Comparing Comprehension Following Silent and Aloud Reading across Elementary and Secondary Students: Implication for Curriculum-Based Measurement

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In the current study, 42 secondary students (10th, 11th, and 12th grade students) and 51 elementary students (4th and 5th grade students) read 400 word passages silently and aloud. During aloud reading, words correct per minute (WCPM) were recorded. After reading each passage, students answered 10 multiple-choice comprehension questions. Results showed comprehension was significantly higher when students read passages aloud, as opposed to silently. No interaction was found between comprehension and grade level (elementary versus secondary). Discussion is focused on theories of reading comprehension and applied implications for assessing comprehension following the administration of Curriculum-Based Measurement (CBM) reading probes.
Keywords: Reading comprehension, silent reading, oral reading, words correct per minute, curriculum-based measurement

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Reading skill deficit are prevalent, common in most student refereed for special education services, and can hinder learning, skill development, and success across vocational, academic, and daily living tasks (Daly, Chafouleas, & Skinner, 2005; Lentz, 1998; National Assessment of Educational Progress, 2005; Winn, Skinner, Oliver, Hale, & Ziegler, in press). Although a variety of theories and procedures have been developed to remedy reading skill deficits, our science has not developed to the point where we can be assured that any specific intervention will remedy reading skill deficits for specific students. Thus, researchers and educators have developed various procedures and systems that allow educators to quickly assess the effects of various reading interventions on students reading skill development (i.e., progress monitoring or measuring responsiveness to intervention, see Fletcher, Coulter, Reschly, & Vaughn, 2004).

Words Correct per Minute

There are several common characteristics with various reading skill development progress monitoring systems. One is that they employ brief and sensitive measures that allow for frequent assessment of skill development. With respect to reading skills, one measure that is included in most systems is words read correctly per minute (WCPM). This measure which Deno and Mirkin's (1977) described in their curriculum-based measurement (CBM) system for progress and performance monitoring, is also used in the Dynamic Indicators of Basic Early Literacy Skills (DIBELS, Good & Kaminski, 2002) and AIMSweb (AIMSweb Progress Monitoring and Response to Intervention System, 2006) systems. To collect WCPM data, students are asked to read aloud, often for 1 minute, as the examiner scores errors. After students have finished reading aloud the examiner calculates both words correct per minute (WCPM) and errors per minute (Deno & Mirkin, 1977; Shapiro, 2004).

WCPM is a measure of *oral* or aloud reading fluency or speed of accurate aloud reading. Many researchers have investigated the psychometric properties of WCPM and found that it is a valid (concurrent, construct, and criterion related validity), reliable, and sensitive measure of general reading skill development (Deno, Mirkin, & Chiang, 1982; Espin & Foegen, 1996; Fuchs & Deno 1991; Fuchs, Fuchs, and Maxwell, 1988; Hintze, Shapiro, Conte, & Basile, 1997). Although, WCPM has been shown to positively correlate with standardized norm-referenced measures of reading comprehension, (Deno et al., 1982; Fuchs & Deno, 1992; Fuchs et al., 1988; Marston, 1989; Shinn et al., 1992), because WCPM does not directly assess reading comprehension educators and research have expressed concerns about the

face validity of the measure (Potter & Wamre, 1990; Skinner, Neddenriep, Bradley-Klug, & Ziemann, 2002). This limitation may be important as the primary function, goal, or purpose of reading is comprehension[2] (Rowell, 1976; Salasoo, 1986; Sindelar & Stoddard, 1991; Skinner, 1998). Thus, some may be concerned that WC/M will not detect comprehension deficits in students who can read aloud accurately and rapidly, but fail to comprehend what they are reading (Marston, 1989).

To address this limitation Shapiro (1996) suggested that reading comprehension questions be administered after CBM WCPM administrations to provide a more directly measure reading comprehension. Students, especially secondary students typically read silently when reading for comprehension (Skinner et al., 2002). If comprehension is assessed after a student reads aloud, then it is important to ascertain if reading mode of topography (i.e., aloud versus silent reading) significantly affects comprehension. If reading mode significantly and systematically affects reading comprehension (i.e., reading comprehension is hindered when students read aloud compared to when they read silently), then measures of reading comprehension following aloud CBM readings may not accurately assess students' silent-reading comprehension skills.

