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Evidence-Based Reading Instruction for Students with Inattention: A Pilot Study

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Abstract

Attention deficit/hyperactivity disorder (ADHD) is characterized by persistently high levels of inattention, hyperactivity, and/or impulsivity that interfere with functioning. Inattention is significantly related to lower reading outcomes, whereas hyperactivity/impulsivity alone is not. Strategies to Read Information Texts and Vocabulary Effectively (STRIVE) is a set of evidence-based instructional practices targeting vocabulary and reading comprehension in social studies classrooms. In this pilot study, we investigated the efficacy of STRIVE instruction on the reading outcomes of students with inattention. We included participants from a larger randomized control trial in Grade 4 ($N = 276$) identified with high levels of inattention based on teacher referral and a brief ADHD measure. Reading outcomes were compared using ANCOVA, accounting for pre-test scores. Students in treatment conditions ($n = 181$) significantly outperformed those in the comparison condition ($n = 95$) on measures of content knowledge, content vocabulary, and content reading comprehension. There were no significant differences between conditions on standardized reading measures.

Keywords

reading, attention, content area instruction, general education classroom

Attention deficit/hyperactivity disorder (ADHD) is characterized by persistently high levels of inattention, hyperactivity, and/or impulsivity that interfere with functioning (American Psychiatric Association, 2013). The behavioral characteristics of ADHD are highly individualized; although some students display both behaviors, others exhibit inattentive behavior without the presence of hyperactivity/impulsivity, and vice versa. Inattentive behavior is highly correlated with deficits in reading fluency and reading comprehension, whereas hyperactivity and impulsivity are not (e.g., Pham, 2016). Students with ADHD who exhibit inattentive behaviors tend to have similar word reading abilities as their typically-developing peers, yet they perform significantly below their peers on reading fluency and reading comprehension measures (Ghelani et al., 2004; Martinussen & Mackenzie, 2015). Given their strong ability to read at the word level, accompanied by difficulties comprehending text, students with high levels of inattention often underperform on reading comprehension assessments (Martinussen & Mackenzie, 2015). As students progress through grades, an increased emphasis is placed on reading comprehension. As a result, many students with inattentive behaviors fall considerably behind their peers in upper elementary, middle school, and high school (McGee et al., 2002).

The National Survey of Children's Health (2017) reports that 8.9% of children ages 3–17 have a diagnosis of ADHD. Although some of these students receive special education services through the Individuals with Disabilities Act (IDEA, 2004), many spend the majority of their day in the general education setting (e.g., Rowland et al., 2015). As a result, it is imperative to consider the type of reading instruction these students receive in general education classrooms.

Although descriptive studies document lower reading outcomes for students with inattention (e.g., Pham, 2016; Rogers et al., 2011), little research documents effective reading instruction for these students in the upper grades, particularly in the areas of reading comprehension. A number of studies document the effects of reading comprehension interventions paired with medical interventions for students with ADHD (e.g., Denton et al., 2020; Tannock et al., 2018), and others include behavioral intervention in addition to reading intervention (e.g., Roberts et al., 2019); however, little research targets reading comprehension

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instruction as the primary independent variable. In fact, recent systematic reviews of the literature document no more than 10 studies targeting reading comprehension alone for students with ADHD in the upper grades (Harrison et al., 2019; Roberts et al., 2020; Stewart & Austin, 2020). Of these studies, only one specifies ADHD presentation (i.e., Johnson et al., 2012). The majority note participants as having ADHD in general. As a result, it is unclear which intervention components may be particularly beneficial for students with inattentive behaviors. Nevertheless, research documents effective instructional practices for students with ADHD, in general, which is comprised of three presentations—two of which are characterized by high levels of inattentive behaviors (i.e., inattentive and combined presentations). It is possible, then, that instructional practices identified in the literature may in fact be beneficial for students with high levels of inattention. To investigate this possibility, additional investigation is warranted.

Furthermore, few studies utilize a group design (i.e., Cassar & Jang, 2010; Rogevich & Perin, 2008) to investigate the effects of reading comprehension instruction for students with ADHD in the upper grades (Roberts et al., 2020; Stewart & Austin, 2020). Instead, many utilize rigorous single-case designs to document individual participant effects (e.g., Ennis, 2016; Hedin et al., 2011). Studies highlight elements of effective reading comprehension instruction for students with ADHD, such as self-regulated strategy development (SRSD) to support the composition of main idea statements and summaries (e.g., Ennis, 2016; Johnson et al., 2012), explicit instruction utilized in Direct Instruction (DI) lessons (Flores & Ganz, 2007, 2009), self-monitoring and goal setting (e.g., Hedin et al., 2011), structured peer interactions (Cassar & Jang, 2010), and the use of graphic organizers (e.g., Johnson et al., 2012). Many of these elements are highlighted in STRIVE instructional practices.

STRIVE Instruction and Students with Inattentive Behaviors

Strategies to read information texts and vocabulary effectively (STRIVE) is an evidence-based program delivered in general education social studies classrooms that includes a set of instructional practices found to effectively improve reading outcomes for students in Grade 4 (e.g., Simmons et al., 2010; Swanson et al., 2021). Simmons and colleagues (2010) found positive effects for the vocabulary and comprehension practices on reading outcomes using a proximal measure, which focused on social studies content. Swanson and colleagues (2021) further supported the efficacy of STRIVE by documenting positive effects for students who received STRIVE instruction on proximal measures examining content vocabulary, content acquisition, and content reading comprehension.

STRIVE lessons incorporate before, during, and after reading practices aimed at developing background knowledge and encouraging the use of strategies such as Get the Gist for main idea generation. The Get the Gist strategy requires students to engage in self-questioning to generate main idea statements about sections of text. STRIVE lessons also incorporate explicit vocabulary instruction with the support of semantic maps and summary composition to aid the comprehension of expository texts. Multiple instructional practices utilized in STRIVE lessons resemble those documented in Stewart and Austin's systematic review.

Vocabulary instruction. Vocabulary practices in STRIVE resemble those reported in previous studies for students with ADHD (Fishley et al., 2012; Jozwik & Douglas, 2016). Jozwik and Douglas (2016) incorporated opportunities to activate prior knowledge and explicitly taught preselected vocabulary words before reading. Fishley and colleagues (2012) utilized graphic organizers to support vocabulary instruction. Semantic maps used in their study included spaces for the definition of the word and a sentence utilizing the word correctly. Both of these components are also found in the semantic vocabulary maps used in STRIVE lessons.

