

## ABSTRACT

Title of Dissertation: EIGHTH-GRADERS' READING COMPREHENSION OF INFORMATIONAL TEXTS AND LITERARY TEXTS IN THE 2009 NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

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National assessment results tell us that a large majority of American middle school students are not proficient readers. These assessment results indicate a dire situation. However, historically literacy research targeting this population is understudied. While we still do not have a complete picture of the situation, we do understand some aspects of it. The current literature has identified student and school characteristics that may explain why American middle school students are having literacy problems.

In this study I analyzed the 2009 National Assessment of Educational Progress (NAEP) reading assessment with a particular focus on eighth graders, looking into both student and school characteristics. The goal of this study was to examine how these student and school characteristics were associated with eighth-grader's reading comprehension of literary and informational texts. In particular, I explored student and

school characteristics that contributed to the White-Black achievement gap and the White-Hispanic achievement gap. The student participants for the 2009 NAEP reading assessment contained a nationally representative sample of 160,900 eighth graders from 7030 schools. Responses to the 2009 NAEP student questionnaire and school questionnaire were analyzed to address my research questions. I used the hierarchical linear modeling approach (HLM) to model the nested data structure (students nested within schools) in NAEP assessment. At the first level, I examined the associations between student characteristics and reading comprehension of informational and literary texts. At the second level, I investigated the associations between school characteristics and reading comprehension of informational and literary texts.

One important finding in this study was that after controlling student characteristics (e.g., gender, eligibility for the National School Lunch Program, home literacy resources, school reading amount, reading motivation), the White-Black achievement gap in literary and informational texts disappeared in the within-school model. In the present study the low family income and lack of literacy resources at home contributed to the White-Black achievement gap. This study showed that eighth-grade Black students were especially disadvantaged in terms of family income. In addition to family income, the present study indicated that Black students had significantly lower access to home literacy resources, such as newspapers, magazines, encyclopedias, and books, compared with White peers. Taken together, the low family income and lack of literacy resources at home contributed to the White-Black achievement gap.

In addition to these student characteristics, this study also demonstrated that school type was significantly associated with the White-Black achievement gap. More

specifically, in public schools Black students scored significantly lower in both informational and literary texts, compared to White students. In private schools, however, no significant difference was observed between White and Black students in literary or informational texts. In other words, Black students performed equally well as White students in private school settings.

Another important finding was the performance of Hispanic students. More specifically, Hispanic students scored significantly higher than White students in both informational and literary texts, after controlling all the student variables in the model. The results of the present study indicated that a disproportionately high percentage of Hispanic students were disadvantaged in both family income and parental education, which contributed to the White-Hispanic achievement gap. This finding is consistent with the White-Hispanic achievement gap literature that demonstrates that Hispanic students are more likely to come from low-income families, compared with White students.

In addition to socioeconomic status, this study also pinpointed other key student characteristics contributing to the White-Hispanic achievement gap, including home literacy resources, reading amount in school, and reading motivation. The results of the present study indicated that Hispanic students had significantly lower access to home literacy resources, were engaged in significantly less reading in school, and displayed significantly lower reading motivation, compared with their White peers. Thus, a plausible explanation for the White-Hispanic achievement gap among adolescent readers can be reasonably attributed to the differences between Hispanic and White students in these key variables.

Above and beyond student characteristics, this study also indicated that school type was significantly associated with the White-Hispanic achievement gap. More specifically, in private schools Hispanic students outperformed White students in both informational and literary texts. However, in public schools Hispanic students scored significantly lower in both informational and literary texts compared to White students.

Taken together, these findings indicate the complexity of reading development among Black students and Hispanic students. Both student characteristics and school characteristics contributed to the White-Black achievement gap and the White-Hispanic achievement gap.

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OF INFORMATIONAL TEXTS AND LITERARY  
TEXTS IN THE 2009 NATIONAL ASSESSMENT OF  
EDUCATIONAL PROGRESS

by

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## **DEDICATION**

I dedicate this dissertation to my Lord and Savior, Jesus Christ, for the mercy and grace that He showers on me every day. Thanks for changing me from a wretched woman who did not know the Almighty God to a blessed woman who has peace, love, and joy in my heart! Thank you for what you did for me on the cross and thank you for granting me the priceless gift of eternal life!

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## CHAPTER ONE: INTRODUCTION

National assessment results tell us that a large majority of American middle-school students are not proficient readers (National Center for Educational Statistics, 2009, 2011a, 2013a, 2015). These assessment results indicate a dire situation. However, historically literacy research targeting this population is understudied (Moje, 2010, 2002; Moore, Bean, Birdyshaw, & Rycik, 1999). While we still do not have a complete picture of the situation, we do understand some aspects of it. The current literature has identified student and school characteristics that might explain why American middle-school students are having literacy problems (Alexander & Fox, 2011; Braun, Jenkins, & Grigg, 2006; Guthrie, Wigfield, & Klauda, 2012).

In this study I analyzed the 2009 National Assessment of Educational Progress (NAEP) reading assessment with a particular focus on eighth graders, looking into both student and school characteristics. The goal of this study was to examine how these student and school characteristics were associated with eighth-grader's reading comprehension of literary and informational texts. In particular, I explored the demographic, motivational, and school factors that contributed to the White-Black achievement gap and the White-Hispanic achievement gap in reading. I begin this chapter with consideration of the adolescent literacy crisis in America, which drives this dissertation. Next, I briefly review the literature on student and school characteristics believed to influence American adolescents' reading performance. Then I present an overview of the study, the data I analyze, and the statistical approach for data analysis. I close this chapter with a discussion of possible contributions of this study to the field, as well as the limitations.

## **1.1. Adolescent Literacy Crisis**

In recent years, the adolescent literacy crisis has drawn more and more national attention (Alexander & Fox, 2011; Biancarosa & Snow, 2006; Heller & Greenleaf, 2007; International Reading Association, 2012; Kamil, Borman, Dole, Salinger, & Torgesen, 2008). National literacy assessment results paint a disappointing portrait of adolescent literacy in the U.S. - large numbers of middle- and high-school students in America show limited ability to critically engage with challenging reading. The 2013 NAEP reading assessment results demonstrated that a high percentage of American eighth graders were not proficient readers. More specifically, 64% of eighth graders read below the proficient level (National Center for Educational Statistics, 2013a), which NAEP defines as follows:

Eighth graders performing at proficient level should be able to provide relevant information and summarize main ideas and themes. They should be able to make and support inferences about a text, connect parts of a text, and analyze text features. Students performing at this level should also be able to fully substantiate judgments about content and presentation of content (National Center for Education Statistics, 2013, p.6).

Furthermore, 22% of American eighth graders read below the basic level, which NAEP defines as the ability to locate information, make simple inferences, and identify main idea. These disturbing statistics have remained largely unchanged over the past ten years, which means one in five American eighth graders perform below grade-level requirements, and about two thirds of American eighth graders struggle to read challenging materials.

### **1.1.1. The Achievement Gap in NAEP**

The White-Black and White-Hispanic achievement gaps are consistently documented in the NAEP assessment results. The 2013 NAEP reading assessment results

indicated that 83% of Black eighth graders and 78% of Hispanic eighth graders were below the proficient level as opposed to 54% of White eighth graders below the proficient level (National Center for Education Statistics, 2013a). To make things worse, 39% of Black eighth graders and 32% of Hispanic eighth graders were below the basic level, whereas only 14% of White eighth graders were below the basic level. That is, at least one third of Black and Hispanic eighth graders struggled with grade level reading materials and about eight out of ten Black and Hispanic eighth graders were not successful when reading challenging reading materials.

Similar disappointing results have also been observed among fourth graders and twelfth graders. For instance, among fourth-graders 65% read below the proficient level and 32% below the basic level (National Center for Education Statistics, 2013a). When these numbers were further broken down to subgroups, we find that 82% of Black fourth-graders and 80% of Hispanic fourth-graders were below the proficient level, whereas 54% of White fourth-graders were below the proficient level. Furthermore, 50% of Black fourth-graders and 47% of Hispanic fourth-graders were below the basic level, as opposed to 21% of White fourth-graders.