Research on the effect of reading mode (e.g., aloud, silent) on comprehension is equivocal (Fuchs & Maxwell, 1988; Juel & Holmes, 1981; McCallum, Sharp, Bell, & George, 2004). There are several theories that suggest that reading aloud and reading silently may systematically impact comprehension differently (Jones & Lockhart, 1919; Juel & Holmes, 1981). Furthermore, these theories suggest that the mode of reading (silent versus aloud) may have differential effects on comprehension, depending upon the skill of the reader (Kragler, 1995).

Some researchers have found evidence that individuals comprehend more information after reading silently when compared to reading aloud (Jones & Lockhart, 1919; Mead, 1915, 1917; Pinter, 1913). To explain these findings, some researchers contend that the process of oral reading requires the reader to allocate a portion of their limited cognitive resources to pronunciation, intonation, and emphasis of words. The result of the reader's cognitive resources being focused, in part, on the dynamics of reading aloud, reduces cognitive resources available for comprehension (Jones & Lockhart, 1919). Juel and Holmes (1981) suggest that oral reading may follow a "bottom up" process, meaning that readers may stop processing after achieving phonological recordings. If the reading process stops directly after achieving phonological recordings, then lexical access or comprehension processes may never occur. Because younger and/or less skilled readers may not have automatic decoding skills, they may be more likely to focus the majority of their cognitive resources on phonological recordings, as opposed to comprehension.

Other researchers found that individuals comprehend more information after reading orally when compared to reading silently (Collins, 1961; Duffy & Durrell, 1935; Rowell, 1976). Based on evidence that comprehension is enhanced by aloud reading, theorists have suggested that poor readers may benefit more than good readers from the experience of hearing themselves read and from the required concentrated attention needed to read orally (Kragler, 1995; Levin, 1979; Swalm, 1973). Finally, others found no significant difference in the comprehension after reading silently when compared to reading aloud (Jones, 1932; McCallum et al., 2004; Poulton & Brown, 1967).

Student's reading proficiency may affect the reading mode that best facilitates comprehension. Kragler (1995) found that beginning readers who read aloud had higher reading placement scores than beginning readers who read silently. Miller and Smith (1990) compared comprehension across silent and oral reading and found that (a) poor readers had higher comprehension scores when reading aloud, (b) average readers had higher comprehension scores when reading silently, and (c) there was no significant difference in comprehension across silent and aloud reading in students with stronger reading skills.

While cognitive processing theories may explain the interactions between reading mode (silent versus aloud) and reading skill (poor readers versus average or above average readers), an alterative explanation is related to choice. When students read aloud, educators and researchers can monitor students reading performance to determine if they have actually read the entire passage. However, when students read silently, observers cannot be assured that they actually read the entire passage. Because less skilled readers often must expend more effort to read, they may be less likely to read during silent-reading conditions (Billington, Skinner, & Cruchon, 2004; Skinner, 1998; Skinner, Pappas, & Davis, 2005). Researchers studying silent-reading comprehension in students with reading skills deficits found that in some instances they did not read passages silently. Instead they appeared to scan the passage before answering questions (Freeland, Skinner, Jackson, McDaniel, & Smith, 2000; McDaniel, Watson, Freeland, Smith, Jackson, & Skinner, 2001).

Purpose

WCPM is a sensitive, valid, and reliable measure of global reading skills (Fuchs & Deno, 2001; Marston, 1989). However, this measure does not provide for a direct assessment of reading comprehension. To ensure that students comprehend what they read, Shapiro (1996) recommended administering comprehension questions after the students read passages aloud. However, when reading for comprehension, students often read silently (Skinner et al., 2002). Thus, the purpose of the current study was to examine the relationship between silent-reading comprehension and aloud reading comprehension and determine if comprehension was systematically affected by reading mode or topography. Additionally, because student reading skill may interact with reading mode to impact comprehension, we tested these differences across elementary and high school students.

Method

Participants and Setting

Participants were recruited from a large school district in the Southeastern United States. The elementary students were recruited from fourth- and fifth- grade general education classrooms in a rural school. The school served approximately 290 kindergarten through fifth-grade students with approximately 57% of the students receiving free or reduced lunch. All students from the fourth and fifth-grade general education classrooms in the school were invited to participate. Slightly over 70% of the students recruited participated. Of the 51 elementary participants (24 males and 27 females), five were African-American and 46 were Caucasian.

