Relationships between Reading Motivation, Reading Activity, Oral Language, and Reading Achievement in Children with Attention-Deficit/Hyperactivity Disorder

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Abstract

Fifteen third and fourth graders with attention-deficit/hyperactivity disorder were asked to complete reading self-efficacy and reading activity scales and standardized tests of oral and written language to examine the relationships between reading self-efficacy, reading activity, oral language, and reading achievement, with gender and age controlled. Students with higher self-efficacy for personally relevant reading activities displayed higher reading achievement, whereas those who held higher self-efficacy for fundamental reading skills displayed lower reading achievement, suggesting inflated perceived competence possibly due to meta-cognitive deficits. Students' reading performance decreased with age, suggesting the presence of Matthew effects. Fourth graders displayed higher task self-efficacy than third graders. Reading activity, oral language, and gender did not contribute significantly to predicting reading achievement in this sample of children.

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neuro-behavioral developmental disorders in childhood, affecting about 5% of the children in the United States, as reported by Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). Prior research has documented that, compared to typically developing peers, children with ADHD tend to demonstrate lower performance on both word recognition (Åsberg, Kopp, Berg-Kelly, & Gillberg, 2010; Mayes and Calhoun 2006) and reading comprehension tasks (Brock & Knapp, 1996; Zentall, Tom-Wright, & Lee, 2013) (e.g., recalling central ideas; Miller, et al., 2013), possibly associated with underlying deficits in executive functioning (Miranda, Soriano, & Garcia, 2005). Ghelani, Sidhu, Jain, and Tannock (2004) found that students with ADHD obtained lower scores on reading rate and accuracy and reading comprehension tasks compared to their typically developing peers. Frazier, Youngstrom, Glutting, and Watkins (2007) also found a large discrepancy in reading achievement between children with ADHD and those without disabilities. They suggested that this might either indicate the negative impact of ADHD symptoms on these students' reading performance or the fact that students with learning disabilities, a frequently co-morbid condition with ADHD that is typically associated with reading difficulties, were not excluded in their study.

When it comes to the amount and breadth of reading activities (we refer to this as reading activity in this study), Lee and Zentall (2012) found that children with ADHD tended to be equally engaged in school reading and personal reading activities (e.g., reading for self-enjoyment) as their typically developing peers. In contrast, students with reading disabilities (RD) with and without ADHD were found to engage in significantly fewer personal reading activities for enjoyment. They argued that this result might indicate that "*reading could be viewed as disability-free for students with*

ADHD without RD" (p. 784). More research is needed to explore the reading activity in the ADHD population.

Deficits in oral language have been observed in children with ADHD (Kim & Kaiser, 2000; McInnes, Humphries, Hogg-Johnson, & Tannock, 2003; Oram, Fine, Okamoto, & Tannock, 1999). For example, Oram, et al., (1999) found that students with ADHD experienced difficulties on standardized tests targeting receptive and expressive language skills, even when potential co-morbid language impairment (LI), a condition typically associated with oral language difficulties, was excluded. Kim and Kaiser (2000) examined the comprehensive language profiles of children with ADHD and found that children with ADHD demonstrated lower oral language abilities compared to their typically developing peers, and these children tended to experience more difficulties in expressive than receptive language.

Children with ADHD also have been found to demonstrate lower general motivation to learn new things and use strategies consistently (Carlson, Booth, Shin, & Canu, 2002; Zentall & Beike, 2012). In Tabassam and Grainger's (2002) study, both children with LD alone and those with co-morbid LD and ADHD showed significantly lower academic self-efficacy than their typically developing peers. However, their study didn't examine academic self-efficacy for children with ADHD alone. A more recent study conducted by Lee and Zentall (2012) found that children with ADHD displayed equivalent self-efficacy for reading compared to their typically developing peers. More studies are needed to examine self-efficacy, a critical component of motivation, in the domain of reading for children with ADHD.

Evidence suggests that reading motivation, reading activity, oral language, and reading achievement are closely related in typically developing children (Guthrie, Wigfield, Metsala, & Cox, 1999; Kendeou, Van den Broek, White, & Lynch, 2009; Shell, Murphy, & Bruning, 1989). However, to date few studies have directly

investigated these critical relationships among children with ADHD. The current study aims to address this research gap and determine whether reading motivation, reading activity, and oral language are strong predictors of reading achievement in children with ADHD. The results from the study are expected to contribute to the field by adding to the very limited body of research literature on reading in children with ADHD, deepening understanding of the underlying causes of their lower reading achievement, and providing some support for future research studies that investigate how to improve reading achievement for these children.

Review of Literature

Reading motivation, reading activity, and oral language have been documented to be critical constructs that play important roles in students' reading development. The body of literature on relationships between these constructs for typically developing children provides theoretical and empirical support for examining these relationships in children with ADHD.

Reading Motivation

Motivation has been documented to be highly correlated with learning in general and reading comprehension in particular (Brophy, 2004; Duke, Pearson, Strachan, & Billman, 2011; Guthrie, 2004; Guthrie, Schafer, & Huang, 2001; Guthrie, et al., 2006; Proctor, Daley, Louick, Leider, & Gardner, 2014). As a critical component of reading motivation, self-efficacy for reading refers to individuals' assessments of their own capabilities to perform reading tasks or activities to achieve desired goals (Eccles & Wigfield, 2002; Wigfield, Guthrie, Tonks, & Perencevich, 2004). Self-efficacy is believed to be very influential for individuals' functioning (Bandura, 1986), and can impact students' choice of the reading activities or tasks with which they engage, how much effort they expend on these, to what extent they persist when faced with reading difficulties, how they feel towards reading, and their overall reading

achievement (Linnenbrink & Pintrich, 2003; Mills, Pajares, & Herron, 2006; Pajares & Schunk, 2002; Solheim, 2011; Wolters, Denton, York, & Francis, 2014). For instance, Solheim (2011) found that reading self-efficacy was a strong positive predictor of fifth graders' reading comprehension on both multiple-choice and constructed-response comprehension measures even with word reading, listening comprehension, and nonverbal cognitive ability held constant. Lee and Zentall (2012) found that the children with ADHD didn't differ from their typically developing peers in intrinsic and extrinsic motivation, a finding that differed from prior studies in which motivational deficits were found in this population across academic areas (e.g., Zentall & Beike, 2012). They argued that this result might indicate that children with ADHD experience deficits in general motivation but not reading motivation. However, their study didn't examine the relationships between reading self-efficacy specifically and reading achievement for the children with ADHD.