Collaborative learning opportunities. STRIVE provides students with opportunities to engage in collaborative learning activities in which students work in pairs to identify words associated with target vocabulary, compose sentences using target vocabulary words, apply the use of target vocabulary words to their own lives by way of a turn-and-talk, and compose main idea statements. Although collaborative learning pairs (CLPs), specifically, were not utilized in previous studies for students with ADHD, one (Cassar & Jang, 2010) provided opportunities to practice skills in structured small groups while playing games. In addition, there is evidence to suggest working with peers in structured settings can increase the on-task behavior of students with off-task behaviors (e.g., Locke & Fuchs, 1995), such as those exhibited by students with attention.

Comprehension strategies. STRIVE also includes reading comprehension strategies that facilitate the development of main idea statements, which is supported by a number of previous studies (e.g., Ennis, 2016; Johnson et al., 2012). After extensive practice generating main idea statements, students are taught to combine these statements into a paragraph-long summary describing the entire content area passages. Multiple studies support summarization instruction as a way to support reading comprehension for students with ADHD (e.g., Ennis, 2016; Johnson et al., 2012; Rogevich & Perin, 2008). While reading, STRIVE requires teachers to incorporate a variety of questions (literal and inferential) to prompt

class discussion of the text. Flores and Ganz (2007) found this practice effective for improving reading comprehension among students with ADHD.

Self-regulated strategy use (SRSD). Many previous studies support the use of SRSD to improve reading outcomes for students with ADHD (e.g., Ennis, 2016; Johnson et al., 2012). SRSD is considered of high utility because it can be used across multiple academic settings (Ennis & Jolivette, 2014). It promotes student self-monitoring and incorporates opportunities for students to set individual goals during strategy use (Harris & Graham, 1996). The SRSD model consists of six stages: (1) developing background knowledge about the topic of instruction, (2) discussing the importance of the strategy along with self-monitoring and goal-setting, (3) explicit modeling of the strategy by the teacher, (4) memorizing the steps of the strategy, (5) teacher support and guidance while students practice the use of the strategy, and (6) independent practice of the strategy with minimal teacher assistance. Although STRIVE instructional practices do not include all six components of SRSD as defined by Harris and Graham (1996), there are elements of SRSD found throughout STRIVE practices. Similar to the first step of the SRSD model (developing background knowledge), STRIVE lessons include a pre-reading routine that builds and activates background knowledge on the lesson topic. In addition, STRIVE includes the Get the Gist comprehension strategy (Klingner et al., 2012). Teachers begin by modeling use of the strategy, which resembles the third stage of the SRSD model (explicit modeling of the strategy by the teacher). STRIVE lessons require teachers to guide students throughout the process and monitor their use of the strategy until students find success utilizing it independently. This process mirrors steps five and six of the SRSD model, which include teacher guidance and independent student use of the strategy. To support independent use of the strategy, STRIVE includes student cue cards that remind them of these steps. Use of the cards and the process of self-questioning to generate gist statements encourages students to self-monitor while composing main idea statements. The act of self-monitoring is also present in the SRSD model.

Mnemonics. Previous research supports the use of mnemonics to facilitate strategy instruction for students with ADHD (e.g., Ennis, 2016; Johnson et al., 2012; Rogevich & Perin, 2008). STRIVE utilizes mnemonics to support the use of a context clue strategy, which facilitates students' utilization of context clues to derive the meaning of unknown vocabulary words. Each letter in the mnemonic reminds students to follow the four key steps associated with the strategy.

Finally, we interpret the focus on building/activating background knowledge and vocabulary acquisition within STRIVE as potentially beneficial for students with inattention. Because many students with inattention exhibit average word reading abilities but still struggle to comprehend text, they may benefit from instruction that targets the development of linguistic comprehension.

The current pilot study expands previous literature in several ways: (a) the sample of students with inattentive behaviors is larger than similar, previous studies, (b) we incorporate a set of instructional practices addressing the comprehension needs of students with ADHD to examine whether they benefit students with high levels of inattention, and (c) the intervention takes place in general education classrooms. In an effort to document preliminary findings that may justify the need for a larger, fully-powered efficacy trial examining effective reading instruction for students with inattention, we addressed the following research question: What is the efficacy of STRIVE reading instruction on the reading outcomes of students with inattentive behaviors?

Method

Participants and Setting

Participants were drawn from a larger randomized control trial (RCT) investigating the efficacy of two professional development (PD) treatment conditions compared to one comparison (BAU) condition on student reading outcomes (Swanson et al., 2021). The larger study included 81 schools split across three consecutive annual cohorts. Schools were blocked at the district level and randomized at the school level to one of three conditions: (a) STRIVE researcher-supported PD (RPD), (b) STRIVE school-supported PD (SPD), and (c) BAU. This study included a subset of participants from year two (Cohort 2) of the larger RCT.

Teachers. Seventy-one fourth grade teachers from two large districts in one southwestern state participated in the study. Schools were located in urban and near-urban districts and served a diverse student population. Teachers in the STRIVE RPD ($n = 23$), STRIVE SPD ($n = 21$), and BAU ($n = 27$) averaged 11.33 years to 14.19 years of experience across all three conditions. Most were female (87%). All teachers held a bachelor's degree, and 38% held master's degrees.

Students. Students were selected to participate in this study utilizing a multi-gated procedure. First, teachers were given a list of items from the Conners 3 ADHD Index–Teacher form (Conners 3AI–T; Conners, 2008) and asked to refer up to five students who exhibited any of the behaviors described on the form. Next, teachers filled out a brief, 10-item attention rating scale (Conners 3AI–T; Conners, 2008) for each referred student. Because we aimed to include students with inattentive behaviors, only the seven items indicative of inattention were used to determine

Table 1. Student Demographic Information.