The secondary students were recruited from 10th, 11th, and 12th grade general education classrooms (see Table 1) in an urban high school that served approximately 981 ninth through twelfth-grade students. Approximately 63% of the students in the school received free or reduced lunch. A Language Arts teacher agreed to recruit students from her classes. Forty-two out of a possible 73 students (57.5%) returned consent and signed assent forms to participate in the study. Of the 42 high-school participants (17 males and 25 females), 15 were African-American, 2 were Asian, 4 were Hispanic, and 21 were Caucasian.

Table 1. Gender and Number of Participants in Each Grade

Grade Level	Grade (# of Participants)	Gender (# of Participants)

Elementary	4th (22) 5th(29)	Male (24) Female (27)
Secondary	10th(37) 11th (3) 12th (2)	Male (17) Female (25)

Approval was sought and granted from the appropriate school board, principals, teachers, and University. Each teacher asked, consented to participate. The primary investigator then met with each class, explained the procedures, and provided each student with a parental consent form. Researchers solicited assent from each student who provided a parental consent. Only those students who provided consent and assent participated.

During the course of the study, researchers collected WCPM data on each student by requiring them to read aloud from material written at their grade level. Based on Shapiro's (1996) criteria, each student's median aloud reading WCPM score was used to place students into one of three reading proficiency categories: mastery (i.e., 100 WCPM or greater), instructional (i.e., 70-99 WCPM), and frustrational (i.e., less than 70 WCPM). See Table 2 for a summary. In addition, students were administered three subtests from the *Woodcock-Johnson Achievement Tests, 3rd ed.* (WJ-III Ach; McGrew & Woodcock, 2001) in order to determine a Grade-Equivalent Broad Reading Score. See Table 3 for a summary. The WCPM and WJ-III Grade Equivalent scores were obtained to provide information regarding each participant's current reading level.

Table 2. Number of Participants at Each Reading Level

	Reading Level		
Grade Level	Mastery	Instructional	Frustrational
Elementary	25	17	9
Secondary	36	6	0

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Table 3. Percentage of Participants Reading On their Grade Level, Above their Grade Level, or Below Their Grade Level Based on WJ-III Broad Reading Cluster Grade Equivalency Scores

	Reading Level		
Grade Level	On Grade Level	Above Grade Level	Below Grade Level

Elementary	25.5%	35.3%	39.2%
Secondary	5%	38%	57%

Procedures were conducted with elementary students during the months of October and November and with high school students between the months of October and February. Procedures were implemented in a quiet area of the school separate from the students' classrooms (e.g., a quiet hallway, conference room, computer room). Four graduate students in a school psychology Ph.D. program and one undergraduate student administered assessment procedures. Using training procedures that involved description, demonstration, practice, immediate feedback, and assessment, the primary experimenter ensured that each University student could administer and score reliably. To ensure that experimenters maintained these skills, interscorer agreement and procedural integrity data were collected throughout the study.

Materials

Selected passages from the *Timed Reading Series* (Spargo, 1989) were used. This series contains 50 passages for each grade level, beginning with grade four. Based on the Fry (1968) readability formula, passages were designed to be slightly more difficult as students progress, with each book spanning one grade level. Each passage contains 400 words providing information across a variety of subjects (e.g., planets, cars, presidents). Ten multiple-choice comprehension questions (five factual and five inferential) follow each passage and are printed on the opposite side of the page.

Students read passages and answered corresponding multiple-choice comprehension questions from their grade level; passages from books 1, 2, 7, 8, and 9 (grade levels 4, 5, 10, 11, and 12 respectively). To hold passage difficulty relatively constant, the experimenters only used the first 12 passages from each book. Although each student only read six passages, 12 passages were used to control for students' prior knowledge related to passage content. The primary experimenter divided the group of 12 passages into three sets of four (passages 1-4, 5-8, and 9-12), based upon the passage difficulty level. A repeated-measures design was used so that each participant was exposed to both the aloud and silent-reading conditions. For each student, a passage from each of the three sets was assigned to the aloud condition and a different passage from each of the three sets was assigned to the silent condition. In total, students read three passages in the aloud-reading condition and three passages in the silent-reading condition. Assignment of passages to conditions was counterbalanced across students to control for prior knowledge of passage content, the slight difference in reading difficulty among the passages, etc.