Reading Activity

Reading activity, defined as the amount and breadth of reading, is critical to students' reading development and engagement (Guthrie, Schafer, & Huang, 2001; Wigfield & Guthrie, 1997). Reading activity has been found to exert a significant positive impact on students' reading achievement (McQuillan & Au, 2001; El-Khechen, Ferdinand, Steinmayr, & McElvany, 2016). In Cipielewski and Stanovich's (1992) study, the Title Recognition Test (TRT) and the Author Recognition Test (ART) were used to measure fourth and fifth graders' reading exposure. The volume of reading tested by both measures was found to predict fifth-grade reading performance, with third-grade reading ability controlled. Guthrie, Wigfield, Metsala, and Cox (1999) found that the amount of reading predicted text comprehension for third and fifth graders, even when prior knowledge, reading self-efficacy, and previous reading in achievement were controlled. El- Khechen and colleagues (2016) also reported similar

findings for bilingual students with Turkish or Turkish/German as family language, whose reading amount in German was found to positively predict their German reading comprehension. In addition to being a predictor of reading achievement, reading activity also has been found to be correlated with reading motivation (Becker, McElvany, & Kortenbruck, 2010; Cox & Guthrie, 2001; Wigfield & Guthrie, 1997; Stutz, Schaffner, & Schiefele, 2016). For example, Wigfield and Guthrie (1997) assessed reading volume and breadth of 105 fourth and fifth graders using the Reading Activities Inventory (RAI; Guthrie, McGough, & Wigfield, 1994). This measure asked students to provide titles of different kinds of print materials they read during the past week in and out of school (e.g., comics, magazines, newspapers) achievement were controlled. El- Khechen and colleagues (2016) also reported similar findings for bilingual students with Turkish or Turkish/German as family language, whose reading amount in German was found to positively predict their German reading comprehension.

and to rate how often they read these materials on a 4-point scale, with 1 representing "*almost never*" and 4 "*almost every day*". The results showed that the students' reading motivation predicted their reading activity. The authors claimed that children who held high self-efficacy beliefs for reading and were intrinsically motivated reported more frequent reading than their less motivated peers. In Cox and Guthrie's (2001) study, 251 third and fifth graders completed three surveys: the Motivation for Reading Questionnaire (MRQ; Wigfield & Guthrie, 1997) to measure a wide array of studies, newspapers) and to rate how often they read these materials on a 4-point scale, with 1 representing "*almost never*" and 4 "*almost every day*". The results showed that the students' reading motivation predicted their reading activity. The authors claimed that children who held high self-efficacy beliefs for reading and were intrinsically motivated reported more frequent reading than their less motivated peers. In Cox and

Guthrie's (2001) study, 251 third and fifth graders completed three surveys: the Motivation for Reading Questionnaire (MRQ; Wigfield & Guthrie, 1997) to measure a wide array of students' reading motivations; the Strategy Self-Report Measure to assess students' use of reading strategies; and the RAI to measure the amount of reading for both enjoyment and school. Reading motivation was found to be a strong predictor of reading for enjoyment for both third and fifth graders when prior achievement and strategy use were controlled. However, reading motivation didn't contribute to variance in self-reported activity in school-oriented reading for these students. More recently, Stutz, Schaffner, & Schiefele (2016) found positive correlations between intrinsic reading motivation and the amount of reading for a large group of second- and third-grade elementary students.

Lee and Zentall (2012) assessed the reading motivation and reading activity of 133 second to fifth graders who were divided into four groups (students with ADHD, students with RD, ADHD + RD, and non-disabled) and found that students with RD and those with ADHD + RD engaged in fewer personal reading activities (as assessed by the RAI) compared to the non-disabled group. Those with ADHD alone didn't differ from their typically developing peers in their school-oriented or personal reading activities. However, the relationships between reading activity, reading motivation, and reading achievement for children with ADHD were not investigated in their study. A more recent longitudinal study conducted by Lee and Zentall (2015) found that reading achievement, amount of reading for personal interest and for school, and intrinsic motivation at the elementary level were positive predictors of reading achievement in middle school for students with ADHD. Self-efficacy for reading, however, didn't seem to contribute to predicting later achievement for these children. We have not located any study that has directly examined the concurrent relationships between reading self-efficacy and reading achievement in the ADHD population.

Oral Language

Oral language has long been associated with students' later reading achievement. Scarborough (2001) conceptualized three different aspects of oral language: phonology (sounds), syntax (word order), and semantic structures (vocabulary for labeling objects and concepts). The relationship between oral language and reading achievement has been well documented in previous research studies (Catts, Fey, Zhang, & Tomblin, 1999; Kendeou, Van den Broek, White, & Lynch, 2009; Nation & Snowling, 2004; Vellutino, Tunmer, Jaccard, & Chen, 2007). For example, Kendeou and colleagues (2009) measured oral language abilities (i.e., listening comprehension, audiovisual story comprehension, and vocabulary) and decoding skills (i.e., letter and word identification and phonological awareness) of four- and six-year-old students and retested them two years later. The results showed that oral language abilities and decoding skills each independently predicted reading comprehension in second grade. In Nation and Snowling's (2004) study, measures tapping vocabulary, listening comprehension, and semantic skills were used to assess students' oral language abilities from the age of 8.5 to 13 years. Regular word reading, exception word reading, nonsense word decoding, and reading comprehension were measured to examine the students' reading skills. The results showed that oral language abilities were both concurrent and longitudinal predictors of reading comprehension. In Vellutino, Tunmer, Jaccard, and Chen's (2007) study, 468 children divided into younger (grades 2 and 3 combined) and older (grades 6 and 7 combined) groups were given a large battery of tests to assess their reading skills (e.g., reading comprehension, word identification) and reading-related cognitive abilities (e.g., phonological and visual coding). Both semantic (vocabulary and verbal concept) knowledge and listening comprehension were found to directly contribute to reading comprehension. In a large-scale study conducted by Catts, Fey, Zhang, and Tomblin (1999), 604 second-graders were grouped

as good readers (who scored at least 1 SD above the mean) versus poor readers (who scored at least 1 SD below the mean) based on their performance on reading comprehension tests. Poor readers were found to have had experienced difficulties with not only phonological processing, but also broader oral language skills in kindergarten. The results from regression analysis showed that oral language contributed significantly to later reading achievement. In this study, standardized measures of oral language abilities included receptive vocabulary, sentence comprehension, expressive vocabulary, and oral narrative skills. Given the oral language difficulties typically experienced by children with LD and with ADHD, it is assumed that oral language skills might be an important contributor to lower reading achievement in these children.