	STRIVE RPD		STRIVE SPD		BAU	
Student Information	$n = 80$	%	$n = 101$	%	$n = 95$	%
Gender						
Male	64	80.0	73	72.3	64	67.4
Female	13	16.3	20	19.8	28	29.5
Gender not reported	3	3.7	8	7.9	3	3.1
Ethnicity						
White	27	33.7	44	43.5	20	48.7
African American	1	1.3	4	4.0	5	5.1
Hispanic	49	61.2	46	45.5	68	41.0
Asian	0	0.0	4	4.0	0	0.0
Native American	0	0.0	0	0.0	1	2.6
Two or More	2	2.5	1	1.0	1	2.6
Ethnicity not reported	1	1.3	2	2.0	0	0.0
SES						
Free or reduced-price lunch	42	52.5	46	45.5	60	63.2
None	31	38.8	53	52.5	24	25.2
Status not reported	7	8.7	2	2.0	11	11.6
Participants in special education	12		14		20	
Other heath impairment	1	8.3	4	28.6	2	10.0
Emotional disturbance	5	41.7	0	0.0	3	15.0
Learning disability	4	33.3	4	28.6	8	40.0
Speech impairment	0	0.0	4	28.6	6	30.0
Autism spectrum disorder	2	16.7	2	14.2	1	5.0

Note. STRIVE = Strategies to Read Information Texts and Vocabulary Effectively; RPD = research-supported condition; SPD = school-supported condition; BAU = business as usual condition; SES = socioeconomic status.

participation in this study. Raw scores were calculated based on inattentive items to generate a T-score and a probability score. Students with both elevated T-scores and probability scores at or above the borderline range were included in the study. Participants were not required to have a clinical diagnosis of ADHD with inattentive or combined presentations to participate in the study. Rather, we aimed to include all students with heightened levels of inattention as indicated on the Conners 3AI–T, regardless of a clinical diagnosis. Teachers referred a total of 362 students. After excluding students who did not receive elevated scores on the Conners–3AI, a total of 276 students remained. All students received social studies instruction in the general education setting. Table 1 presents student-level demographic information across all conditions.

Intervention Materials and Procedures

Professional development. All teachers in treatment conditions attended a six-hour initial PD meeting where researchers introduced the intervention, reviewed teacher and student materials, and answered teacher questions. The day-long PD included explicit modeling of intervention procedures, guided practice opportunities, and independent practice in which teachers practiced implementing STRIVE instructional practices with peers. After the initial PD, teachers attended two, 2-hr follow-up sessions during Weeks 6 and 12 of the 18-week intervention. Each follow-up session included explicit modeling of new practices found in the upcoming intervention units as well as opportunities for teachers to practice implementation with their peers. Teacher participants in the researcher-supported PD condition attended follow-up sessions led by researchers. Appointed coordinators at school sites delivered the sessions to teachers in the STRIVE school-supported PD condition. Researchers provided coordinators in the school-supported condition with an overview of PD content and PD materials before they led sessions at their respective school sites. Both PDs were exactly the same, with the exception of the person leading the meetings. Comparison teachers did not receive any PD and taught BAU social studies instruction to their students.

Intervention materials and procedures. STRIVE comprised three, 6-week units of social studies instruction, totaling 18 weeks and 36 lessons. Teachers delivered two, 45-min lessons per week. Lessons included elements of explicit instruction, which required teachers to introduce the practices,

model each practice using a think-aloud, guide students through multiple practice opportunities, and provide opportunities for students to practice skills independently. Lessons contained five major components: (a) building/activating background knowledge, (b) explicit vocabulary instruction using sematic maps, (c) text reading with a range of questions to prompt discussion, (d) generation of gist statements, and (e) composition of summaries. Lesson components were divided into before, during, and after reading routines. Time spent on each component was specified in each lesson and depended on the lesson objective. The STRIVE teacher manual contained specific information on how much time should be spent on each component to support teachers with this process.

Before reading, teachers built or activated background knowledge with the use of visuals found within the text as well as those found on vocabulary maps. Teachers explicitly built background knowledge when introducing a new topic and activated background knowledge by referring to previous lessons. Students were encouraged to engage in class discussion throughout this process.

Lessons also included explicit instruction of content vocabulary that included (a) semantic graphic organizers containing the target vocabulary word, an illustration, definitions, word associations, and opportunities to build onto the word using prefixes and suffixes; (b) opportunities to compose sentences with the correct usage of the word; (c) opportunities to identify the word used in the correct context; and (d) turn and talk activities that allowed students to apply the meaning of the word to their own lives. In addition, in Lessons 25 to 36, students learned a context-clue strategy, which helped them derive the meaning of vocabulary words using clues in the text. Cue cards containing the necessary steps were provided to students to support the use of this strategy.

While reading the passages, teachers engaged students in text-based discussions and main idea generation. Teachers posed a variety of questions (e.g., who, what, where, why, how, when) to promote discussion and monitor student comprehension of text. To support students' ability to answer questions using text-based evidence, students were provided with cue cards reminding them of what to look for in the text based on the question type. For example, a *who* question should be answered with the name of a person. Before reading a new passage, teachers posed a comprehension purpose question (i.e., an overarching main idea question) to provide a clear purpose for reading. At the end of the lesson, the teachers revisited the question and the class answered the question, with support from the teacher.

The gist strategy required students to ask and answer two questions: (a) *Who* or *what* is the text about? And (b) What's the most important thing about the *who* or the *what*? Students answered these two questions and then combined the answers to create a main idea statement about a section of the passage. Teachers initially modeled the strategy using a think-aloud and accentuated the importance of keeping gist statements as concise as possible (10 words or less). In lesson five, students were taught to work in collaborative learning pairs to generate gist statements. Students used cue cards to support this process.

After reading, students returned to their vocabulary maps to review target words and compose summaries of the text. After multiple opportunities to practice gist writing in the first unit of instruction, the summary writing routine was introduced. Before composing a summary, teachers worked with students to write gist statements during reading. Next, teachers explicitly modeled how to put already-written gist statements into a paragraph summary about the lesson passage. To scaffold the summary writing process, students used a graphic organizer to write initial gist statements and the full summary.

Comparison condition. Teachers in the BAU condition taught social studies content that covered the same state standards included in STRIVE instruction; however, different text sources were used in classes that did not implement STRIVE. Additional information regarding instructional practices documented in the BAU condition is presented in the fidelity section.

Measures

Student reading outcomes were assessed using the Gates MacGinitie Reading Comprehension and Vocabulary subtests (fourth edition; MacGinitie et al., 2000) within 2 weeks prior to and 2 weeks following the implementation of STRIVE. One district only permitted students to take the Gates MacGinitie Vocabulary subtest at pretest and posttest. This district did not permit students to take the reading comprehension subtest. As a result, only one district's standardized assessment scores in the area of reading comprehension are included in the study analysis. Near-transfer assessments evaluating content and vocabulary knowledge were also delivered across all conditions at the end of each 6-week STRIVE unit.