Among twelfth graders, an overall 62% read below the proficient level and 25% read below the basic level (National Center for Education Statistics, 2013b). Moreover, about 84% of Black twelfth graders and 77% of Hispanic twelfth graders were below the proficient level, as opposed to 53% of White twelfth-graders. This means that at the end of K-12 education, more than half of the high school seniors struggled with challenging reading materials and this problem was more acute among Black and Hispanic students.



In short, a disproportionately high percentage of Black and Hispanic students do not have strong literacy skills to succeed in school or at work.

### **1.1.2. Adolescent Literacy**

The significance of literacy development during adolescent years is highlighted in the position statement of the International Reading Association (Moore et al., 1999), which emphasizes a developmental perspective of reading literacy. In line with this developmental perspective on literacy, the importance of middle school years in adolescents' reading development is further elaborated in the joint position statement of the International Reading Association and the National Middle School Association (2001). As noted in this joint position statement,

It is during the middle school years that most students refine their reading preferences; become sophisticated readers of informational text; and lay the groundwork for the lifelong reading habits they will use in their personal, professional, and civic lives. During the middle school years, young adolescent students can use reading to help answer profound questions about themselves and the world. With good instruction, ample time, and opportunity to read across a variety of types of texts, young adolescents can become successful readers both in and out of the school setting (p.2).

Sadly, though, literacy research during adolescent years has historically been understudied (Moje, 2010, 2002; Moore et al., 1999; Vacca, 1998). This lack of attention to adolescent literacy is distressing, partly because this neglect stems from, and is perpetuated by the flawed assumption that literacy development ends in third grade. This long-held assumption, that children learn to read from kindergarten through third grade and then they read to learn from fourth grade till twelfth grade (Chall, 1983), has deeply influenced perceptions and practices around reading education. Literacy programs after grade three have been traditionally considered as not so important as those up through grade three.

In recent years, however, the poor performance of American adolescents in national reading assessment has drawn increasing attention from researchers and policy makers (Kamil et al., 2008; National Governors Association Center for Best Practices, 2010). The reading research community has also witnessed steadily growing attention to adolescent readers (Alexander & Fox, 2011; International Reading Association, 2012; Snow & Biancarosa, 2003). As a result, some important initiatives have been developed to address the adolescent literacy crisis, including an updated position statement of International Reading Association on adolescent literacy (IRA, 2012) and several notable policy papers, such as *Reading Next: A Vision for Action and Research in Middle and High School Literacy* (Biancarosa & Snow, 2006). Most importantly, the release of the Common Core State Standards in 2010 highlights the significance of literacy development during adolescent years (National Governors Association Center for Best Practices, 2010). For the first time, rigorous standards have been specified for reading literature and informational texts, respectively, for students in secondary school. The Common Core State Standards view literacy education as the foundation for a broader effort to help all students become well prepared for success in college, career, and civic engagement. To date, the Common Core State Standards, although not without controversy, have been adopted by forty-two states, the District of Columbia, four territories, and the Department of Defense Education Activity (DoDEA). The Common Core State Standards set very high expectations for a literate person as follows:

Students who meet the Standards readily undertake the close, attentive reading that is at the heart of understanding and enjoying complex works of literature. They habitually perform the critical reading necessary to pick carefully through the staggering amount of information available today in print and digitally. They actively seek the wide, deep, and thoughtful engagement with high-quality literary and informational texts that builds knowledge, enlarges experience, and broadens

worldviews. They reflexively demonstrate the cogent reasoning and use of evidence that is essential to both private deliberation and responsible citizenship in a democratic republic (p.3).

As stated above, a literate person in the twenty-first century is not only expected to be a highly skilled reader who uses a repertoire of reading skills flexibly and automatically, but is expected to be a highly motivated and engaged reader as well. These high standards on literacy makes the adolescent literacy crisis more acute in that growing research demonstrates that a large majority of adolescents are demotivated and disengaged from reading activities (Guthrie et al., 2012). Furthermore, noting that “most of the required reading in college and workforce training programs is informational in structure and challenging in content” (National Governors Association Center for Best Practices, 2010, p. 4), the Common Core Standards emphasize adolescents’ ability to handle complex informational texts. This presents particular challenges to students in the U.S. who have been shown to be weak in this genre (Mullis, Martin, Foy, & Drucker, 2012).

The literature on adolescent literacy has identified variables that might contribute to American adolescents’ poor reading performance. These variables include student race/ethnicity (Hemphill & Vanneman, 2011; Vanneman, Hamilton, Baldwin Anderson, & Rahman, 2009), socioeconomic status (Grissmer, Kirby, Berends, & Williamson, 1994; Rand Reading Group, 2002; Snow & Biancarosa, 2003), reading strategies (Alexander, 2005; Alexander, Graham, & Harris, 1998; National Reading Panel, 2000; Pressley & Afflerbach, 1995), reading motivation (Guthrie & Wigfield, 2000), reading amount (Guthrie et al., 2012), and school type (Braun et al., 2006).

Despite the growing body of literature on adolescent literacy, much still needs to be done before we can get an accurate picture of adolescents' literacy development. For instance, it has been well established in the literature that reading amount is a strong predictor of student reading achievement (Anderson, Wilson, & Fielding, 1988; Guthrie et al., 2012; Wigfield & Guthrie, 1997), but we still do not have much information about the amount of school reading that eighth graders engage in on a daily basis. Even less is known about secondary school classroom practices in reading, in particular, what adolescent readers are asked to do on a daily basis in school (Moje, 2010). Hence, there is a need for more research to investigate adolescent literacy learning in school, which will help us better understand adolescent literacy development. With the intervention from policy makers, this may in the long term reverse the declining trend of academic performance among adolescents and will make a difference in the teaching and learning of reading literacy at secondary schools.

In this study, I investigated student and school characteristics that were associated with eighth-graders' reading comprehension of informational and literary texts, using the 2009 NAEP reading assessment data. In particular, I focused on the factors contributing to the White-Black and White-Hispanic achievement gaps. In the following section, I briefly review the literature that informs this research.

## **1.2. Student and School Characteristics Influencing Adolescent Literacy**

Current research on adolescent literacy has identified student and school characteristics that are associated with American adolescents' reading performance, such as student race/ethnicity (Hemphill & Vanneman, 2011; Vanneman et al., 2009), socioeconomic status (Grissmer et al., 1994; Rand Reading Group, 2002; Snow &

Biancarosa, 2003), reading strategies (Alexander, 2005; Alexander & Murphy, 1998; National Reading Panel, 2000; Pressley & Afflerbach, 1995), reading motivation (Guthrie & Wigfield, 2000), reading amount (Guthrie et al., 2012), and school type (Braun et al., 2006).

Among these characteristics, reading strategies are seen as the cognitive component of reading comprehension, reading motivation as the affective component, school-level characteristics as the contextual component. In the following section, I first briefly review the literature on student characteristics related to adolescent reading development, followed by a brief review of literature on school characteristics related to adolescent reading development.

### **1.2.1. Student Characteristics**

Current research on adolescent literacy has identified student characteristics that are associated with American adolescents' reading development, such as student race/ethnicity (Hemphill & Vanneman, 2011; Vanneman et al., 2009), socioeconomic status (Grissmer et al., 1994; Rand Reading Group, 2002; Snow & Biancarosa, 2003), reading strategies (Alexander, 2005; Alexander & Murphy, 1998; National Reading Panel, 2000; Pressley & Afflerbach, 1995), reading motivation (Guthrie & Wigfield, 2000), and reading amount (Guthrie et al., 2012).