Three subtests (Letter-Word Identification, Reading Fluency, and Passage Comprehension) from the WJ-III Ach were administered for the purpose of obtaining a Broad Reading Grade-Equivalent Score for each student. Battery-powered tape recorders were to record each session. These recording were used to collect interscorer agreement and procedural integrity data. Researchers used stopwatches to measure time seconds spent reading.

General Experimental Procedures

For each student, assessment data were collected across three sessions. Typically, these sessions were held on three separate school days. However, in order to accommodate special situations (e.g., student leaving early, school-wide achievement testing, end of the semester) four high-school students were tested on the same day with sessions separated by at least 30 minutes. Sessions were scheduled in

conjunction with the participants' teachers in order to minimize disruptions. During one session students read passages aloud, during another they read passages silently, and during the third they completed three subtests of the WJ-III Ach. Condition order was counterbalanced across participants to control for sequence effects.

After the experimenter took time to establish or re-establish rapport, the experimenter implemented one of three conditions (silent reading, aloud reading, and WJ-III Ach). For the silent and aloud reading conditions, each student was required to read three passages and answer the comprehension questions immediately after he or she finished reading each passage.

Silent Reading. After escorting the participant to the testing area, the experimenter started the tape recorder and read the following instructions:

> I am going to give you a reading passage. When I say begin, I want you to read the passage silently. Read the passage silently at your normal pace, and only read the passage through once. When you have finished reading the passage silently say, "finished." I will take up the passage and give you comprehension questions to answer. I cannot answer any questions about the content of the passage. Do your best to answer each question correctly. Do you have any questions? Ok, here is the passage. The title of the passage is _____. You can now begin.

The experimenter said, "begin" and started the stopwatch. When the student indicated that he or she had finished reading the passage, the experimenter stopped the stopwatch, recorded the number of seconds the student spent reading the passage (these data were used in a separate research project), collected the reading passage, gave the student the comprehension questions, and read the following instructions:

> Please answer the questions I have given you by circling the answer you think is right. You may not know the answers to all of the questions, but try your best on each one. You may begin. Please tell me when you have finished.

Once the participant indicated that he or she was finished, the experimenter collected the passage. The same procedures were then followed for both the second and third reading passages.

Aloud Reading. After escorting the participant to the testing area, the experimenter started the tape recorder and read the following instructions:

> I am going to give you a reading passage. When I say begin, I want you to read the passage aloud. Read the passage aloud at your normal pace. When you have finished reading the passage aloud, I will take up the passage and give you comprehension questions to answer. I cannot answer any questions about the content of the passage. Do your best to answer each question correctly. Do you have any questions? Ok, here is the passage. The title of the passage is _____. You can now begin.

When the student began reading, the experimenter started the stopwatch. The experimenter had a copy of the passage being read. For the first minute, the experimenter recorded errors for the purpose of calculating words correct per minute (WCPM) according to common CBM procedures. Errors were scored based on the guidelines provided by Shapiro (1996) and included mispronunciations, substitutions, omissions, additions, and skipped lines. While students were reading, if they skipped lines or began re-reading lines the experimenter re-directed them and counted this redirection as one error. Additionally, if a student paused for five seconds, the experimenter read the word aloud and the student continued reading.

After the participant finished reading the entire passage, comprehension was assessed using procedures identical to those used after the silent-reading condition. Once the participant indicated that he or she was finished answering the questions, the questions were collected and the same procedures were followed for the remaining two reading passages.

Administration of WJ-III Ach. Each student also participated in a session in which three subtests from the WJ-III Ach (Letter-Word Identification, Reading Fluency, and Passage Comprehension) were administered. These subtests were used to obtain a Broad Reading Grade Equivalency Score.

Dependent Variables and Experimental Design and Analysis Procedures

For each passage, the number of questions answered correctly was summed. For both the aloud and silent-reading conditions, three different scores were obtained (one for each passage). In order to reduce the effects of extreme scores, each student's median comprehension score under each condition was analyzed (Shapiro, 1996).

To test for significant and systematic differences in comprehension caused by reading mode and/or reading skill level, median comprehension scores were analyzed using a two-by-two mixed-model ANOVA. The within-subjects factor was reading mode (aloud versus silent). The between-subjects factor was student grade (elementary versus high school). Pearson's product-moment correlations were used to further describe the relationship between comprehension scores for aloud and silent passage reading.