Conners 3 ADHD index–teacher version. The Conners 3AI–T (Conners, 2008) is an abbreviated version of the full-length Conners 3–Teacher form. The Conners 3AI–T provides information that allows raters to differentiate youth with significant inattentive or hyperactive behaviors from those in the general population (Conners, 2008). It is an efficient tool to identify students who may require additional evaluation for ADHD. Teachers rate students on a 10-item, 3-point Likert-type scale where a score of 0 = little to no presence of inattentive or hyperactive/impulsive behaviors and a score of 3 = frequent or often inattentive or hyperactive/impulsive behaviors. Raw scores are converted to a

T-score and a probability score. Seven items on the rating scale pertain to inattentive behaviors, and three address hyperactive/impulsive behaviors. Four of the seven inattention items were taken directly from the Conners 3–T Content Scale for inattention, and three items were taken from the Conners 3–T *DSM*-IV-TR Symptom Scale for ADHD Inattentive. Once totaled, raw scores are converted to T-scores and probability scores using the conversion tables in the Conners 3 manual (Conners, 2008), which account for gender and age. Students with T-scores at or above elevated levels (≥65) and probability scores at or above the borderline level (≥51%) on the Conners 3AI–T have more of the key features of ADHD than expected for their age and gender.

Gates MacGinitie reading comprehension subtest (fourth edition). The Gates MacGinitie reading comprehension subtest (GMRT–4 RC; MacGinitie et al., 2000) is a 35-min timed assessment that evaluates reading comprehension. The group administered, 48-item measure consists of narrative and informational passages that vary from three to 15 sentences. After silently reading each passage, students answer three to six multiple-choice questions about the passage. Alternative form reliability ranges from .80 to .87, and internal consistency reliability ranges from .91 to .93. One of the two districts permitted the administration of the GMRT–4 RC subtest.

Gates MacGinitie vocabulary subtest (fourth edition). The Gates MacGinitie vocabulary subtest (GMRT-4V; MacGinitie et al., 2000) is a 45-item, group-administered assessment that assesses vocabulary knowledge. The 20-min timed measure consists of frequently encountered vocabulary words at each grade level. Each item presents a target word in a concise context followed by five word meaning choices. The Kuder-Richardson Formula 20 (K-R 20) reliability coefficient and the test–retest reliability for the fourth-grade assessment are both .92. Both districts in this study permitted the administration of the GMRT-4V subtest.

Unit assessments. Three researcher-developed assessments were designed to measure content acquisition for each of the three instructional units. Each unit assessment contained a content knowledge and a content vocabulary section. The third unit assessment also included a reading comprehension section. The aim of these measures was to assess content mastery, and several teachers indicated that a few of their students who spoke Spanish at home would benefit from having these content questions in Spanish. In response to this request from teachers, Spanish versions of unit assessments were made available to teachers in all three conditions. No teachers in the BAU condition opted to use the Spanish versions of the assessment. As a result, students in the treatment conditions who responded to the Spanish versions of the assessments were dropped before analyses of outcomes were conducted ($n = 17$). We recognized this decision could result in an over-estimation of treatment effects due to the systematic removal of data from students who may have been less proficient in English. As a result, we ran the analysis with and without these data to determine if intervention effects on all outcomes would significantly differ, and they did not.

Unit tests of content knowledge. Content knowledge assessments included 20 to 21 multiple-choice items consisting of short sentence stems accompanied by four answer choices. Items included information taught during the STRIVE intervention. Internal consistency reliability for content knowledge items ranged from .75 to .85 across all three measures.

Unit tests of vocabulary knowledge. Vocabulary items required students to match target vocabulary words to short definitions. Vocabulary sections ranged from 16 to 24 items. Internal consistency reliability ranged from .88 to .93 across all three content vocabulary measures; however, these estimates may be inflated given that matching assessments used a common set of response choices.

Content reading comprehension. This assessment consisted of five reading passages each followed by six multiple-choice questions, resulting in a possible score ranging from zero to 30. Passages ranged from 197 to 233 words and had a Lexile range of 700L to 900L (i.e., fourth-grade level). The topics focused on social studies content that was not covered in STRIVE, providing researchers an opportunity to examine reading comprehension with a measure that was not as highly aligned with the STRIVE intervention as the other sections of unit assessments. The internal consistency reliability for the assessment was .88.

Additional information regarding the larger randomized control trial, intervention materials and procedures, and researcher-developed assessments can be found in Swanson et al. (2021).

Fidelity

Implementation fidelity and instructional quality were examined across all STRIVE classrooms. The code sheet used in this study was utilized in prior studies examining the effects of STRIVE (e.g., Hairrell et al., 2011; Swanson et al., 2021). To investigate treatment adherence, coders used a four-point rating scale where a rating of 1 = low alignment with the intended method of practice and 4 = high alignment with the intended method of practice. Items received a "not applicable" code only when a lesson component was not expected in the coded lesson or in the event of an outside interruption, such as a school

emergency or fire drill, or an error related to audio recording (e.g., the recorder ran out of batteries in the middle of a lesson and did not capture the remainder of the lesson). Instructional quality was measured using seven items that focused on lesson pacing, teacher preparedness, opportunities for students to practice, the presence of specific feedback for student answers, the presence of a range of questions, teacher enthusiasm, and the presence of explicit instruction.

Fidelity coding procedures. Treatment teachers were asked to audio record all STRIVE lessons. Teachers in the BAU condition were asked to record one week of BAU social studies lessons at Weeks 6, 12, and 18. Forty-four audio recordings were coded for teachers in the treatment conditions, and 30 were coded in the BAU condition. Before coding began, all coders participated in fidelity training led by the principal investigator of the larger study and established interrater reliability of at least 90% agreement with the principal investigator, who acted as the gold standard. To maintain agreement, two members of the research team independently coded one-third of the audio recordings, resulting in agreement above 90% for all double-coded files.