Gender and Age/Grade as Potential Moderators

Gender differences favoring girls in reading motivation have been explored and reported in previous research studies. In general, girls tend to demonstrate more positive reading motivation compared to boys (Lau, 2009; Logan & Johnston, 2009; Marinak & Gambrell, 2010; Wigfield & Guthrie, 1997). For example, Wigfield and Guthrie (1997) found significant gender differences favoring girls on different reading motivation scales for fourth and fifth graders. Similar findings were obtained in a national survey conducted by McKenna, Kear, and Ellsworth (1995), which showed that girls held more positive attitudes toward both academic and recreational reading than boys at all grade levels in elementary school. Marinak and Gambrell (2010) also examined gender differences in the reading motivation of 288 third graders. The Motivation to Read Profile (MRP; Gambrell, et al., 1996) that tapped two constructs of reading motivation (i.e., self-concept as a reader, and value of reading) was used. Boys were found to hold equivalent self-concept beliefs compared to their female counterparts, but valued reading less. These results, as suggested by the researchers, indicated that low reading motivation in boys might be strongly related to the limited

value they place on reading. It is worth noting that Marinak and Gambrell's study measured self-concept and not self-efficacy beliefs. Reading self-concept refers to more general beliefs about one's abilities within the domain of reading (e.g., "I am a good reader"), while reading self-efficacy refers to beliefs that are more task- or skill-specific (e.g., "I am confident I can read and understand a magazine article").

Girls also have been found to perform better on reading achievement outcomes (Mullis, Martin, Gonzalez & Kennedy, 2003; Mullis, Martin, Kennedy & Foy, 2007) and engage in more reading activities than boys (Coles & Hall, 2002; Logan & Johnston, 2009). In Logan and Johnston's (2009) study, 232 10-year-old children were given different measures of reading (including word reading, comprehension, and vocabulary) and were asked to complete a questionnaire that reflected their reading frequency, attitudes, perceived competence, and academic support. Girls were found to hold more positive attitudes toward reading than boys and performed better on reading comprehension tasks and read more frequently than boys. In contrast, no gender differences in reading performance were found for 136 first to fourth graders with ADHD in Dupaul, et al,.'s (2006) study, in which both boys and girls with ADHD were found to demonstrate reading performance in the low average range, as assessed by Woodcock-Johnson III Tests of Achievement (WJ-III) and report card grades. Although girls were found to perform slighter better than boys in the area of reading, the differences were not statistically significant. They also reported higher ratings for academic motivation in girls than boys.

In terms of age/grade differences in reading motivation, Eccles, Wigfield, Harold, and Blumenfeld (1993) assessed 865 first, second, and fourth graders for their perceived competency and valuing in different domains, in which reading was included as a specific domain. Results showed that younger children (particularly first graders) exhibited more positive self-efficacy than older children. McKenna, Kear, and

Ellsworth (1995) found that students in grades 1 through 6 exhibited decreasing motivation towards both reading for pleasure and academic reading. Wigfield and Guthrie (1997) found that fourth graders held a more positive motivational stance regarding reading than fifth graders, though the differences were only significant in the fall and not in the spring administration of their measures. In Lau's (2009) study, fourth to eleventh graders in Hong Kong were divided into three grade levels (primary, junior secondary, and senior secondary) and were given a Chinese version of the Motivation for Reading Questionnaire (CMRQ; Wigfield & Guthrie, 1997) to assess their reading motivation, including self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation. Students in higher grade levels were found to be less motivated than those in lower grade levels. These grade differences were consistently shown across all types of reading motivation.

Cox and Guthrie (2001) found grade differences for third and fifth graders in both reading for enjoyment and reading for school. With respect to reading for enjoyment, reading motivation predicted reading activity for fifth graders (with other variables controlled) whereas reading motivation together with prior reading achievement predicted reading activity for the third graders. With respect to reading for school, reading motivation contributed to reading activity for third grades but not fifth graders. In Lee and Zentall's (2012) study that sampled second to fifth graders with ADHD, RD, co-morbid ADHD and RD, and typically developing students, grade effects in reading motivation were found, in that fifth graders showed lower reading self-efficacy than third and fourth graders. They also found grade differences for school--oriented reading activities, with fifth graders reporting more frequent activity than second graders. Lee and Zentall (2015) also found that the intrinsic, extrinsic, and social motivation were higher in elementary than middle school for children with ADHD.

The Current Study

Given the well-documented poor reading achievement of children with ADHD as well as the fact that few studies have directly examined the relationships between oral language, reading motivation, reading activity, and reading achievement in this population, the current study aims to address the following three questions: a) What are the reading self-efficacy beliefs and frequency of engaging in different reading activities for third and fourth graders with ADHD compared to their typically developing peers? b) To what degree do reading self-efficacy, reading activity, and oral language abilities predict reading achievement in third and fourth graders with ADHD? c) To what degree do reading self-efficacy and oral language predict reading activity in third and fourth graders with ADHD? This study targeted third and fourth graders for the following two reasons. First, the shift from learning to read to reading to learn takes place at around third/fourth grade (Chall & Jacobs, 2003). When entering these grades, students are pressed to use reading as a tool to learn complex words, concepts, and facts to expand their knowledge about the world. Therefore, reading achievement in the intermediate grades is a particularly important academic outcome to investigate because of its close ties with students' ability to learn and explore. Second, this period also witnesses the trend of decrements in reading motivation for many elementary students (e.g., Lee & Zentall, 2012; McKenna, Kear, & Ellsworth, 1995).

Method

Participants

Fifteen students (5 boys and 10 girls) with ADHD from 3rd (n=8) and 4th (n=7) grade in9 schools in the Midwest were included in this study. Of the 15 participants, 60% were White, 20% were African American, 6.7% were Asian American, and 13.3% were Hispanic. None of the participants had documented intellectual, emotional, or

hearing difficulties, or spoke English as a second language. Student assent and signed parental consent forms were obtained before the study measures were administered.

Prior to participating in the current study, twelve students were clinically diagnosed as having ADHD, eleven of whom took medication on a daily basis. Those students were required not to take any medication on testing days for the study. Further, screening assessments for ADHD were administered and the results indicated that all 15 participants met our criteria of having ADHD, defined in this study as (a) obtaining a T-score over 60 on either the Conners' Continuous Performance Test-Second Edition (CPT-2) omission or commission portions, (b) obtaining a T-score above 60 on the parent version of the Conners' Rating Scale-Revised long form (CRS-R), and/or (c) obtaining a T-score above 60 on the teacher version of the CRS-R. Based on regression analysis, the criterion used to define ADHD did not serve as a significant predictor of any outcome measure in this study.

Among all 15 participants with ADHD, ten also demonstrated oral language difficulties, either receptive (listening comprehension) or expressive (oral expression), or both, defined as scoring below the 25th percentile on Wechsler Individual Achievement Test-II (WIAT-II; Wechsler, 2005) Listening Comprehension and/or Oral Expression sub-tests. In addition, 14 of the participants scored below the 25th percentile on the WIAT-II Written Language sub-test, indicating written language deficits for most of these children. Sixty-two typically developing students (37 boys and 25 girls) randomly selected from one 3rd (n= 19), 4th (n= 20) and 5th (n= 23) grade class from 3 schools in the same geographic area also were included as an instrument validation sample. All these students were nominated by their general education teachers as not having any known disabilities and making typical progress in academics. This group was asked to complete the reading motivation and reading activityLower Measures, and their scores served to validate these instruments. For third graders, 52.6%

were White, 5.3% were African American, 5.3% were Asian American, 15.8% were Hispanic, and 21.5% identified as two or more races. For fourth graders, 35% were White, 5% were African American, 10% were Asian American, 25% were Hispanic, and 25% identified as two or more races. See Table 1 for the demographic information of the participants with ADHD and the typically developing validation sample.