**1.2.1.1. Reading strategies.** The abundant research in cognitive psychology in the past forty years has produced a solid knowledge base regarding the important role of reading strategies in reading comprehension (Alexander, 2005; Alexander et al., 1998; Alexander & Murphy, 1998; Palincsar & Brown, 1984; Pressley & Afflerbach, 1995). Reading strategies, which refer to “deliberate, goal-directed attempts to control and modify

the reader's efforts to decode text, understand words, and construct meanings of text" (Afflerbach, Pearson, & Paris, 2008, p. 368), are positively associated with student reading comprehension (National Reading Panel, 2000). Explicit instruction on reading strategies enhances reading comprehension of literary and informational texts (Pressley, 2000). However, a disturbing finding from the Rand Reading Report (2002) shows that teachers in secondary school are not well prepared to teach comprehension strategies. This finding, coupled with the fact that students encounter increasingly challenging texts in secondary school, might explain the poor performance of American adolescents in national and international assessments.

**1.2.1.2. Reading motivation.** In recent years, motivation researchers find that student reading motivation plays an important role in reading comprehension. Guthrie and Wigfield (2000) define reading motivation as "individual's personal goals, values, and beliefs with regard to the topics, processes, and outcomes of reading" (p. 405). Guthrie, Wigfield, and their associates find that reading motivation is not only strongly associated with reading comprehension, but predicts comprehension growth as well (Guthrie et al., 2007; Wang & Guthrie, 2004).

A growing body of literature indicates that a key dilemma faced by many teachers in secondary school is low student motivation and a lack of engagement in academic activities (Balfanz, Herzog, & Mac Iver, 2007; Finn & Zimmer, 2012). Extensive research indicates that between elementary and secondary school, student academic motivation declines in multiple subject areas, including math, science, social studies, and reading (Wigfield et al., 2015). In particular, valuing academic learning – an important component of student academic motivation – appears to decline in each of these subject

areas from early elementary years up through the end of secondary school (Fredricks & Eccles, 2002; Kelley & Decker, 2009; Watt, 2004). The same declining trend is also observed in intrinsic motivation, another important component in student academic motivation (Gottfried, Fleming, & Gottfried, 2001; Lepper, Corpus, & Iyengar, 2005; Otis, Grouzet, & Pelletier, 2005).

In contrast, adolescents' perceived difficulty of reading tasks is observed to increase from junior high to senior high school (Watt, 2004). Taken together, these studies indicate that student intrinsic motivation and valuing of reading decline as students move from elementary to secondary school, at the same time they perceive school reading as increasingly difficult to comprehend. This developmental trend in student motivation may very well contribute to adolescents' poor reading performance. There is a need for more research to investigate the relationship between reading motivation and reading comprehension among adolescent readers. This study examined the association between eighth-grader's reading motivation and reading comprehension of informational and literary texts.

**1.2.1.3. Student demographics.** Student demographics, such as gender, race/ethnicity, and student socioeconomic status, were included in this study because these variables have proven to be related to students' reading comprehension (Rand Reading Group, 2002; Snow, Burns, & Griffin, 1998). I briefly review these student demographic characteristics in the following section.

**Gender.** National reading assessments indicate that girls outperform boys in reading. For instance, the 2015 NAEP Reading results indicated that female students scored higher on average than male students in both grade four and grade eight (National

Center of Education Statistics, 2015). This same pattern has been observed in the NAEP results in the past 20 years. Furthermore, a meta-analysis of gender difference in reading achievement as measured in national and international large-scale assessments indicated that adolescent girls had advantage over adolescent boys in reading, regardless of age and language of instruction (Lietz, 2006). Therefore, gender, as an important variable in adolescent reading development, was included in this study.

***Race/ethnicity.*** The persistent White-Black achievement gap and the White-Hispanic achievement gap are pressing issues in the field of educational research (Bohrnstedt, Kitmitto, Ogut, Sherman, & Chan, 2015; Hemphill & Vanneman, 2011; Ladson-Billings, 2006; Reardon & Galindo, 2009). A disproportionately high percentage of Black and Hispanic students struggle in reading. For instance, the 2015 NAEP Reading results reported that 46% of White fourth graders were proficient readers, compared with only 18% of Black fourth graders and 21% of Hispanic fourth graders. On the other hand, only 21% of White fourth graders were below basic level, as opposed to 48% of Black fourth graders and 45% of Hispanic fourth graders (National Center of Education Statistics, 2015).

Eighth graders showed the same stark performance gap. For White eighth graders, 44% were proficient readers, as opposed to only 16% of Black eighth graders and 21% of Hispanic eighth graders (National Center of Education Statistics, 2015). Furthermore, only 15% of White eighth graders were below basic level, compared with 42% of Black eighth graders and 34% of Hispanic eighth graders. Additionally, 44% of Black eighth graders and 45% of Hispanic eighth graders were at basic level. Overall, it is safe to say that eight out of ten Black eighth graders were struggling readers and the same was true



for Hispanic eighth graders. In summary, a disproportionately high percentage of Black and Hispanic middle-school students struggle in reading. Therefore, there is a great need to investigate the factors accounting for the White-Black achievement gap and the White-Hispanic achievement gap. This study examined student characteristics and school characteristics that were associated with the White-Black achievement gap and the White-Hispanic achievement gap.

*Socioeconomic status.* The current literature indicates that student socioeconomic status is closely associated with the achievement gap. Student socioeconomic status has long been established as a significant predictor of academic achievement (Rand Reading Group, 2002). Student eligibility for the National School Lunch Program and parental educational level have been traditionally used as indicators of student socioeconomic status (Snow et al., 1998). Students from low-income families are more likely to be at risk for academic failure than students from middle-income families. For instance, the NAEP 2011 Reading results indicated that among eighth graders who were at the bottom 25 percentile, 67% were eligible for the National School Lunch Program (National Center for Educational Statistics, 2011a). In contrast, among those who were in the top 25 percentile, only 21% were eligible for the National School Lunch Program. Similarly, among those at the bottom 25 percentile, only 32% reported having at least one parent who was a college graduate. Yet among those who were in the top 25 percentile, 71% reported having at least one parent who was a college graduate.

Studies examining the White-Hispanic achievement gap found that student socioeconomic status accounted for most of the achievement gap between White and Hispanic students (Fryer & Levitt, 2006). Therefore, socioeconomic status, as an

important student-level variable that characterizes the sociocultural environments influencing adolescents' reading comprehension, was included in this study.

### **1.2.2. School Characteristics**

Current research has identified school characteristics that are associated with American adolescents' reading development, such as school type (Braun et al., 2006), school socioeconomic status (Snow et al., 1998), and school demographic makeup (Bohrnstedt et al, 2015).

**1.2.2.1. School-level socioeconomic status.** The influence of socioeconomic status on student academic achievement is also evident at the aggregate level, that is, at the school/community level (Snow et al., 1998). In other words, socioeconomic status is not only a student-level sociocultural factor, it is also a school-level/community-level sociocultural factor. The influence of school-level socioeconomic status on academic achievement was documented in a classic meta-analysis (White, 1982), which demonstrated that school-level socioeconomic status was strongly associated with student academic achievement, whereas student-level socioeconomic status was only moderately associated with student achievement. Putting it another way, a low-SES student attending an affluent suburban school is more likely to become a skilled reader than the same student attending a poverty-stricken urban school. Therefore, school-level socioeconomic status, as an indicator of community/neighborhood sociocultural context, was included in this study.

**1.2.2.2. School type.** The impact of school type on academic achievement is documented in the literature (Braun et al., 2006; Lubienski & Lubienski, 2006). For instance, the 2011 NAEP reading results indicated that eighth graders in private schools

scored on average higher than those in public schools (National Center of Education Statistics, 2011a). The same pattern holds true in the NAEP results in the past two decades. Braun et al. (2006) examined results from the 2003 NAEP reading and mathematics assessment and investigated the differences between public school and private schools in reading and math performance. They found that after adjusting for differences in student characteristics, the differences between public and private schools disappeared except for eighth-grade reading which still remained significant with private school having a higher mean than public schools. Their findings indicated that eighth graders' membership in public or private school influenced student reading performance. Given the importance of student membership in public or private school, this variable was included in this study.