Research design. As previously noted, participants were drawn from a larger RCT investigating the efficacy of two PD conditions compared to one BAU condition (Swanson et al., 2021). Because the aim of this study was to examine the effects of STRIVE instructional practices rather than the effects of a distributed PD model, both treatment conditions were collapsed for analysis. This was done for two reasons: (a) mean assessment scores in both treatment conditions were not significantly different on any measure, and (b) implementation fidelity in the treatment conditions was similar and consisted of far more instances of STRIVE instructional practices compared to classrooms in the BAU condition. We used a secondary data analysis to investigate treatment effects for a subset of students with inattention in Cohort 2 of the larger study. Ten schools participated in each condition, resulting in 30 total elementary schools. We examined the effects of STRIVE instruction at the student level, which differed from the larger study's analysis at the school level. Because schools had already been randomized to a condition in the larger study before students were identified to participate in this study, randomization at the student level was not possible.

Analysis. Prior to conducting any analyses of effects, treatment conditions were compared using a one-way ANOVA to determine if they were significantly different on any measure. The two treatment conditions were not significantly different on any measure. In addition, we examined fidelity data closely to (a) reinforce our decision to combine treatment groups for analysis and (b) evaluate the extent to which treatment conditions differed from BAU, which provided additional context in which findings could be interpreted.

To investigate differences between treatment and comparison conditions, multiple steps were taken. First, mean pre-test scores were examined to see if they were statistically similar across treatment and comparison conditions. Then, preliminary analyses were conducted to check the assumptions for ANCOVA. After checking all assumptions, the main analyses were completed using ANCOVA models to investigate the effects of STRIVE instruction on each outcome measure using pretest scores as a covariate.

Results

Fidelity Results

Fidelity data allowed for the examination of treatment adherence, discerning if instruction in the treatment conditions was aligned with STRIVE instructional practices as they were intended and to investigate the extent to which STRIVE instructional practices were utilized in the BAU condition compared to treatment conditions. Table 2 includes information about the frequency and means of instructional practices seen across all three conditions. Because this study aimed to find the effects of STRIVE instructional practices on the reading outcomes of students with inattentive behaviors rather than investigating the differences in how teachers were provided with STRIVE training, we felt it necessary to consider how implementation in both treatment conditions compared. To compare implementation fidelity ratings across both treatment conditions, an independent sample *t*-test was conducted. There were no significant differences between treatment groups on any implementation fidelity rating except on the vocabulary practice provided before reading, which was significantly different, $t_{(41)} = 1.302$, $p = .009$. It is worth noting that both means in the treatment conditions (researcher-supported PD = 3.91; school-supported PD = 3.76) greatly exceed ratings for this practice in the BAU condition ($M = 2.92$), suggesting students in the treatment conditions may have been exposed to more explicit STRIVE vocabulary instruction before reading than students in the BAU condition. Furthermore, many practices were not observed as frequently in BAU classrooms compared to treatment classrooms (e.g., generating summaries). For example, the generation of gist statements was observed one time across BAU recordings, but it was observed 19 times in the researcher-supported condition and 17 times in the school-supported condition. In addition, all but one practice (i.e., one instance of generating gist statements; $M = 4.00$) yielded mean ratings from 1.00 to 2.92, which are far lower than ratings reported for treatment conditions. These ratings provide insight on the instructional practices that were and were not implemented in the BAU condition, providing further evidence that students in the treatment conditions

Table 2. Implementation Fidelity and Instructional Quality.

Coding Components	STRIVE RPD (n = 22)		STRIVE SPD (n = 21)		BAU (n = 31)	
	% observed	*M* (*SD*)	% observed	*M* (*SD*)	% observed	*M* (*SD*)
			Implementation fidelity			
STRIVE components						
Building background knowledge	96	2.33 (0.97)	86	2.56 (1.10)	90	2.18 (0.94)
Explicit vocabulary instruction						
Before reading[a]	100	3.91 (0.29)	100	3.76 (0.44)	81	2.92 (0.81)
After reading	77	3.71 (0.59)	76	3.81 (0.54)	13	2.00 (1.41)
Questions to prompt text-based discussion						
Pose comprehension purpose question	96	2.90 (1.41)	100	2.48 (1.36)	19	2.33 (1.37)
Questions during text reading	96	3.24 (0.94)	100	3.10 (1.09)	90	2.82 (0.98)
Discuss comprehension purpose question	73	3.19 (1.33)	71	3.00 (1.25)	3	1.00 (n/a)
Gist statements	100	3.32 (1.00)	100	3.47 (0.94)	3	4.00 (n/a)
Summaries	100	3.60 (0.89)	83	3.60 (0.55)	3	1.00 (n/a)
Lesson closure	55	2.58 (1.08)	52	3.00 (1.34)	39	1.92 (0.67)
			Instructional quality			
Teacher organization	100	3.00 (0.93)	100	3.00 (0.77)	97	3.80 (0.82)
Clear questions/directions	100	3.18 (1.01)	100	3.10 (0.89)	100	3.29 (0.82)
Pacing	100	2.91 (0.81)	100	3.10 (0.89)	100	3.39 (0.72)
Opportunities for students to practice	100	2.95 (0.72)	100	3.10 (0.89)	100	3.03 (0.80)
Effective Feedback	100	2.64 (0.79)	100	2.86 (0.85)	100	2.81 (0.91)
Explicit Instruction	100	2.77 (0.81)	100	3.05 (0.74)	100	2.61 (0.88)
Teacher enthusiasm	100	3.31 (1.04)	100	3.23 (0.70)	100	3.77 (0.50)
Global observations						
Overall STRIVE implementation	100	2.68 (0.84)	100	2.62 (0.80)	n/a	n/a
General instruction	100	2.95 (0.72)	100	3.29 (0.78)	100	3.10 (0.79)
Group management	100	3.22 (0.69)	100	3.14 (0.91)	100	3.26 (0.77)
Student engagement	100	3.36 (0.73)	100	3.19 (0.75)	100	3.42 (0.67)

Note. STRIVE = Strategies to Read Information Texts and Vocabulary Effectively; RPD = research-supported condition; SPD = school-supported condition; BAU = business as usual condition; SD = STRIVE School-delivered PD.
[a]In Unit 3, explicit vocabulary instruction included the context clue strategy.

experienced different instruction than those in the comparison condition.