Table 1. Participant characteristics.

Variables	ADHD Group (n=15)	NA Group (n=62)	Total Sample (n=77)
Grade			
Third	8	19	27
Fourth	7	20	27
Fifth	---	23	23
Age in months	116.27 (10.40)	120.89 (11.06)	119.99 (11.02)
Gender			
Male	5	37	42
Female	10	25	35
CRS-Parent-Inattentive	68.00 (11.93)	---	---
Minimum	51		
Maximum	90		
CRS-Parent-Hyperactive	66.57 (16.24)	---	---
Minimum	43		
Maximum	90		
CRS-Teacher-Inattentive	64.73 (7.96)	---	---
Minimum	54		
Maximum	81		
CRS-Teacher-Hyperactive	52.55 (7.50)	---	---
Minimum	37		
Maximum	63		
CPT-Omission	55.83 (16.97)	---	---

Minimum	42.95		
Maximum	103.64		
CPT-Commission	54.60 (8.28)	---	---
Minimum	36.83		
Maximum	62.09		
WIAT-Listening Comp	93.73 (15.72)	---	---
Minimum	62		
Maximum	129		
WIAT-Oral Expression	93.60 (13.63)	---	---
Minimum	68		
Maximum	112		
WIAT-Written Language	76.87 (14.88)	---	---
Minimum	49		
Maximum	105		
WIAT-Word Reading	95.67 (12.64)	---	---
Minimum	72		
Maximum	117		
WIAT-Reading Comp	90.87 (15.39)	---	---
Minimum	62		
Maximum	122		
Reading SE-Personal Tasks	3.69 (0.97)	4.42 (0.63)	4.28 (0.76)
Minimum	1.80	2.60	1.80
Maximum	5.00	5.00	5.00
Reading SE-Fundamental Skills	3.40 (0.90)	3.64 (0.88)	3.59 (0.89)
Minimum	1.63	1.63	1.63
Maximum	5.00	5.00	5.00
Frequency Reading Activities	2.60 (0.55)	3.36 (1.12)	3.21 (1.07)
Minimum	1.75	1.00	1.00
Maximum	3.75	5.00	5.00

Measures

The data were collected using tests that targeted the participants' oral language, written expression, reading motivation, reading activity, and reading achievement.

Oral Language. To examine the participant's oral language abilities, the Listening Comprehension and Oral Expression sub-tests from the WIAT-II were administered. During the Listening Comprehension sub-test, students were asked to point to one of four pictures that matched the word (e.g., "*Point to the picture of an empty box*") or sentence (e.g., "*Which picture matches the sentence? Grandma is walking upstairs to get her hat*") spoken by the examiner, or tell the word associated *with the picture and description provided by the examiner (e.g., "Look at this picture. Tell me the word that means a small place where clothes are stored"*). During the Oral Expression sub-test, only third graders were asked to repeat sentences after the examiner. All the participants completed the word fluency (e.g., name as many different animals as possible within 60 seconds), visual passage retell (e.g., tell a story to describe the pictures), and giving directions (e.g., explain how to make a peanut butter and jelly sandwich) tasks. Internal consistency reliability estimates for these sub-tests are high for age 8-11: Listening Comprehension (.78 < □ < .82) and Oral Expression (.83 < □ < .89).

Written Expression. To examine the participants' written language performance, the Written Expression subtest from the WIAT-II was administered. The students responded to the prompt targeting word fluency (i.e., write things that are round within 60 seconds), sentence combination (e.g., combine the two sentences "*Mark has a sister named Ann*" and "*Ann is six years old*" without altering the meaning), and paragraph completion (e.g., "*My favorite game is…"*). The internal consistency reliability estimates for the Written Language sub-test was .81 < □ < .87 for the sample ages.

Reading Self-efficacy. The Reading Self-Efficacy Scale (RSES) was adapted from the instrument used in Shell, Colvin, and Bruning's (1995) study that originally included five items in the reading tasks sub-scale and four items in the reading skills sub-scale. In the present study, more items were added to each of the two sub-scales so as to examine students' perceived competence across a larger set of reading tasks and skills typically experienced by third to fifth graders.

Eight tasks were provided in the reading tasks sub-scale: (a) "*read a letter from a friend," (b) "read a chapter from one of your textbooks," (c) "read the daily newspaper*," (d) "*read a book or story from the library," (e) "read a magazine article," (f) "read web pages, blogs, etc.," (g) "read poems," and (h) "read instructions for putting together a model (like a model car or dollhouse).*" Eleven skills were provided in the reading skill sub-scale: (a) *"know how to say all the words on a page in one of your school books," (b) "know the meaning of all the words on a page in one of your school books," (c) "know the meaning of small parts of words like prefixes (for example: un-, dis-) and suffixes (for example: -ly, -ment)," (d) "know how to say all the parts of a word," (e) "understand the plot of a story," (f) "understand the main idea of an article," (g) "read a page sounding like your teacher," (h) "know how stories should be organized," (i) "know how informational papers should be organized," (j) "know how argument or opinion essays should be organized," and (k) "know what to do to fix it when you don't understand what you are reading."* The students were asked to rate how sure they thought they could perform the task or demonstrate the skill on a 5-point Likert-type scale *(1 = I'm sure I cannot, 2 = I'm pretty sure I cannot, 3 = Maybe I can, 4 = I'm pretty sure I can, and 5 = I'm sure I can).* In the present study, internal consistency reliability estimates (Cronbach's □) of the reading tasks sub-scale and reading skills sub-scale were .79 and .87, respectively. Each item on the two sub-scales was read aloud to the participants during administration.

Reading Frequency. Students were asked to rate how frequently they performed each task listed on the self-efficacy for reading tasks sub-scale on a 5-point scale (1 = Never, 2 = Seldom, 3 = Often, 4 = Very Often, and 5 = Always) to examine their reading volume for different reading tasks for the Reading Activity Scale (RAS). Internal consistency of this scale in this study was .85. Each item was read aloud to the participants during administration.

Reading Achievement. The Word Reading and Reading Comprehension sub-tests of WIAT-II were administered to assess the participants' reading performance. During the Word Reading sub-test, the students were asked to read a word list beginning at the grade-appropriate start point without being timed. During the Reading Comprehension sub-test, the participants read sentences and passages and were asked different types of questions regarding the content, such as to identify the main idea, to recall details, to define vocabulary, and to make inferences. The internal consistency reliability estimates of the two sub tests were as follows for the samples ages: Word Reading (.97 < □ < .98) and Reading Comprehension (.94 < □ < .96).