**1.2.2.3. School demographic characteristics.** School demographic make-up is associated with student academic achievement (Armor & Watkins 2006; Bohrnstedt et al., 2015; Ewijk & Slegers 2010). In one study, Bohrnstedt et al. (2015) examined the association between student academic achievement and the proportion of Black student enrollment in school. These researchers found that academic achievement for both White and Black students was lower in schools that have the highest proportion of Black student enrollment. Therefore, school demographic make-up, as an important variable associated with adolescent's academic achievement, was included in this study.

### **1.3. Adolescent's Reading of Informational Texts and Literary Texts**

Reading researchers have proposed that American adolescents' poor performance in reading is partly due to the fact that these students are not well prepared for the challenging texts that they encounter in secondary school (Duke & Roberts, 2010). As

students move from elementary to secondary school, they are expected to tackle increasingly complex informational texts (e.g., science or history textbooks). Informational texts, specifically exposition, argumentation, and persuasive text (Chambliss & Calfee, 1998), may be challenging to adolescent readers because the structures in informational texts are distinctly different from the structure of literary texts that most students are familiar with even in elementary school (Guthrie et al., 2012). Stories, as a typical form of literary texts, generally follow the “story structure” that refers to characters, plot, conflict, and climax (Graesser, Golding & Long, 1991). Due to the structural differences between informational texts and literary texts, students’ knowledge about the “story structure” may not automatically transfer to their comprehension of informational texts (Meyer, 1975; Meyer, & Freedle, 1984). Therefore, students need to have rich experiences interacting with informational texts before they become skilled readers in this text type. However, student reading in elementary classrooms is historically dominated by stories (Duke, 2000; Moss & Newton, 2002; Pressley, Rankin & Yokoi, 1996; Yopp & Yopp, 2006). An emphasis on stories in the primary grades means students have little exposure to informational texts and few opportunities to practice reading strategies using informational texts. While progress has been observed in incorporating more informational texts into student’s reading diet at the elementary school level, informational texts are still often neglected in reading instruction due to the fact that teachers are not well prepared to teach it (Rand Reading Study Group, 2002; Moss 2008; Ness, 2011).

Secondly, informational texts in content areas require specialized prior knowledge, syntax, technical vocabulary, and domain-specific strategies, all of which

pose another challenge for adolescent readers (Alexander, 1998; Alexander & Jetton, 2003; Lampert & Blunk, 1998). Informational texts in secondary schools can be challenging to adolescent readers partly because of the technical and abstract vocabulary that are not familiar to adolescent readers and thus may compromise their reading comprehension (Fang, 2008). Subject matter knowledge, including domain knowledge (the breadth of knowledge) and topic knowledge (background knowledge relative to a particular concept), also influences adolescent reader's reading comprehension of informational texts (Alexander, 1997; Alexander, Jetton & Kulikowich, 1995). A lack of either domain knowledge or topic knowledge makes it hard for adolescent readers to comprehend informational texts (Coutant & Perchemlides, 2005).

Thirdly, secondary teachers are not equipped to teach adolescent readers how to tackle informational texts (Rand Reading Report, 2002). The reading research literature demonstrates that explicit instruction on reading strategies enhances student comprehension of informational texts (Biancarosa & Snow, 2006; Heller & Greenleaf, 2007; Pressley, 2000). However, a disturbing finding from the Rand Reading Report (2002) shows that teachers in secondary school are not well prepared to teach comprehension strategies. In an observational study of instructional practices in middle and high school settings, Ness (2009) found that out of the 2,400 minutes of instructional time in secondary classrooms, only 3% was spent in reading comprehension instruction. During the interviews with these teachers, Ness found that these secondary teachers lacked professional training on reading comprehension instruction and thus they did not feel comfortable teaching it in class. Just as Alexander and Jetton (2000) noted that when the linguistic demands of text-based learning increases in secondary school, academic support

(e.g., explicit comprehension instruction) for adolescent readers is decreasing. Therefore, it is not surprising that informational texts are particularly challenging for American adolescent readers (Mullis et al., 2012).

Furthermore, current reading research literature suggests that the examination of student reading comprehension should be differentiated between informational texts and literary texts. The 2011 Progress in International Reading Literacy Study (PIRLS) results indicated that American students scored higher on literary scale than on informational scale (Mullis et al., 2012), suggesting that different reading processes/strategies may have been involved when students are engaged with literary and informational texts.

This distinction of reading comprehension between informational and literary texts was acknowledged in the 2009 NAEP reading assessment. For the first time in the NAEP history reading comprehension of literary texts and informational texts was reported separately in the 2009 NAEP reading assessment. This distinction between informational and literary texts was also reflected in the reading materials selected and used in the 2009 NAEP reading assessment. For instance, in the 2009 NAEP eighth-grade reading assessment, 45% of the reading passages were literary texts and 55% were informational texts. The percentage of informational texts even rose to 70% in the twelfth-grade NAEP reading assessment. The separate reporting of reading comprehension in literary and informational texts provided researchers with opportunities to explore the factors contributing to adolescents' reading comprehension in different text types.

In summary, the American adolescent literacy crisis has led to a need for more research to investigate the factors influencing adolescents' reading comprehension of

literary texts and informational texts. Current research has identified student-level and school-level variables believed to contribute to this literacy crisis. In this research, I analyzed the 2009 NAEP reading assessment and looked into how student and school characteristics were related to eighth graders' reading comprehension of literary texts and informational texts.

#### **1.4. Goals of the Study**

The goal of this dissertation was to investigate the associations between student characteristics, school characteristics and eighth-graders' reading comprehension of informational and literary texts. In particular, I explored the demographic, cognitive, motivational, and school factors that contributed to the White-Black achievement gap and the White-Hispanic achievement gap in reading. In this study, student characteristics referred to gender, race/ethnicity, socioeconomic status, reading motivation, school reading amount, home literacy resources, and student participation in school reading activities. School characteristics referred to school type, school-level socioeconomic status, school academic environment, and school demographic make-up. This study addressed the following research questions:

Research question 1. *How are student characteristics associated with eighth-graders' reading comprehension of informational and literary texts?*

- a. How are student demographic variables (i.e., gender, race/ethnicity, eligibility for the National School Lunch Program, parental education) associated with adolescents' reading comprehension of informational and literary texts?

- b. How is reading motivation associated with eighth-graders' comprehension of informational and literary texts, after controlling for student demographic variables, reading amount in school, and other student-level variables?
- c. How is student reading amount in school associated with eighth-graders' comprehension of informational and literary texts, after controlling for student demographic variables, reading motivation, and other student-level variables?
- d. How are home literacy resources associated with eighth-graders' comprehension of informational and literary texts, after controlling for student demographic variables, reading motivation, and other student-level variables?

Research question 2. *Does the White-Black achievement gap narrow after controlling all the student-level variables? Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?*

Research question 3. *How are school characteristics associated with eighth-graders' reading comprehension of informational texts and literary texts? How are school characteristics associated with the White-Black achievement gap? How are school characteristics associated with the White-Hispanic achievement gap?*

These research questions allowed me to look into how student and school characteristics jointly influenced eighth-grader's reading comprehension of informational texts and literary texts. More importantly, the achievement gap between traditionally high



performing and low performing students was examined to get a better understanding of the factors contributing to the achievement gap.

### **1.5. National Assessment of Educational Progress (NAEP)**

The National Assessment of Educational Progress (NAEP) is the largest nationally representative assessment to measure American students' academic achievement in grades four, eight, and twelve (NCES, 2009). According to the NAEP legislation, the goal of NAEP is "to provide, in a timely manner, a fair and accurate measurement of student academic achievement and reporting of trends in such achievement in reading, mathematics, and other subjects" (section 303(b)(1), National Assessment of Educational Progress Reauthorization Act, P.L. 107-279). The NAEP assessments include national assessment, state assessment, the Trial Urban District Assessment (TUDA), and the long-term trend assessment (LTT).