Information regarding instructional quality is also presented in Table 2. There were no significant differences between treatment conditions on any items except for one pertaining to teacher enthusiasm, in which the STRIVE researcher-supported condition received a higher mean rating than the teacher-supported condition, $t_{(41)} = 4.067$, $p = .05$. Although significant differences between treatment and comparison ratings of instructional quality were not hypothesized, means were significantly different on two items: (a) teacher organization, $t_{(71)} = 6.351$, $p = .014$, and (b) teacher enthusiasm, $t_{(72)} = 14.407$, $p < .001$, in which the comparison condition received higher mean ratings than treatment conditions. While these differences are important to note, it is unclear what impact these differences may have on study findings. Previous research documents higher teacher quality ratings (specifically in the area of providing corrective feedback), level of student engagement, and instructional pacing are positively related to student outcomes (Hairrell et al., 2011); however, differences on quality ratings in these areas were not documented in this study.

Baseline Equivalence

To examine baseline equivalence, Hedges' g effect sizes were calculated for both the GMRT-4V subtest and the GMRT–4 RC subtest. Means across conditions on the GMRT-4V subtest slightly exceeded the What Works Clearinghouse limit of 0.25 ($g = 0.27$) at pretest (IES, 2020). Means across conditions on the GMRT–4 RC subtest yielded an effect size of $g = 0.10$, which meets WWC standards but requires a statistical adjustment (IES, 2020). To account for differences between conditions at pre-test, all ANCOVAs included the GMRT-4V pretest scores as a covariate. This covariate was selected for two reasons. First,

Table 3. Descriptive Statistics for Combined Treatment Groups and Comparison Condition.

	STRIVE (RPD + SPD)		BAU	
Measure	*M* (*SD*)	*n*	*M* (*SD*)	*n*
Unit 1 Content Knowledge	11.68 (3.88)	146	7.31 (2.88)	83
Unit 1 Content Vocabulary	17.57 (6.18)	144	10.30 (6.60)	81
Unit 2 Content Knowledge	11.96 (3.84)	135	8.05 (3.17)	78
Unit 2 Content Vocabulary	11.02 (4.39)	132	6.24 (3.54)	76
Unit 3 Content Knowledge	13.55 (5.06)	137	9.24 (3.92)	82
Unit 3 Content Vocabulary	12.83 (5.01)	134	8.40 (4.68)	81
Content Reading Comprehension	19.05 (6.82)	130	14.40 (6.04)	81
GMRT V (ESS) Pretest	457.36 (42.29)	150	446.69 (34.93)	90
GMRT V (ESS) Posttest	474.35 (44.85)	147	463.24 (35.71)	83
GMRT RC (ESS) Pretest	462.36 (41.52)	113	458.38 (34.59)	37
GMRT RC (ESS) Posttest	476.11 (43.96)	103	477.25 (34.45)	36

Note. STRIVE = Strategies to Read Information Texts and Vocabulary Effectively; RD = STRIVE researcher-delivered PD; SD = STRIVE School-delivered PD; M = mean; SD = standard deviation; GMRT V (ESS) = Gates MacGinitie Vocabulary subtest (extended scale score); GMRT RC (ESS) = Gates MacGinitie Reading Comprehension subtest (extended scale score).

both districts completed the GMRT-4V measure at pretest; therefore, pretest scores on the GMRT-4V subtest may be more representative of the abilities of the entire sample compared to the GMRT–4 RC subtest scores, which only represent roughly half the sample. Second, the GMRT-4V subtest scores were significantly different at pretest (g = 0.27), implying differences across conditions may also exist on proximal measures not administered at pretest. Use of GMRT-4V scores as a covariate in estimating treatment effects attempted to account for such differences. GMRT–4 RC scores at pretest were used only as a second covariate in the analysis of GMRT–4 RC at posttest to account for the small difference (g = 0.10) identified at pretest. Table 3 presents the unadjusted means and standard deviations for treatment and comparison groups on all measures, including those measured at pretest.

Analysis of Treatment Effects

Because the present pilot study was conducted within the context of a larger RCT, the multi-level structure of the data was complex. The assignment for the RCT had already been done at the school level. In addition to being nested within schools, the students identified as inattentive were nested in teachers. Teachers identified up to five students in their classes as inattentive, resulting in a relatively small number of students within each unit at each level. Therefore, we were concerned that a multi-level analytical model may not converge. As a result, we conducted our analysis at the individual student level and adjusted effect sizes for clustering at the school level; furthermore, we felt these preliminary findings may document a substantial need for additional work in this area. Specifically, a future, larger-scale study of the effects of STRIVE for students identified as inattentive should be designed and powered to account for the nested nature of the data to confirm our findings.

To examine effects of STRIVE reading instruction on the reading outcomes of students with inattentive behaviors, a one-way ANCOVA analysis was conducted for each outcome measure using pretest scores as the covariate. Hedges' g effect sizes were calculated for each measure (Hedges, 1981) and adjusted for clustering at the school level (Institute of Educational Sciences, 2020). Furthermore, to control for the potential proportion of falsely rejected null hypotheses (i.e., false discovery rate), the Benjamini-Hochberg correction was utilized for all ANCOVA findings (Benjamini & Hochberg, 1995). ANCOVA results for all outcome measures are presented in Table 4. Significant p-values represent differences after applying the Benjamini-Hochberg correction.

There were no significant differences between conditions found on either standardized measure (i.e., GMRT-4V subtest, GMRT–4 RC subtest), $F(1, 214) = .406$, $p = .525$ and $F(1, 120) = .817$, $p = .368$, respectively. There were significant differences between conditions on near- transfer measures (i.e., Content Knowledge and Content Vocabulary for Units 1–3), with moderate to large effect sizes (g = 0.52–0.66). Specifically, students with inattention in the STRIVE conditions significantly outperformed students in the BAU on the Unit 1 Content Knowledge assessment, $F(1, 214) = 81.77$, $p < .001$, the Unit 1 Content Vocabulary assessment, $F(1, 211) = 69.12$, $p < .001$, the Unit 2 Content Knowledge assessment, $F(1, 201) = 53.56$, $p < .001$, the Unit 2 Content Vocabulary assessment, $F(1, 197) = 61.09$, $p < .001$, the Unit 3 Content Knowledge assessment, $F(1, 207) = 40.56$, $p < .001$, and the Unit 3 Content Vocabulary assessment, $F(1, 187) = 44.09$, $p < .001$. A significant difference was also found between conditions on the Content Reading Comprehension measure, with a small effect size, g = 0.36;

Table 4. ANCOVA Results and Effect Sizes.