Study Design and Procedures

The present study is a correlational research study. The participants with ADHD were given the assessments that examined their oral language, reading motivation, reading activity, and reading achievement during the spring semester. The student instrument validation sample completed only the reading motivation and activity scales. The assessments were administered in two sessions: during the first session the oral and written expression sub-tests were administered and during the second session the reading achievement sub-tests, RSES, and RAS were administered. Each session lasted about 40 minutes. All the tasks were administrated individually by the first author in a quiet room either at a school or the community location preferred by the parents.

Results

Instrument Analysis

Means and standard deviations for all the items on the oral language sub-tests, reading achievement sub-tests, RSES, and RAS are reported in Table 1. Factor analysis was used to explore the loading of each item on the apriori factors for the RSES (tasks and skills) and RAS. Items were expected to exhibit factor structure loading of .50 or greater.

A principal components analysis extraction with varimax rotation using a forced three-factor solution was conducted for responses on the RSES and RAS from all of the students in this study (the validation sample plus the ADHD sample). Low communalities (below .4) were found for items 2, 3, and 4 on the RSES-Tasks sub-scale, items 1, 6, and 11 on the RSES-Skills sub-scale, and items 2, 4, 6, and 7 on the RAS. After removing these items, the remaining items were re-analyzed and the three forced factors explained 62.6% of the total variance and the rotated factor loadings aligned well with all loadings above .5 on the three factors. For the RSES-Tasks sub-scale, item 1 "*read a letter from a friend," 5 "read a magazine article," 6 "read web pages, blogs, etc.," 7 "read poems,"* and *8 "read instructions for putting together* a *model*," loaded on the factor labeled *Self-Efficacy for Personally Relevant Reading Tasks* (Cronbach's □ = .79). For the RSES-Skills sub-scale, item 2 "*know the meaning of all the words on a page in one of your school books," 3 "know the meaning of small parts of words like prefixes and suffixes," 4 "know how to say all the parts in a word," 5 "understand the plot of a story," 7 "read a page sounding like your teacher," 8 "know how stories should be organized," 9 "know how informational papers should be organized," and 10 "know how argument or opinion essays should be organized,"* loaded on the factor labeled *Self-Efficacy for Fundamental Reading Skills* (Cronbach's □ = .87). For the RAS, item 1 "*How often do you read a letter from a friend," 3 "How*

often do you read the daily newspaper," 5 "How often do you read a magazine article," and 8 "How often do you read instructions for putting together a model,"

loaded on the factor labeled Frequency of Personally Relevant Reading Activities (Cronbach's □ = .85).

Comparisons for Self-Efficacy Beliefs and Reading Frequency

A series of independent *t*-tests was conducted to compare the children with ADHD to their typically developing peers on Self-Efficacy for Personally Relevant Reading Tasks, Self-Efficacy for Fundamental Reading Skills, and Frequency of Personally Relevant Reading Activities (see Table 2). The results showed that children with ADHD obtained significantly lower scores than their typically developing peers on Self-Efficacy for Personally Relevant Reading Tasks (t = -3.566, p = .001) and Frequency of Personally Relevant Reading Activities (t = -2.544, p = .013). However, the two groups rated themselves similarly on Self-Efficacy for Fundamental Reading Skills (t = -.943, p = .349).

Table 2. Comparison of reading self-efficacy beliefs and reading activity of students with ADHD and typically developing peers.

	ADHD	TD	t	*p*
Reading SE-Personal Tasks	3.69 (.97)	4.41 (.63)	-3.566***	.001
Reading SE-Fundamental Skills	3.40 (.90)	3.64 (.88)	-.943	.349
Frequency Reading Activities	2.60 (.55)	3.36 (1.12)	-2.544*	.013

Correlation and Regression Analysis

Correlation analysis (using all available data) then was conducted to determine whether composites needed to be created prior to linear regression analysis. See Table 3 for the zero-order correlation matrix for the measures for the ADHD group. Noting that reading comprehension and word reading were highly correlated (r = .80), a composite variable for reading achievement (READ) was created by averaging scores on the two measures. Listening comprehension and oral expression were also highly correlated (r = .57), so a composite variable for oral language (ORAL) was created by averaging scores on the two measures. The results showed that reading achievement was negatively correlated with age (*r* = -.67) and Self-Efficacy for Fundamental Reading Skills (*r* = -.54) but positively correlated with oral language abilities (*r* = .79). Age was positively correlated with Self-Efficacy for Fundamental Reading Skills (*r* = .54) and was negatively correlated with oral language (*r* = -.64). Self-Efficacy for Personally Relevant Reading Activities was positively correlated with Self-Efficacy for Fundamental Reading Skills (*r* = .57), but not Frequency of Personally Relevant Reading Activities. Self-Efficacy for Fundamental Reading Skills was not correlated with Frequency of Personally Relevant Reading Activities either.

Table 3. Zero-order correlation matrix for measures for ADHD group.

Variable	READ	Age	Gender	Ethnicity	WIAT-ORAL	SETasks	SESkills
READ							
Age	-.67**						
Gender	.08	--					
Ethnicity	.24	--	--				
WIAT-ORAL	.79**	-.64*	.10	.21			
SETasks	.09	.45	.44	.14	-.01		
SESkills	-.54*	.54*	.47	.21	-.42	.57*	
Frequency	.38	-.38	.27	.28	.36	.21	-.07

Note. READ is the reading achievement composite score based on WIAT- Word Reading and WIAT-Reading Comprehension scores; WIAT-ORAL is the oral language composite score based on WIAT-Listening Comprehension and WIAT-Oral Expression scores; Zero-order correlation between READ, chronological age, WIAT-ORAL, task-oriented reading self-efficacy, skill-oriented reading self-efficacy, and reading activity was reported using the Pearson correlation coefficient, *r*; The correlation between gender and ethnicity with READ, WIAT-ORAL, task-oriented reading self-efficacy, skill-oriented reading self-efficacy, and reading activity, respectively, was reported using the eta index for measures of association.
* $p < .05$, ** $p < .01$

To examine whether reading motivation, reading activity, oral language, and other possible factors may contribute to reading achievement in students with ADHD, a two-step regression analysis was conducted (see Table 4) in which the reading composite was entered as the dependent variable, and age, gender, ethnicity (coded as 0 for white and 1 for non-white), and oral language were entered (as a block) first as background variables. All assumptions for running regression analysis were met, including linear relationships between the dependent and independent variables based on scatter plots, no significant outliers, independence of observations based on Durbin-Watson statistic, homoscedasticity (i.e., equal variance of residuals), and normal distribution of residuals. The result from the regression analysis showed that the student background variables accounted for a significant proportion of variance in the reading composite score ($R^2 = .684$; $F = 5.411$, $p = .014$). Self-Efficacy for Personally Relevant Reading Tasks, Self-Efficacy for Fundamental Reading Skills, and Frequency of Personally Relevant Reading Activities were then entered as a second block. The results showed that self-efficacy beliefs made a unique contribution to the regression model, with all the variables entered accounting for an additional 20% of variance in the reading composite score ($R^2 = .883$; $F = 7.577$, $p = .008$). In particular, Self-Efficacy for Personally Relevant Reading Tasks was found to be a strong positive predictor of reading achievement (= .640, $p = .016$), and Self-Efficacy for Fundamental Reading Skills was a strong negative predictor of reading achievement (= -.562, $p = .031$). Age contributed to predicting reading achievement in a negative

manner (= -.550, p = .049). Oral language, frequency of reading activity, and gender did not make a significant contribution in predicting reading achievement.