In the current study, I analyzed the 2009 national NAEP reading assessment, with a particular focus on eighth graders' reading comprehension. The rationale for using this dataset with a focus on eighth graders was as follows: (a) The conceptual framework of the 2009 NAEP reading assessment was grounded in current scientifically-based research on literacy education compared with the old framework used between 1992 and 2007; (b) For the first time in the NAEP history, student reading comprehension in literary texts and informational texts was reported separately in the 2009 NAEP reading assessment; (c) The 2009 national NAEP reading assessment provided valid and reliable reading measures and high quality data to investigate my research questions; (d) I was interested in literacy development during early adolescence years, since early adolescence is a developmental period in which children face many life changes. For many of the youth

this life stage marks the beginning of a downward trajectory leading to delinquency, behavioral/psychological problems, school failure, and dropout (Eccles, 1999; Wigfield, Byrnes, & Eccles, 2006, Wigfield et al., 2015). Therefore, I decided to focus on eighth graders and explore the factors contributing to eighth-graders' reading comprehension in general and the White-Black achievement gap as well as the White-Hispanic achievement gap in particular.

### **1.5.1. How Reading Comprehension is Defined and Measured in NAEP**

According to the 2009 NAEP reading framework, *reading* was conceptualized as an “active and complex process that involves understanding written text, developing and interpreting meaning, and using meaning as appropriate to type of text, purpose, and situation” (National Assessment Governing Board, 2009, p. 2). More specifically, student reading comprehension was distinguished between two major dimensions, namely informational texts and literary texts. Three thinking processes involved in reading comprehension were measured in the 2009 NAEP reading assessment, including (a) locate and recall information from text, (b) integrate and interpret information and ideas presented in text, (c) critique and evaluate information and ideas in text and the ways in which authors present text. Therefore, the construct that the 2009 NAEP reading assessment intended to make inferences about was students' reading comprehension proficiency, which was measured by tapping into students' three cognitive processes across the two dimensions of informational texts and literary texts. There were 166 cognitive questions in the 2009 NAEP reading assessment, including 30% of the test items on students' ability to critique and evaluate, 50% on students' ability to integrate and interpret, and 20% on students' ability to locate and recall (NCES, 2009). A further

analysis of the three cognitive processes and the test items released from the 2009 NAEP reading assessment was elaborated in chapter two. These test items adequately captured the reading construct conceptualized in the 2009 NAEP reading assessment. Additionally, the authentic reading materials and the well-crafted test items did lend support to the construct validity of the 2009 NAEP reading assessment.

### **1.5.2. The 2009 NAEP as a Measure of Teacher’s Prompting for Students to Use Reading Strategies**

Reading strategies were defined as “deliberate, goal-directed attempts to control and modify the reader’s efforts to decode text, understand words, and construct meanings of text” (Afflerbach et al., 2008, p. 368). This conceptualization of reading strategies was grounded in Pressley and Afflerbach’s (1995) model of constructively responsive reading, which focused on skilled readers’ cognitive processes in reading. The significance of reading strategies in reading comprehension has been well established in the literature (Alexander, 2005; Alexander et al., 1998; Alexander & Murphy, 1998; Pressley & Afflerbach, 1995).

In this study, the student background questionnaire was used to collect information about teacher’s prompts to ask students to use reading strategies in class. Questionnaire items related to teacher’s prompting focused on classroom practices of encouraging students to use reading skills/strategies. These items were the following: (a) when reading summarize passage, (b) when reading question motives of characters, (c) when reading interpret meaning of passage, (d) when reading, identify main themes of passage. According to Pressley and Afflerbach’s (1995) model of constructively responsive reading, there were three general categories of reading strategies, namely

identifying and learning text content, monitoring, and evaluation. Overall the strategies included in the 2009 NAEP questionnaire mapped onto the cognitive processes for identifying and learning text content.

### **1.5.3. How Reading Motivation is Defined and Measured in NAEP**

The 2009 NAEP reading assessment student questionnaire also collected data on adolescents' reading motivation which is documented to influence reading comprehension (Guthrie et al., 2012; Guthrie et al., 2007; Wigfield & Guthrie, 1997). Guthrie and Wigfield's (2000) conceptualization of reading motivation was used in the present study to identify items designed to measure adolescents' reading motivation. Items included in the NAEP survey to address adolescents' reading motivation were the following: (a) learn a lot when reading books, (b) read for fun on own, (c) reading is a favorite activity (d) talk with friends about what you read. I believe these items could be used as indicators of three components of student reading motivation, namely intrinsic reading motivation (Deci & Ryan, 2000), valuing of reading (Eccles & Wigfield, 2002; Wigfield & Cambria, 2010), and pro-social goal (Wentzel, 1996; Wentzel & Watkins, 2002). However, given the large amount of research documenting the relationship between student motivation and reading comprehension, it is unfortunate that the 2009 NAEP student questionnaire had very limited number of items on adolescents' reading motivation. Admittedly, there is a gap between what could have been measured regarding adolescents' reading motivation and what was actually measured in the 2009 NAEP student questionnaire. Despite this drawback, I still think these items do convey useful information about adolescents' reading motivation.

#### **1.5.4. How Adolescent Classroom Literacy Practices Are Defined and Measured in NAEP**

Student participation in classroom reading activities was conceptualized as students being involved in classroom reading activities, such as reading aloud, reading silently, discussing readings, and working on group projects. The 2009 NAEP reading assessment student questionnaire collected reasonable amount of data on adolescents' participation in classroom reading activities. These items were the following: (a) In class discuss new or difficult vocabulary, (b) in class read silently, (c) in class read aloud, (d) in class read books of own choice, (e) do a group activity or project about what we have read, (f) in class explain what we have read, (g) in class discuss different interpretations of what we have read, (h) work in pairs or small groups to talk about something that you have read, and (i) have a class discussion about something that the whole class has read. These items were used to capture student involvement in classroom reading activities.

#### **1.6. Hierarchical Linear Modeling**

I used the hierarchical linear modeling approach (HLM) to model the nested data structure (students nested within schools) in NAEP assessment (Raudenbush & Bryk, 2002). The decision to use hierarchical linear modeling approach was due to the multi-level nature of my research questions. Raudenbush and Bryk (2002) pointed out that ignoring the hierarchical data structure would result in aggregation bias and misestimated precision, which would undermine the accuracy of inferences drawn from research. In this study I used a two-level analysis to investigate my research questions. At the first level, I studied the associations between student-level variables and reading comprehension of informational and literary texts. At the second level, I examined the

associations between school characteristics and reading comprehension of informational and literary texts. The software HLM 7 with full maximum likelihood estimation was used for analyses in this study.

### **1.7. Contributions to the Field**

This study contributed to the field of reading research in three aspects. First, this study contributed to our understanding of adolescent literacy development by investigating student and school characteristics simultaneously, utilizing HLM as the analytical approach to address the multi-level research questions. This study identified student characteristics that were significantly and positively associated with eighth-graders' reading comprehension in informational and literary texts. These student characteristics included socioeconomic status, home literacy resources, school reading amount, and reading motivation. In addition to student characteristics, the present study also identified school characteristics that were associated with eighth-graders' reading comprehension of informational and literary texts. These school characteristics included school type, school socioeconomic status, school demographic characteristics, and school academic environment.

Secondly, this study contributed to our understanding of the White-Black achievement gap in reading by identifying student and school characteristics that accounted for the complexity of the White-Black achievement gap. This study extended the reading research literature by documenting the gap between White and Black eighth graders in terms of home literacy resources and family income. Furthermore, the present study identified school characteristics contributing to the White-Black achievement gap in reading. Specifically, in public schools Black students scored significantly lower in

both informational and literary texts, compared to White students. In private schools, however, no significant difference was observed between White and Black students in literary or informational texts.