Interscorer Agreement and Procedural Integrity Data

All assessment sessions were audiotaped. A second independent observer listened to 20% of the sessions, recorded procedural integrity data, and independently scored WCPM. Finally, this experimenter re-scored the written multiple-choice responses. Procedural integrity data showed that the primary experimenters read instructions as written for each condition and administered procedures using appropriate passages and in the appropriate sequence 100% of the time. Interscorer agreement for comprehension accuracy was 100%. Pearson product moment correlations showed strong agreement on WCPM across experimenters, $r = .94$.

Results

Means and standard deviations for all measures are reported in Table 4. Results of the repeated measures mixed-model ANOVA (see Table 5) indicated that there was no significant interaction between grade level and reading mode, $F(1, 91) = .004$, $p = .949$. A significant within-subjects main effect was found for reading mode, $F(1, 91) = 11.509$, $p \leq .001$. Comprehension was significantly higher when students read aloud ($M = 7.75$, $SD = 1.40$) than when they read silently ($M = 7.19$, $SD = 1.76$). Between-subjects analysis of comprehension revealed a significant main effect, $F(1, 91) = 19.269$, $p \leq .001$. Elementary students' comprehension ($M = 8.05$, $SD = 1.49$) was significantly higher than the secondary students' ($M = 6.89$, $SD = 1.54$).

Table 4. Mean and Standard Deviation Reading Scores for Elementary Students, Secondary Students, and Elementary and Secondary Students Combined

Oral-Reading	Silent-Reading	
Comprehension	Comprehension	WCPM

	Mean (SD)	Mean (SD)	Mean (SD)
Elem. (*n*=51)	8.33 (1.14)	7.77 (1.73)	99.31 (31.97)
Sec. (*n*=42)	7.17 (1.43)	6.62 (1.61)	140.57 (29.04)
Total (*N*=93)	7.75 (1.40)	7.19 (1.76)	117.95 (36.85)

WCPM = Words correct per minute.

Table 5. Analysis of Variance for Reading Comprehension

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*p*
Between subjects					
Intercept	10284.349	1	10284.349	3218.384*	.000
Grade	61.575	1	61.575	19.269*	.000
Error	290.791	91	3.196		
Within-subjects					
Mode	14.349	1	14.349	11.509*	.001
Mode * Grade	.005	1	.005	.004	.949
Error (mode)	113.457	91	1.247		

N=93.

*Differences significant at $p < .05$.

Pearson's product-moment correlation were used to analyze the relationship between comprehension for aloud and silent passage reading. For both elementary and secondary students the correlation between aloud and silent-reading comprehension was significant ($r = .526$, $p \leq .01$ and $r = .379$, $p \leq .05$, respectively).

Discussion

The current study suggests that reading comprehension was enhanced when students read aloud as opposed to silently. This finding has theoretical implications. Furthermore, because collecting data on WCPM requires students to real aloud, the current findings have implications for assessing comprehension following CBM assessment procedures.

Some researchers have proposed theories, based on their empirical findings, which suggest that aloud reading may hinder comprehension because cognitive resources are being applied primarily to achieving phonological recordings, as opposed to extracting meaning from the text (e.g., Jones & Lockhart, 1919; Juel & Holmes, 1981). The results from the current study indicate that the students answered significantly more comprehension questions correctly under the oral-reading condition when compared to the silent-reading condition. This finding suggests that requiring students to read passages aloud, as opposed to silently, does not hinder and may actually improve comprehension.

Other researchers have suggested that *less skilled readers* may benefit from reading aloud, as hearing the word and the additional concentration and attention required to read aloud may enhance comprehension (Kragler, 1995; Levin, 1979; Swalm, 1973). The current study provides some support for these theories as comprehension was significantly higher under the aloud-reading condition. However, we found no evidence that reading skill interacted with reading mode to impact comprehension (i.e., no interaction effects) as both elementary and secondary students answered more questions correctly when they read aloud. Furthermore, because over 82% of the elementary-student participants and 100% of the secondary-student participants were reading at the instructional or mastery level (according to their WCPM scores), the current study suggests that aloud reading enhanced comprehension in average and skilled readers. These results conflict with Miller and Smith (1990) who found that average readers comprehend more when reading silently and that reading mode (silent versus aloud) did not affect comprehension in highly skilled readers.