Table 4. Predicting reading achievement from reading self-efficacy beliefs and activity.

Predictor	Model 1	Model 2
	β	β
Chronological Age	-.301	-.550*
Gender	-.028	-.112
Ethnicity	-.104	.036
WIAT-ORAL	.580*	.271
SE-Personal Tasks		.640*
SE-Fundamental Skills		-.562*
Frequency Reading Activity		-.123
R^2	.684	.883
Adj. R^2	.558	.766
Δ R^2	.684	.199
F	5.411*	7.557**

* $p < .05$, ** $p < .01$

To examine whether reading motivation and other background variables might contribute to predicting reading activity in students with ADHD, another two-step regression analysis was conducted (see Table 5). Reading activity was entered as the dependent variable, and age, gender, ethnicity, and oral language were entered (as a block) first as background variables. The results showed that student background variables didn't explain a significant portion of the variance in reading activity (R^2 = .314; F = 1.146, p = .390). Self-Efficacy for Personally Relevant Reading Tasks and Self-Efficacy for Fundamental Reading Skills were then entered as a second block. The results showed that self-efficacy beliefs didn't make a significant unique contribution to

reading frequency, accounting for only an additional 8% of variance in reading activity (R^2 = .397; *F* = .876, *p* = .551).

Table 5. Predicting reading activity from reading self-efficacy beliefs.

Predictor	Model 1	Model 2
	β	β
Chronological Age	-.383	-.618
Gender	-.329	-.229
Ethnicity	-.151	-.139
WIAT-ORAL	.112	.076
SE-Personal Tasks		.407
SE-Fundamental Skills		-.077
R^2	.314	.397
Adj. R^2	.040	-.056
Δ R^2	.314	.082
F	1.146	.876

* $p < .05$, ** $p < .01$

A post-hoc analysis was conducted to examine whether reading achievement predicted reading self-efficacy beliefs in the children with ADHD (see Tables 6 and 7). Self-Efficacy for Personally Relevant Reading Tasks was entered as the dependent variable, and age, gender, ethnicity, and oral language were entered (as a block) first. The background variables didn't account for a significant portion of variance in task self-efficacy (R^2 = .430; *F* = 1.883, *p* = .190). The reading composite score was then entered into the regression model, but it did not make a significant independent contribution to task self-efficacy (□ = .643, *p* = .136). Age was found to positively predict Self-Efficacy for Personally Relevant Reading Tasks (□ = .843, *p* = .027), suggesting that 4th graders showed higher task self-efficacy than 3rd graders with ADHD. The same analysis with Self-Efficacy for Fundamental Reading Skills as the dependent variable showed that student background variables didn't account for a

significant portion of variance (R^2 = .513; F = 2.633, p = .098) and that reading achievement was not a strong predictor of skill self-efficacy (= -.402, p = .332).

Table 6. Predicting self-efficacy for personal reading tasks from reading achievement.

Predictor	**Model 1**	**Model 2**
	β	**β**
Chronological Age	.650	.843*
Gender	-.333	-.315
Ethnicity	.031	.097
WIAT-ORAL	.449	.076
Reading Achievement		.643
R^2	.430	.560
Adj. R^2	.201	.316
ΔR^2	.430	.131
F	1.883	2.295

❿ $p < .05$, ** $p < .01$

❿

Table 7. Predicting self-efficacy for fundamental reading skills from reading achievement.

Predictor	**Model 1**	**Model 2**
	β	**β**
Chronological Age	.379	.258
Gender	-.457	-.468
Ethnicity	.317	.275
WIAT-ORAL	-.064	.169
Reading Achievement		-.402
R^2	.513	.564
Adj. R^2	.318	.322

ΔR^2	.513	.051
F	2.633	2.328

Discussion

This study aimed to investigate the relationships between reading motivation (in particular, reading self-efficacy), reading activity, oral language, and reading achievement for children with ADHD. The potential role of age and gender as moderators was also taken into consideration. The major findings of the study are: 1) children with ADHD showed lower Self-Efficacy for Personally Relevant Reading Tasks and engaged in less frequent reading of personally relevant materials compared to their typically developing peers; 2) reading self-efficacy and age were found to be strong predictors of reading achievement for children with ADHD; and 3) fourth graders with ADHD demonstrated higher Self-Efficacy for Personally Relevant Reading Tasks than third graders with ADHD.

Children with ADHD were found to display lower Self-Efficacy for Personally Relevant Reading Tasks compared to their peers without disabilities. This result was different from Lee and Zentall's (2012) study in which students with ADHD showed equivalent reading self-efficacy with their typically developing peers. One possible explanation is that potential co-morbid conditions such as learning disabilities, reading disabilities, or language impairment that are frequently associated with motivational deficits were not excluded in our study. As a matter of fact, the screening results showed that most of this group of children with ADHD experienced significant difficulties with writing. Therefore, it's possible that lower reading self-efficacy in our sample might actually be associated with potential co-morbid language and/or literacy learning problems instead of the negative impact of ADHD symptoms. On the other hand, children with ADHD didn't differ from their typically developing peers in Self-

Efficacy for Fundamental Reading Skills. Although no prior study has investigated skill-oriented reading self-efficacy, the current finding is expected given that children with ADHD might tend to overestimate their competence in mastering reading skills due to their meta-cognitive deficits (Alvarado, Puente, Jiménez, & Arrebillaga, 2011). In addition, children with ADHD were also found to display lower Frequency of Personally Relevant Reading Activities than their peers without disabilities. This result is different from Lee and Zentall's (2012) study, in which students with ADHD were found to engage in equivalent amounts and frequencies of personal reading activities. One possible explanation might be that the RAS used in our study targeted some different personal reading activities than the RAI used in Lee and Zentall's (2012) study (e.g., "*how often do you read instructions for putting together a model"* from RAS vs. "*how often do you read fiction books"* from RAI). Another possible explanation might be due to the fact that RD as a frequently occurring condition with ADHD was excluded in Lee and Zentall's (2012) study.