Thirdly, the present study contributed to our understanding of the White-Hispanic achievement gap in reading by identifying key student characteristics associated with the White-Hispanic achievement gap, including home literacy resources, reading amount in school, and reading motivation. The present study indicated that Hispanic students had significantly lower access to home literacy resources, were engaged in significantly less reading in school, and displayed significantly lower reading motivation, compared with their White peers. Furthermore, the present study identified school characteristics contributing to the White-Hispanic achievement gap in reading. Specifically, in private schools Hispanic students outperformed White students in both informational and literary texts. However, in public schools Hispanic students scored significantly lower in both informational and literary texts compared to White students.

### **1.8. Limitations of this Study**

While the results of this study shed light on the relationships among student demographic, motivational, and school factors associated with adolescents' reading comprehension, it is not appropriate to draw causal claims about the relationship between student/school variables and adolescents' reading comprehension, since this study was a correlational study. Secondly, the findings of this study were based on a representative sample of American eighth graders and the results can only be adequately generalized to the population of American eighth graders. The results of this study need to be replicated across other grade levels. Thirdly, this study focused on adolescents' interaction with

print-based text, thus the findings of this study can only be used to account for reading comprehension in traditional print-based text. Last but not least, due to the constraints entailed in secondary data analysis, I had no control over what variables were collected in the NAEP reading assessment or how the reading comprehension scales were reported for further analyses. For instance, the limited questionnaire items on reading motivation did not honor the complexity of this construct and its significant role in reading comprehension.



## CHAPTER TWO: LITERATURE REVIEW

I begin this chapter with the theoretical framework that informs the examination of eighth-graders' reading comprehension as measured in the 2009 NAEP assessment. Next, I define the key construct *reading* and briefly review the factors believed to contribute to adolescents' reading performance. I close this chapter with a detailed analysis of the 2009 NAEP reading assessment from an assessment perspective (e.g. assessment format, validity, reliability).

### 2.1. Theoretical Framework of the Study

The theoretical framework that informs this study is Bronfenbrenner's (1998) bioecological model of child development. Bronfenbrenner describes child development as situated in multiple contexts of microsystems (local settings such as home and school in which child participate), macro-systems (societal and cultural contexts), and the meso-system (interrelationships between multiple settings). Microsystems refer to the immediate environments in which child interacts with people or objects and is influenced by these interactions. Home and school are examples of microsystems in which child forms relationship with parents, siblings, friends, or teachers. Bronfenbrenner defines the macro-system as the broader societal or cultural context in which people have shared values and beliefs. Meso-systems refer to the interaction between multiple microsystems. Examples of meso-systems are interactions between parents and teachers. Among these multiple settings, microsystems are nested within macro-systems in a multi-level structure.

The four key components in this model are process, person, context, and time. Among these components, proximal processes – child reciprocal interactions with people or objects in the immediate environment, are believed to be the primary mechanism for

child and adolescent development. Reading is an example of proximal processes in which children regularly engage in interactions with friends, parents, teachers, and books.

According to Bronfenbrenner, these interactions are influenced by the settings in which it occurs, whether it be home or school.

Bronfenbrenner also posits that the extent to which child development is influenced by the multi-level contexts varies depending on person characteristics and environment characteristics. Person characteristics refer to biological or psychological characteristics. Examples of person characteristics are child gender, dispositions, knowledge, skills, and motivation. Examples of environmental characteristics are parental socioeconomic status, such as income and educational level. Bronfenbrenner conveys the interactive effects of both person and contexts in child development as follows:

The form, power, content, and direction of the proximal processes effecting development vary systematically as a joint function of the characteristics of the developing person; of the environment—both immediate and more remote—in which the processes are taking place; the nature of the developmental outcomes under consideration; and the social continuities and changes occurring over time through the life course and the historical period during which the person has lived. (Bronfenbrenner & Morris, 1998, p. 996)

From this perspective, adolescent reading development can be viewed as influenced by a combination of factors, including adolescent characteristics, parental characteristics, home environment characteristics, and school characteristics. This perspective on reading literacy is clearly explicated in the report of the RAND Reading Study Group (2002), a group of fourteen distinguished researchers and experts in the field of reading. They highlight that the contexts in which students live and learn to read are equally important for students' reading development as the content and the process of reading instruction. The RAND Reading Report point out that sociocultural differences

characterized by income, ethnicity, and neighborhood account for much of the differences among readers. Therefore, “further research is needed regarding the relationship between membership in certain groups and reading comprehension” (p. xvi), which is one of the goals in this study.

In this study I examine the associations between student characteristics (e.g., student ethnicity), parental characteristics (e.g., income, educational level), school characteristics (e.g., school-level socioeconomic status), and eighth-graders’ reading comprehension. Additionally, I investigate the relationship between student cognitive (i.e., reading strategies), non-cognitive variables (i.e., reading motivation), and eighth-graders’ reading comprehension. More importantly, I examine how these relationships may vary as a function of reading informational and literary texts.

Grounded in current scientifically-based research on literacy education, the NAEP reading assessment defines *reading* as “an active and complex process that involves: Understanding written text. Developing and interpreting meaning. Using meaning as appropriate to type of text, purpose, and situation” (National Assessment Governing Board, 2015, p.2). In this conceptualization, the complexity of reading is reflected not only in the cognitive process of constructing meaning from written texts (i.e., understanding written text. developing and interpreting meaning), but in the situational nature of reading as well (i.e., using meaning as appropriate to type of text, purpose, and situation). This definition of reading is consistent with the conceptualization of reading in the Rand Reading Report (2002) and several important international assessments, including the Progress in International Reading Literacy Study (PIRLS) and Programme for Student Assessment (PISA).

In this study, I use NAEP's definition of *reading* in my investigation of adolescent reading comprehension and I look into the associations between student demographic characteristics (e.g., ethnicity, student socioeconomic status), parental characteristics (i.e., income, educational level), school characteristics (e.g., proportion of student eligible for free and reduced lunch), and adolescents' reading comprehension. By incorporating these student-level and school-level variables into the examination of adolescent reading comprehension, I can get a more accurate picture of adolescent literacy practices, which in turn will inform policy makers, researchers, and practitioners on how to best serve these understudied students.

In addition to the aforementioned factors, current literature has identified other factors believed to influence adolescents' reading comprehension, such as students' use of reading strategies and reading motivation. Among these factors, reading strategies are seen as the cognitive component of reading comprehension and reading motivation as the affective component. In the following section, I review literature on these factors that are associated with American adolescent reading comprehension.

## **2.2. Student-Level Variables**

### **2.2.1. Reading Strategies**

Abundant research in cognitive psychology in the past forty years has produced a solid knowledge base regarding the contribution of reading strategies to students' reading comprehension (Kamil, Pearson, Moje, & Afflerbach, 2010; NICHD, 2000; Rand Reading Report, 2002; Snow, Burns, & Griffin, 1998). Explicit teaching of comprehension strategies embedded in meaningful social interactions helps students become more strategic readers (Pressley, et al., 1992). However, majority of the existing

research on reading strategies focus on elementary students and there is a lack of research on reading comprehension strategies used by adolescent readers. Given the fact that 64% of American eighth graders read below the proficient level (NCES, 2013), more research is needed to investigate the factors contributing to adolescent reader's reading comprehension, including their use of reading strategies.

