(1.4)	92	(0.8)	94	(0.5)
	Passage reading expression	Yes	2.4	(0.15)	3.3	(0.16)	3.7	(0.17)
		No	2.8	(0.09)	3.4	(0.07)	3.8	(0.07)
Word reading	Word list reading: WCPM	Yes	30	(2.7)	42	(3.9)	46	(4.0)
		No	37	(1.7)	46	(1.6)	50	(1.4)
Phonological decoding	Pseudoword list reading: WCPM	Yes	9	(1.0)	14	(1.7)	17	(2.4)
		No	13	(1.0)	16	(0.9)	19	(0.8)

NOTE: Pseudoword is a made-up but pronounceable word. Standard errors are in parentheses. WCPM is an abbreviation for words correct per minute. The results for students with disabilities are based on students who were assessed and cannot be generalized to the total population of such students.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2018 Oral Reading Fluency study.