Measure	Group	*F*	Adjusted mean	Standard error	*p*-value	*df*	Hedges' *g*
Unit 1 Content Knowledge	T	81.77	11.43	0.26	<.001*	1	0.66
	C		7.55	0.34			
Unit 1 Content Vocabulary	T	69.12	17.27	0.47	<.001*	1	0.62
	C		10.77	0.62			
Unit 2 Content Knowledge	T	53.56	11.80	0.30	<.001*	1	0.59
	C		8.26	0.38			
Unit 2 Content Vocabulary	T	61.09	10.73	0.32	<.001*	1	0.61
	C		6.56	0.42			
Unit 3 Content Knowledge	T	40.56	13.40	0.38	<.001*	1	0.52
	C		9.44	0.49			
Unit 3 Content Vocabulary	T	44.09	12.94	0.38	<.001*	1	0.52
	C		8.83	0.49			
Content Reading Comprehension	T	20.50	18.74	0.52	<.001*	1	0.36
	C		14.95	0.65			
GMRT V (ESS)	T	0.406	471.29	2.08	.525	1	0.03
	C		469.08	2.76			
GMRT RC (ESS)	T	0.817	475.23	2.76	.368	1	−0.07
	C		480.07	4.59			

Note. T = treatment condition; C = comparison condition; GMRT V (ESS) = Gates MacGinitie Vocabulary subtest (extended scale score); GMRT RC (ESS) = Gates MacGinitie Reading Comprehension subtest (extended scale score).
*Statistically significant at $p < .005$.

$F(1, 198) = 20.50$, $p < .001$. See Table 4 for additional information regarding each assessment outcome.

Discussion

The purpose of this pilot study was to expand previous research by investigating the potential effects of STRIVE instructional practices on the reading outcomes of students with inattention. We document significant differences between treatment and comparison conditions on all Content Knowledge, Content Vocabulary, and the Content Reading Comprehension measures. Findings support previous results reported in the larger STRIVE study, which also document significant positive effects on near-transfer measures (Swanson et al., 2021). Significant differences between treatment and comparison conditions were not found on far transfer measures of vocabulary and comprehension in our sample. These findings among students with inattention align with those of the larger STRIVE study and are expected given the lack of alignment between far-transfer measures and STRIVE instruction. Although supporting a far transfer of skills is ideal and including such measures is essential to investigate this transfer, there is some evidence documenting a lack of significant findings on far-transfer measures among interventions that utilize informational text (e.g., Fuchs et al., 2018). In addition, the lack of significant differences between conditions on standardized measures also provides evidence that groups made relatively equal gains; therefore, STRIVE was equally effective as typical instruction for promoting expected increases in reading comprehension and vocabulary outcomes during fourth grade.

STRIVE and Students with Inattention

The instructional practices in STRIVE lessons support students with inattention in multiple ways. Previous research highlights the importance of evidence-based vocabulary, reading comprehension strategy instruction, and built-in routines that support on-task behavior for students with ADHD, in general; however, findings from this study suggest they may be particularly beneficial for students with high levels of inattention.

Vocabulary. Findings in this study not only align with previous research conducted with students with ADHD, but they also expand previous research in numerous ways. First, STRIVE instruction takes place in a whole-class setting and is delivered in general education classrooms. Previous studies document positive vocabulary outcomes for students with ADHD using one-to-one instruction or small group instruction, often in special education classrooms (e.g., Fishley et al., 2012). We provide evidence that even in the general education setting, students with inattention who received STRIVE vocabulary instruction outperformed those who did not on content vocabulary measures. In addition, previous studies utilizing single-case designs and small group designs documented positive outcomes for

individual students with ADHD (e.g., Fishley et al., 2012; Jozwik & Douglas, 2016). This study presents positive outcomes for a much larger sample of students, particularly those with inattention. Although the findings presented in this study will benefit from replication, they document positive outcomes for more than one student, which is a necessary step toward identifying evidence-based practices for students with inattention.

Findings also support explicit vocabulary instruction that includes visual scaffolding (e.g., graphic organizers; Fishley et al., 2012), opportunities to build and activate background knowledge by having students identify word associations, and opportunities to collaborate with peers to apply a word's meaning to their everyday lives (e.g., turn and talk). Combining these practices was effective in improving the vocabulary knowledge of students with inattention in this study.

Reading comprehension. Positive effects of STRIVE instruction on students' reading comprehension outcomes align with multiple previous studies (e.g., Crabtree et al., 2010; Ennis, 2016; Rogevich & Perin, 2008). After explicit instruction, many opportunities to engage in guided practice, working collaboratively with peers to write gist statements, and eventually composing written summaries of entire passages, students with inattention in the treatment condition significantly outperformed those in the comparison condition on a content reading comprehension measure. Similar findings are also documented in studies utilizing SRSD in addition to mnemonics such as TWA (think before reading, think while reading, and think after reading) to support summary writing as a way of improving reading comprehension for students with ADHD (e.g., Ennis, 2016). Although STRIVE instruction does not include SRSD specifically, there are multiple elements of SRSD woven throughout, particularly while writing main idea statements and summaries. Findings in this study support previous research, but they also expand it by documenting positive effects for students who present with inattention. Furthermore, findings support the instructional practice of posing a range of questions while reading, which aligns with findings presented by Crabtree and colleagues (2010). STRIVE also requires teachers to engage in explicit instruction, an evidence-based practice for a wide range of students (Becker & Carnine, 1980). Findings in this study further support the efficacy of explicit instruction already documented for students with ADHD, in general (e.g., Flores & Ganz, 2009); however, they expand previous findings by documenting positive effects for students with inattention.

Behavioral support. Although STRIVE does not include specific behavioral support in terms of reinforcement or rewards, some of the instructional practices are documented to support students who engage in off-task behaviors (i.e., collaborative working opportunities and self-monitoring during SRSD). STRIVE integrates structured collaborative learning opportunities into lessons, which is documented as one way to increase on-task behavior for students with ADHD (e.g., Locke & Fuchs, 1995). STRIVE instruction also encourages self-monitoring with the use of cue cards, which supports students while they engage in reading comprehension strategies such as Get the Gist. Before utilizing cue cards or practicing any strategies independently, teachers explicitly model the strategies and the use of the cards. These practices align with some of the steps found in the SRSD model, which is supported by multiple studies as a way to improve reading outcomes for students with ADHD (e.g., Ennis, 2016). Findings from this study suggest the self-monitoring opportunities and strategy use housed within STRIVE lessons may be especially important for students with inattention.