Reading self-efficacy was found to be a strong predictor of reading achievement for children with ADHD. According to the results from the self-efficacy instrument analysis, five items loaded on one factor labeled Self-Efficacy for Personally Relevant Reading Tasks from the RSES-Tasks subscale, and eight items loaded on Self-Efficacy for Fundamental Reading Skills from the RSES-Skills subscale. The results from regression analysis showed that Self-efficacy for Personally Relevant Reading Tasks contributed to predicting these children's reading achievement in a positive manner. For every standard deviation increase in task self-efficacy, reading achievement increased by .640 standard deviations when all the other predictors were controlled. This result confirms previous findings not only supporting reading self-efficacy as a strong predictor of reading achievement (Proctor, et al., 2014; Shell, Murphy, & Bruning, 1989; Shell, Colvin, & Bruning, 1995), but also the fact that personally meaningful

reading materials contribute to better reading achievement (Fink, 2007; Guthrie & Wigfield, 2000; Quirk & Schwanenflugel, 2004). In other words, children with ADHD who held greater perceived competence for reading tasks that were relevant to their lives (e.g., read a letter, daily newspaper, magazine) tended to exhibit better reading performance.

Self-efficacy for Fundamental Reading Skills contributed to predicting reading achievement in a negative manner. For every standard deviation increase in skill self-efficacy, reading achievement decreased by .562 standard deviations when controlling for all the other predictors. It is possible that children with ADHD who experience deficits in reading achievement may tend to have inflated perceived competence for reading skills. This possibility is supported by our finding that children with ADHD showed similar ratings for Self-Efficacy for Fundamental Reading Skills, but obtained significantly lower scores on Self-Efficacy for Personally Relevant Activities and Frequency of Personally Relevant Reading Activities compared to typically developing students, suggesting inflated perceived competence in fundamental reading skills. Nelson and Manset-Williamson (2006) also examined reading self-efficacy in students with reading disabilities who were entering fourth to eighth grade and found that these students' estimated competence in reading was much higher than their actual reading comprehension performance. Although no studies have investigated reading self-efficacy specifically for reading skills in children with ADHD, the research in the domain of writing has reported inflated competency beliefs for writing skills in children with learning disabilities (e.g., Graham, MacArthur, Schwartz, & Page-Voth, 1992). More broadly, Kruger and Dunning (1999) found that students who were less skilled in a domain not only performed more poorly but also tended to exhibit inflated competency beliefs for skills within that domain. They also found that the students exhibited significant deficits in meta-cognition, which (as argued by the researchers)

led to inflated perceived competence for these low achievers. Their findings are consistent with Klassen's (2002) argument that unrealistically high self-efficacy beliefs may lead to poor academic performance due to the fact that students who hold such unrealistic beliefs tend to put forward less effort and discount or fail to employ effective strategies and self-regulation processes. Our sample of 3rd and 4th graders with ADHD may be within the developmental period when there is great press for using reading as a tool to accomplish varied reading tasks and expand one's understanding of the world. Therefore, the students may hold task-related self-efficacy beliefs that are aligned well with the reading task demands they face both in and out of school. On the other hand, the typical meta-cognitive deficits in children with ADHD (Alvarado, Puente, Jiménez, & Arrebillaga, 2011; Westby & Cutler, 1994) may hinder these children from realistically estimating how well they could execute different reading skills across tasks, leading to inflated self-efficacy for fundamental reading skills.

Age was found to contribute to variance in reading achievement negatively. In other words, older children with ADHD were found to demonstrate decreased reading performance compared to relatively younger children in this study. Results from some prior studies showed that students exhibited higher levels of reading proficiency as they aged due to acquisition of text structure knowledge (Englert & Hiebert, 1984) and improved sensitivity to important elements in texts (Brown & Smiley, 1977). For children with ADHD, however, decrements in reading achievement over time might reflect the long-term negative impact of language and motivation deficits on their reading outcomes. Other factors such as lack of strategic reading skills, limited print exposure, and lack of appropriate reading instruction also might lead to a widening reading achievement gap over the course of schooling. This is commonly referred to as the Matthew effect in reading (Stanovich, 1986; Walberg & Tsai, 1983): students who have initially better reading ability obtain positive reading gains whereas those who are

disadvantaged early in reading lose ground over time in comparison to their peers (Pfost, Dörfler, & Artelt, 2012).

Age was found to be a positive predictor of Self-efficacy for Personally Relevant Reading Tasks, suggesting that 4th graders displayed higher self-perceptions for reading than 3rd graders in this sample of children with ADHD. This result was consistent with Lee and Zentall's (2012) study reporting lower reading self-efficacy for 5th graders than 3rd and 4th graders, with the 4th graders displaying the highest self-efficacy. Given the developmental nature of reading, the shift from emphasizing learning to read to reading to learn typically happens around 3rd or 4th grade. When entering 4th grade, students have already developed knowledge about alphabetic principle, word decoding, fluent reading, and comprehending texts with familiar vocabulary and language that are also well connected to their experience (Chall & Jacobs, 2003). Therefore, 4th graders tend to hold higher reading self-efficacy compared to 3rd graders in our study. Another possible explanation as suggested by Lee and Zentall's (2012) was a spurt in reading motivation in the fourth grade. As a matter of fact, 4th grade typically developing students also have been reported to demonstrate the highest reading self-efficacy (Becker, McElvany, & Kortenbruck, 2010; Wigfield & Guthrie, 1997).

Oral language did not contribute to reading achievement in this study. Previous findings have emphasized the critical role of oral language in reading development, especially in the area of reading comprehension (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003). Catts et al. (1999) found that oral language and phonological processing made unique significant contributions to reading achievement in second graders. They also found that poor readers tended to experience expressive and/or receptive language difficulties four to five times greater than good readers when they were in kindergarten. In addition, the body of oral language intervention literature

suggests that instruction in different aspects of oral language contributes to improved literacy skills (e.g., Bowyer-Crane, et al., 2008; Hatcher et al., 2006). For this study, however, oral language didn't contribute to predicting reading achievement. One possible explanation might be related to the instruments used to assess reading achievement and/or oral language. Cutting and Scarborough (2006) suggested that different measures of reading achievement might pose differentiated demands on vocabulary and sentence processing abilities. In our study, oral language was measured by the Listening Comprehension and Oral Expression sub-tests from WIAT-II and reading achievement (a composite score) was measured by the Word Reading and Reading Comprehension sub-tests on the WIAT-II. It is possible that the specific instruments used for this study led to the non-significant contribution of oral language to reading achievement for children with ADHD. Another possible explanation for our non-significant finding is our limited sample size, which does constrain the generalizability of the results from this study to the larger population of children with ADHD.