Reading strategies are “deliberate, goal-directed attempts to control and modify the reader's efforts to decode text, understand words, and construct meanings of text” (Afflerbach, Pearson, & Paris, 2008, p. 368). Reading strategies are not equivalent to reading skills which refer to “automatic actions that result in decoding and comprehension with speed, efficiency, and fluency and usually occur without awareness of the components or control involved” (Afflerbach, Pearson, & Paris, 2008, p. 368). A strategic reader consciously monitors the effectiveness of strategies they use in reading and flexibly adjust the strategies as they read, whereas a skilled reader uses reading skills out of habit and automatically. Therefore, what distinguishes reading strategies and reading skills is a readers' deliberate control of their cognitive processes. This conceptualization of reading strategies is grounded in Pressley and Afflerbach's model of constructively responsive reading (1995), which focus on skilled readers' cognitive processes in reading. The constructively responsive reading model is built upon a comprehensive synthesis of a wide range of think-aloud studies on reading strategies. These researchers identify more than 300 strategies involved before reading, during reading, and after reading. They further consolidate this vast amount of reading strategies into three general categories, namely identifying and learning text content, monitoring, and evaluation. Pressley and Afflerbach's model acknowledges the strategic,

metacognitive, knowledge-based, and social aspect of reading and characterizes skilled reading as “constructively responsive, capturing the reader constructions that are so essential to meaning construction but emphasizing that those constructions are in response to the particular text being processed” (p. 116). Pressley and Afflerbach’s model of constructively responsive reading honors the complexity of mental processes involved in reading and provides me with the theoretical framework for analysis of adolescents’ reading strategies.

Experimental studies of adolescent’s reading comprehension indicates that explicit instruction on reading strategies enhances adolescents’ reading comprehension. Reading researchers believe that the progression from a strategic reader to a skilled reader is a developmental process (Afflerbach, Pearson, & Paris, 2008; Alexander, 2005; Pressley, 2000). It takes many encounters with different types of texts before students become proficient and skilled readers. Skilled reading requires the coordinated and flexible use of multiple strategies, such as making inferences, identifying main idea, and integrating different parts of text (Pressley & Afflerbach, 1995; Pressley, 2000). Therefore, the goal of reading instruction is to help students learn the multiple reading strategies and finally become fluent, proficient, and skilled readers.

Palincsar and Brown (1984) conducted one of the first classic intervention studies to investigate the role of multiple reading strategy instruction on adolescents’ (seventh-, and eighth-graders) reading comprehension. The teaching of comprehension strategies was embedded in student-teacher dialogic interaction, with teacher as the expert modeling and scaffolding the use of strategies and students as novice actively participating in the interaction. Explicit teaching of four reading strategies (i.e.,

summarizing, questioning, clarifying, and predicting) was examined. Palincsar and Brown (1984) found that the reciprocal teaching approach enhanced struggling adolescent readers' ability to summarize and question. After the intervention, these poor readers still performed significantly better in daily comprehension assessment and standardized reading test. Long term positive effects on text comprehension were also observed among these struggling adolescent readers. In summary, the findings from this line of research indicate that explicit instruction on multiple reading strategies helped these middle school struggling students become more aware of their cognitive processes during reading. With guided practice, these adolescent readers became more strategic in reading informational texts. As a result, their reading comprehension of informational texts improved as well.

In a similar vein, Pressley and his colleagues developed "transactional strategies instruction" in which teachers and students jointly interacted with written texts and constructed the shared group understanding together (Pressley, et al., 1992). Teacher explicit explanation of multiple reading strategies and modeling were also featured in this line of intervention studies (Brown, Pressley, Van Meter, & Schuder, 1996; Pressley, 2000; Pressley, et al., 1992). The teaching of reading strategies was embedded in teacher-student interaction about written texts. A broader set of strategies were included, including decoding strategies, word attack strategies, comprehension strategies (e.g., summarization, prediction, text structure analysis, self-questioning, generating interpretation). Researchers found that students' reading comprehension as measured in standardized reading tests showed significant gains compared with control students. Transactional strategies instruction (Pressley, et al., 1992) and Palincsar and Brown's

(1984) reciprocal teaching are arguably the two most widely-cited intervention programs on multiple reading strategies instruction in the 1980s and 1990s.

These two intervention programs share some commonalities. First, both of these intervention programs focused on summarization strategy, which the National Reading Report (NICHD, 2000) deemed as effective in improving normal reader's reading comprehension. Secondly, the primary focus in these two intervention programs was on elementary students, reflecting a national attention to early reading literacy. Whenever secondary students were involved, they were always struggling readers (Palincsar & Brown, 1984). While research on struggling adolescent readers may have important implications for their normal peers, adolescent readers are an understudied population and deserve more attention. Given the fact that 64% of American eighth graders read below the proficient level (NCES, 2013a, 2013b), more research is needed to investigate adolescents' use of reading strategies. Thirdly, student-teacher interaction and student-student interaction were emphasized in these two intervention programs. In both intervention programs, the teaching of reading strategies was contextualized in meaningful dialogues to construct meaning from written texts. The cognitive intervention component was seamlessly blended with the social context where learning occurred. This emphasis on socially mediated learning was also reflected in other prominent reading intervention programs, such as Peer-Assisted Learning (Fuchs, Fuchs, Mathes, Simmons, 1997), Questioning the Author (McKeown, Beck, & Worthy, 1993; Beck, McKeown, Hamilton, & Kucan, 1997; McKeown & Beck, 1999), and Collaborative Reasoning approach (Anderson, Nguyen-Jahiel, McNurlen, Archodidou, Kim, Reznitskaya, Tillmanns, & Gilbert, 2001; Reznitskaya, Kuo, Clark, Miller, Jadallah, Anderson, &



Nguyen-Jahiel, 2009). Given the converging evidence from experimental studies on the importance of summarization strategy for student reading comprehension and the role of meaningful social interaction that facilitates the development of reading strategies, in this study I investigate adolescent readers' self-reported use of reading strategies and how this is associated with their reading comprehension.

In summary, the abundant research in the past forty years has produced a solid knowledge base on effective reading comprehension strategies which improve student comprehension. Explicit teaching of comprehension strategies embedded in meaningful social interactions can help students become more strategic readers. The lack of research on reading comprehension strategies among adolescent readers is troublesome. Given the fact that 64% of American eighth graders read below the proficient level (NCES, 2013a, 2013b), more research is needed to investigate the factors contributing to adolescent reader's reading comprehension, including their reading practices and their use of reading strategies.

### **2.2.2. Reading Motivation**

In recent years, researchers have found that student reading motivation plays an important role in reading comprehension. Guthrie and Wigfield (2000) define reading motivation as "individual's personal goals, values, and beliefs with regard to the topics, processes, and outcomes of reading" (p. 405). Reading motivation is a multi-dimensional construct (Baker & Wigfield, 1999; Schiefele, Schaffner, Moller, & Wigfield, 2012; Wigfield & Guthrie, 1997). Three components of reading motivation to be investigated in this study are valuing of reading, intrinsic reading motivation, and perceived difficulty.

These motivation variables are included in this study because they are strongly associated with adolescents' reading comprehension and use of reading strategies.

**2.2.2.1. Valuing of reading.** In the motivation literature, the construct of values has been primarily examined from the lens of expectancy-value theory (Eccles, 2005; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000, 2002). Theorists in this line of research posit that there are four major components in the construct of values, including attainment value, utility value, intrinsic value, and cost. Attainment value is conceptualized as the importance of doing well on a given task and utility value is defined as usefulness of a given task for an individual's future plan (Wigfield & Eccles, 2000). Intrinsic value refers to the pure enjoyment of doing an activity and this component is similar to the construct of intrinsic motivation conceptualized in self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2009). Cost refers to what a person has to give up in order to accomplish a task (Wigfield & Eccles, 2000). Eccles and colleagues propose that values directly influence adolescents' achievement-related choices, effort, and academic performance.

Experimental and correlational studies on the construct of values indicate a positive impact of values on academic achievement. For instance, in an experimental study, Johnson and Sinatra (2012) investigated the relations among value and conceptual change with a sample of one hundred and sixty-five college students. These students were randomly assigned into three conditions – attainment value condition, utility value condition, and control condition. They were then asked to read an informational text regarding causes of the common cold, which was designed to correct some common misconceptions and improve student conceptual understanding on this topic.