Implications

Findings from this study not only support previous reading research for students with ADHD, they also bring forth new information about instructional practices that show potential promise for a particular group of students with inattention. Given the lack of empirical work documented in the area of reading instruction for these students, these findings shed new light on instructional practices that may be effective. Because this is the first study documenting effective reading instruction for students in upper elementary school with high levels of inattention without the manipulation of medication, much work is needed to support and expand these findings. Pilot studies such as this one benefit the field of educational research by exploring interventions to determine if they show promise and are worth investigating with larger efficacy studies. This pilot highlights elements of instruction that can be replicated on a much larger scale. For example, STRIVE instruction was successfully implemented with high levels of fidelity by a number of general education teachers in treatment conditions ($n = 44$). This shows promise of successful implementation by a larger number of teachers in future efficacy trials. In addition, we found that using a brief rating scale to identify high levels of inattention (e.g., Conners 3AI–T) in up to five students per class was feasible for teachers. Future studies can expand this limit to potentially identify more than five students per class. Future RCTs with larger groups of students with inattention investigating the effects of STRIVE are needed to make causal inferences and to ensure findings are representative of the larger population.

In addition, findings from this study represent the outcomes of students who were exposed to STRIVE instructional practices within social studies lessons. Future studies incorporating these instructional practices across other

content areas (e.g., science) may emphasize the utility of these practices for students with inattention across subject areas.

Although this study provides evidence of effective instructional practices for students with inattentive behaviors, it is imperative to consider the components of lessons that may support these students beyond the academic instructional practices (e.g., pacing, sequence of activities, etc.). Future research may benefit from investigating additional elements of lessons that specifically support behavior. Collecting behavioral data to investigate student time-on-task during each instructional practice, for example, may provide insight about which structural elements of lessons may be particularly engaging for students with high levels of inattention. Examining time-on-task as it relates to fidelity ratings may also shed light on additional elements of instruction that may impact attention. There is some evidence suggesting effective academic instruction can significantly improve attention scores (e.g., Roberts et al., 2015); therefore, examining levels of inattention before and after treatment in addition to collecting data about student time-on-task during lessons may provide more insight on additional elements of instruction that support students with inattention.

Limitations

There are several limitations to this study. First, the lack of random assignment of students with inattention to conditions limits the ability to infer that differences in outcomes are solely due to treatment. We feel it is important to note, however, that students in treatment conditions received far more instances of STRIVE instructional practices than those in the comparison condition, and teachers in both conditions were required to cover the same state standards (i.e., social studies content); therefore, positive effects suggest STRIVE instruction may benefit students with inattentive behaviors. Furthermore, without randomization, it is difficult to be sure that samples in each condition are truly representative of those in the larger population. Even though these findings may not represent the larger population as a whole, they do provide some evidence of the positive effects of STRIVE instructional practices on the reading outcomes of students with inattention in a much larger sample than any previous study in this area.

Means across conditions on the GMRT-4V subtest slightly exceeded the What Works Clearinghouse limit of 0.25 ($g = 0.27$) at pretest (IES, 2020); however, this difference was accounted for using a the GMRT-4V subtest as a covariate. Still, we feel it is necessary to note the potential implications of this difference when interpreting findings. Differences at baseline favored the treatment condition, leaving room for the possibility that study effects could be impacted by baseline differences rather than the intervention alone.

The majority of measures used to determine intervention effects were researcher-developed assessments that focused on content taught across the state-designed scope and sequence for social studies. Students in treatment and BAU conditions were both exposed to this same scope and sequence of social studies content in accordance with state standards throughout the study. Still, target vocabulary found in STRIVE lessons may not have been covered in BAU classrooms. As a result, findings should be interpreted with caution as STRIVE content vocabulary measures were aligned with STRIVE unit benchmarks. Because the researcher-developed assessments (a) covered content available to all participants in treatment and comparison conditions, (b) were presented in a format different than what students experienced in STRIVE lessons, and (c) covered content not yet taught in either treatment or comparison lessons (i.e., Content Reading Comprehension Measure), these measures meet the What Works Clearinghouse (IES, 2020) criteria for avoiding over alignment of researcher-developed measures. The Content Reading Comprehension measure, in particular, was far less aligned with the lesson materials. As a result, student outcomes on this measure provide encouraging evidence of a potential transfer of skills.

Another notable limitation is the removal of Spanish unit benchmark data from our analysis ($n = 17$). Although these assessments were translated directly from English versions to ensure identical item sequencing, no statistical analyses were conducted to rule out whether the English and Spanish versions of the assessments were significantly different. Dropping these data from the analysis introduced a systematic change, as data were not dropped at random. Although we confirmed statistically similar findings with and without these data in our analyses (i.e., statistically significant effects were observed on all unit assessments and the content reading comprehension measure with and without the inclusion of these data), we recognize the potential for an over-estimation of effects given that only students in the treatment group took Spanish versions of assessments.

The sample consisted of students with high levels of inattention without disaggregating those who also embodied high levels of co-occurring hyperactivity/impulsivity. Although descriptive research points to inattention rather than hyperactivity/impulsivity as the behavior specifically correlated with lower reading outcomes, future studies investigating whether the intensity of co-occurring hyperactivity/impulsivity in conjunction with inattention mediates intervention effects may provide a more in-depth picture of effective reading instruction for this population.

Last, this pilot study involved a small number of students, which limited our ability to investigate all potential

covariates (e.g., demographic differences) and to account for the nested nature of the data. Although we document encouraging evidence that STRIVE instructional practices may be beneficial for students with inattention, we also acknowledge that more research in this area is necessary to confirm our preliminary findings.

Conclusion

This pilot study investigated the impact of STRIVE instructional practices on the reading outcomes of students with inattention. After receiving STRIVE instruction, students with inattentive behaviors outperformed those in the comparison condition on content vocabulary measures, content knowledge measures, and a content reading comprehension measure. Students in treatment and BAU conditions performed equally well on standardized measures. Findings encourage the use of STRIVE instructional practices during social studies instruction to improve the reading outcomes of upper elementary students with inattention; however, additional research is necessary to confirm these preliminary outcomes.

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