While the current results appear to support cognitive theories which suggest that comprehension is enhanced when students read aloud, there are several threats to internal validity associated with the current study that suggest rival hypotheses may account for the current results. Many of these limitations are related to procedures used to assess WCPM. In the current study, when students read silently, the examiner had no way of knowing if the student was actually reading and/or read the entire passage. However, when students read orally, experimenters confirmed that the student actually read the entire passage. Furthermore, in keeping with prescribed procedures for assessing WCPM (e.g., Deno & Mirkin, 1977; Shapiro, 1996), the experimenter re-directed students if they skipped or repeated lines. Therefore, the significantly higher level of comprehension for the oral passages relative to the silent passages may have been caused by students' failure to read the entire passage in sequence under the silent-reading condition. Future researchers could use various procedures to address these limitations. For example, reinforcing students for response accuracy may increase the probability that students silently read the entire passage (Skinner et al., 2005). Having students wear goggles that track eye-movement may also help ensure students read the entire passage silently (Neddenriep, 2003).

An alternative rival hypothesis is also related to CBM assessment procedures. While reading aloud, when a student paused for more than 5 seconds, the examiner provided the correct word to the student. Under the silent-reading condition the examiner did not provide unknown words to students. Providing unknown words may have enhanced the students' comprehension under the oral-reading condition. Future research should be done to investigate whether providing students with correct words enhanced comprehension during CBM assessment procedures.

Because we used CBM assessment procedures during the aloud reading condition the current study has implications for assessing reading skills. Although WCPM has been shown to correlate with reading comprehension, WCPM does not provide a direct measure of comprehension (Skinner et al., 2002). Administering questions after students read passages aloud could be used to ensure that students

who read rapidly and accurately also comprehend what they read. The current results suggest that requiring students to read aloud, as opposed to silently, does not hinder and may actually enhance student comprehension. Thus, the current study supports Shapiro's (1996) recommendation for assessing comprehension after students have read passages aloud to ensure that the student comprehends what they have read.

The current study also raises some concerns related to assessing comprehension following aloud reading. Perhaps the biggest concern is the correlations between aloud and silent-reading comprehension. For elementary students, aloud-reading comprehension only accounted for approximately 27.66% of the variance in silent-reading comprehension. For secondary students, aloud-reading comprehension accounted for only 14.38% of the variance in student silent-reading comprehension. These data suggest that aloud comprehension scores may not be very strong predictors of silent-reading comprehension.

The weak correlations suggest that silent-reading and aloud reading comprehension may be better conceptualized as two distinct skills, especially for secondary students. However, before drawing such conclusions, researchers should address other methodological limitations that may account for these weak correlations. First, the sample sizes were relatively small. Second, for both groups the samples contained very few poor readers. Less than 18% of the elementary students and no secondary students were reading at a frustrational level. Thus, the range of scores across both groups may have been restricted because poor readers may have been less likely to agree to participate. This is especially true for the secondary students, who declined to participate at a much higher rate than the elementary students. Finally, the range of possible scores on comprehension questions was also restricted as students could only score 0-10. Thus, the small sample size, restricted range of reading skills across the participants, and the lack of sensitivity associated with the reading comprehension measure may have reduced the probability of finding strong correlations between the aloud and silent-reading comprehension measures.

Future research is needed to account for the relationship between aloud and silent-reading comprehension. Additionally, researchers should address external validity limitations associated with the current study. Similar studies should include more participants who were experiencing reading difficulties. Although the relationship between oral and silent-reading comprehension was investigated, future researchers should examine the relationship between oral and silent-reading comprehension and other measures of reading skill (e.g., Cloze procedure, standardized reading assessments). Finally, although reading comprehension levels may provide a more direct measure of comprehension than commonly used indicators or correlates, this measure may lack the sensitivity needed for evaluating the effects of interventions (Skinner, 1998). Future researchers should continue to develop and evaluate procedures that may enhance the sensitivity of such measures.

Footnotes

[1] The researchers wish to acknowledge the support of the Statistics Consulting Center at The University of Tennessee and, in particular, Michael A. O'Neil who assisted the researchers with data analysis procedures.

[2] There are several notable exceptions when the primary purpose or function of reading is not the reader's comprehension of text. For example, radio and television professionals may read the news aloud or an adult may read a story to a child. Other examples include when students read aloud so that educators can assess their reading skills (e.g., collect data on words correct per minute).

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