Four items from the RAS loaded on one factor, labeled Frequency of Personally Relevant Reading Activities. The results from regression analysis showed that this factor did not predict variance in reading achievement. This finding is contrary to the results reported by other researchers (e.g., Guthrie, et al., 1999), where reading activity was a strong predictor of reading performance. It is assumed that frequent reading across different types of texts contributes to overall reading achievement. However, in the case of children with ADHD, even frequent reading activities might not be able to adequately compensate for the negative impact of attention and language deficits on their reading performance. This speaks to the influence of the Matthew effect on poor readers' achievement gains—frequent unsuccessful or error ridden reading attempts may be unlikely to have much of an influence on reading achievement. Of course,

limited sample size remains another possible explanation for this null finding. On the other hand, self-efficacy beliefs were not significantly correlated with reading activity. Neither Self-efficacy for Personally Relevant Reading Activities or Self-Efficacy for Fundamental Reading Skills was found to be a strong predictor of reading activity for children with ADHD. This finding is inconsistent with prior research studies that have found reading self-efficacy to be correlated with reading activity (e.g., Wigfield & Guthrie, 1997). Our limited sample size might be a possible explanation of this non-significant correlation finding between reading self-efficacy beliefs and reading activity. However, another possible explanation rests with how prior research has defined motivational constructs used to predict reading activity. For example, Wigfield and Guthrie (1997) created an intrinsic motivation composite that included reading self-efficacy, curiosity, and involvement based on an exploratory factor analysis and found that the intrinsic motivation composite strongly predicted the amount and breadth of reading. However, in Guthrie et al.'s (1999) study, reading self-efficacy was considered a theoretically independent construct from the intrinsic motivation composite used in Wigfield and Guthrie's (1997) investigation. Later studies (e.g., Cox & Guthrie, 2001; Wang & Guthrie, 2004) reported consistent findings of intrinsic motivation as a strong predictor of reading activity, but self-efficacy for reading was not included as part of the motivational construct. Therefore, future studies need to examine directly to what extent the correlation and/or predictive relationships might exist between reading self-efficacy beliefs and reading activity. It may be that reading self-efficacy beliefs alone are not adequate to explain variance in reading activity.

Gender was not correlated with Self-Efficacy for Personally Relevant Reading Tasks, Self-Efficacy for Fundamental Reading Skills, or Frequency of Personally Relevant Reading Activities, according to the correlation analysis. The regression analysis showed that gender did not contribute unique variance in reading achievement.

This is contrary to previous findings in the typically developing population suggesting that girls outperform boys on reading comprehension and word reading tasks (Logan & Johnston, 2009; Mullis, Martin, Gonzalez, & Kennedy, 2003; Mullis, Martin, Kennedy, & Foy, 2007). For instance, Logan and Johnston (2009) found significant, though relatively small, gender differences favoring girls in reading abilities (as measured through word reading, comprehension, and vocabulary). They argued that this difference might be due to the fact that girls hold more positive attitudes toward reading than boys. The lack of a gender effect on reading performance in this study is likely due to the limited sample size.

Limitations and Future Directions

As with all studies, there are limitations in this study. First and foremost, our limited sample size reduces the potential generalizability of the results to a larger group of children with ADHD. As explained above, failure to detect relationships between reading achievement and gender, oral language, and reading activity might partly be due to the limited number of students who participated in our study. Therefore, studies with far more children with ADHD will be needed to further explore these issues in the future. Additionally, exploration of group differences in self-efficacy for reading and reading activity between children with ADHD and their typically developing peers should be further explored by excluding potential co-morbid conditions such as LD, RD, or LI that could possibly pose negative impact on the students' motivation to read and engagement in frequent and various reading activities.

This study only investigated self-efficacy for reading as a critical construct of reading motivation. Wigfield and Guthrie (1997) proposed many sub-components of reading motivation such as self-efficacy for reading, intrinsic motivation (e.g., curiosity, preference for challenge), extrinsic motivation (e.g., desire for reading recognition, obtaining good grades), and social reasons for reading (these latter three

could be construed as achievement goal orientations). Future studies should consider examining the role of each motivational construct on the reading performance of children with ADHD so as to identify potent motivational precursors to reading achievement in these special populations. For example, what is the relationship between intrinsic versus extrinsic reading motivation and reading achievement? Do children with ADHD exhibit gender and/or age differences in intrinsic, extrinsic, or social aspects of their reading motivation?

Lastly, even with a small sample, the results from this correlational study suggested that reading self-efficacy and age are strong predictors of reading achievement for children with ADHD. Future studies may use data from this study for designing appropriate early interventions to improve these children's reading self-efficacy beliefs, which ultimately contribute to improved reading achievement. As suggested by Walker (2010), instructional activities that incorporate (a) teaching strategy use (e.g., different reading and coping strategies), (b) giving students choice (e.g., selecting books and topics of personal interest), and (c) providing self-evaluation opportunities (e.g., student tracking reading progress using teacher-developed checklists) all help cultivate reading self-efficacy beliefs and positive reading outcomes. Margolis and McCabe (2006) also suggested adopting peer modeling of targeted strategies and reinforcing student efforts to emulate these strategies.

International scholars may consider further exploring this area of inquiry with students with ADHD in their own countries by replicating and adapting the current study, as suggested above, via correlational and/or experimental research studies, which will ultimately contribute to enhanced understanding of relationships between reading motivation and achievement across cultures.

Implications for Practice

The findings from the study are informative for classroom practice in several ways. First, Self-efficacy for Personally Relevant Reading Tasks is a strong positive predictor of reading achievement for children with ADHD, suggesting that teachers should engage students in reading activities that have authentic purposes and pertain to their personal lives. Second, Self-efficacy for Fundamental Reading Skills was found to be a strong negative predictor of reading achievement, which indicates that fundamental reading skills such as decoding accuracy, reading fluency, text structure knowledge, and strategic meaning-making should be taught to students with ADHD to (a) improve these skills to promote reading success which in turn can enhance self-efficacy beliefs and (b) help students with challenges in these fundamental skills better calibrate their competency beliefs with their actual performance. Considering that many students with ADHD experience meta-cognitive weaknesses, teachers may consider incorporating self-regulation skills into the systematic teaching of reading strategies (Mason, Meadan-Kaplansky, Hedin, & Taft, 2013; Pressley, 1986). Lastly, it is critical to provide appropriate early interventions for children with ADHD to mitigate the Matthew effect. We encourage the use of evidence-based practices that enable mastery of fundamental reading skills to be adopted in classrooms to help reduce the achievement gap between these struggling learners and their typically developing peers. It's worth noting that the findings from the study are also relevant for international audiences given that students with ADHD in many countries (ADHD is a worldwide phenomenon affecting students in many educational systems; Polanczyk, Silva de Lima, Horta, Biederman, & Rohde, 2007) would likely benefit from engaging in personally relevant reading activities, learning fundamental reading skills, and receiving early intervention targeting effective reading strategies together with self-regulation skills.

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