The researchers experimentally induced two kinds of task values (attainment value, utility value) by providing two different instructions. Participants approached the informational text with the task value being induced in the respective condition. For example, in the attainment value condition, the instruction first described a fictional college student whose goal in reading was to demonstrate that he was a good student. Next participants were asked to reflect on their own experiences when they behaved like this fictional student and then participants were asked to read the passage carefully to demonstrate their ability as a good student. On the other hand, instruction in the utility condition described a fictional college student whose goal in reading was to connect everything he learned to what might be useful in his future career. Participants were asked to reflect on their own experiences when they behaved like this fictional student and then these participants were asked to think about how the information presented in the informational text could be applied to future careers. In the motivation questionnaire, utility value was characterized by items such as “My learning about what causes the common cold can be applied in future circumstance.” Attainment value was represented in such items as, “Understanding the subject matter of this reading is very important to me.” Student conceptual understanding was measured in multiple-choice items and true-or-false items.

Johnson and Sinatra (2012) found that students in the utility condition and the attainment condition showed significantly higher conceptual change than those in the control condition, even after controlling for pretest scores on conceptual understanding. Thus, experimentally induced utility value and attainment value can enhance student conceptual understanding of informational texts. The results of this study were

corroborated by similar findings from other experimental studies, supporting the positive impact of values on student reading comprehension (Hulleman, Godes, Hendricks, & Harackiewicz, 2010). Even though the experimental design in this study lends support to the causal link between values and reading comprehension, the findings may not be reasonably applied to adolescent readers, since these experimental studies only recruited college students as participants. Moreover, no measures of delayed effects were collected in this study to show the long term impact of values on student comprehension.

The long term impact of values on student reading performance is documented in the study conducted by Durik, Vida and Eccles (2006). These researchers investigated how students' perceived importance of reading/English influenced their literacy achievement from a longitudinal perspective. Using the structure equation modeling approach, Durik and her colleagues found that fourth-graders' valuing of reading (perceived reading importance) was a significant predictor of their eighth-grade English grades, the number of language arts courses they took in high school, and valuing of English (perceived importance of English) in tenth-grade. In turn, tenth-graders' valuing of English predicted both the number of language arts courses they took in high school and career aspirations related to literacy. These findings suggest that students who consider reading as important and useful early in their schooling experiences tend to achieve better in English and take more literacy-related courses in high school. In other words, valuing of reading has a long term influence on student literacy achievement, course selection decisions, and career aspirations.

Research on the developmental trend of the construct of values indicates a declining trend for valuing academic learning in general and in reading in particular

between elementary school and secondary school. For instance, Wigfield and colleagues (1997) looked into the change of values in math, reading, instrumental music, and sports over 3 years with a sample of elementary students. These researchers found that the mean level change in children's attainment value (perceived importance) and utility value (perceived usefulness) both declined over time across the domains of math, reading, instrumental music, and sports. This finding was replicated and further extended to the entire elementary and secondary school period (Fredricks & Eccles, 2002; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Kelley & Decker, 2009; Watt, 2004). This declining trend of values suggests that as students progress through grades K-12, they tend to view school work as less important or less useful. That is, as students go through middle school and high school years they are likely to devalue school-related activities more than they do so in elementary school years.

The consequence of devaluing academic activities is nontrivial. Devaluing of schooling has debilitating effect on student literacy achievement. Strambler and Weinstein (2010) conducted a study in which participants were African American and Latino students from the first grade through the fifth grade at a high-poverty urban elementary school. In this study, devaluing of schooling was captured in questionnaire items as follows: "Learning is not important to me" "I don't care about learning." "I don't care about getting a bad grade." Strambler and Weinstein (2010) found that devaluing was a significant and negative predictor for English language arts scores, even after controlling for prior achievement, academic valuing, and alternative identification.

This negative relation between English language arts scores and devaluing of schooling suggests that when students do not care about learning, they usually tend to end

up with low literacy achievement. Thus, this association between devaluing and low literacy achievement, coupled with the declining trend of value between elementary and secondary school years, suggest a plausible explanation for American adolescent literacy crisis – there could be a link between adolescents’ low valuing of reading and poor reading achievement, which still needs to be empirically tested. This is one of the goals in this study.

**2.2.2.2. Intrinsic reading motivation.** Intrinsic reading motivation is included in this study because the strong predictive power of intrinsic motivation on academic achievement is widely documented in the motivation literature in general and the reading literature in particular (Gottfried, 1985; Guthrie, Wigfield, Metsala, & Cox, 1999; Schiefele, Schaffner, Moller, & Wigfield, 2012, Wigfield, Cambria, & Ho, 2012). The majority of the existing literature supports a significant positive correlation between intrinsic reading motivation and reading comprehension. However, negative correlation between intrinsic reading motivation and reading comprehension is also reported in the literature (Wigfield, Cambria, & Ho, 2012). The seemingly discrepant findings suggest that reading intrinsic motivation should be distinguished between informational texts and literary texts.

Self-determination theory is a major theoretical perspective that has informed the research on intrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2009). Theorists in this line of research believe that human beings have a natural desire to learn and develop through the interaction with the social and cultural environments. From this perspective, intrinsic motivation was conceptualized as individual’s natural enjoyment of a task, whereas extrinsic motivation was conceptualized as doing an activity not because of the

activity itself, but for some other reasons (Deci & Ryan, 2000; Ryan & Deci, 2009). In other words, with intrinsic motivation people are actively engaged in a task due to the pure pleasure and enjoyment that arise from doing the activity, but with extrinsic motivation people participate in an activity for reasons not inherent in the activity itself, instead they do it for reasons such as earning a reward. For example, an eighth-grader who loves fantasy stories would be reading the Harry Porter series voraciously, because reading the book itself gives her satisfaction and enjoyment. A student studying for a final exam in math, in contrast, may very well do this because she wants to demonstrate she is a good student or believes doing good in math was useful for her future career. The construct of intrinsic motivation is very similar to the construct of intrinsic value proposed in the expectancy-value theory, but they are conceptualized from two different theoretical lenses.

The positive association between intrinsic motivation and academic achievement in multiple subject areas is documented in the existing literature. Gottfried (1985) examined the contribution of intrinsic motivation to student achievement across the domains of reading, math, science, and social studies. She collected data from students ranging from grade four through grade eight and asked students to complete motivation inventory. Intrinsic motivation was operationalized as students' enjoyment of learning, mastery-orientation, curiosity, and persistence, using items such as "I enjoy learning new things" "I like to do as much work as I can" "I enjoy doing hard assignment" and "I like to find answers to questions". Gottfried found that intrinsic motivation was significantly and positively associated with scores in standardized achievement tests and student perception of academic competence. This held true across grades and across the four

domains of reading, math, science, and social studies. So students who report high intrinsic motivation are likely to score high in achievement tests and tend to report high perceived competence, whereas students with low intrinsic motivation are likely to score low in achievement tests and tend to report low perceived competence.

The positive association between reading intrinsic motivation and reading comprehension is reported among elementary students. Wang and Guthrie (2004) study explored the contributions of intrinsic motivation and extrinsic motivation to reading comprehension among American and Chinese fourth-graders. Intrinsic motivation was conceptualized as student interest and involvement in reading as well as their preference for challenge. Utilizing the structural equation modeling approach, Wang and Guthrie found that intrinsic motivation predicted reading comprehension much stronger for both groups of students than all the other motivational and cognitive constructs in the model, including extrinsic motivation and prior reading achievement. In addition, intrinsic motivation had a direct impact on reading amount in school and reading amount for enjoyment. Therefore, students with high intrinsic motivation not only read more in school-related activities, but also read more for their personal enjoyment, which means they have more opportunities to practice reading strategies and experience success. This will, in turn, further enhance their motivation to read. This reciprocity between strategy use and motivation turns out a sort of Matthew effects, which originally refers to the rich-get-richer and poor-get-poorer phenomenon in students' reading development (Stanovich, 1986). This reciprocal relation between reading strategies and reading motivation has long been speculated in the literature (Alexander, Jetton, & Kulikowich, 1995; Alexander, Graham, & Harris, 1998; NICHD, 2000; Pressley, et al., 1992). For instance,



this potential effect of student motivation on reading comprehension is noted by the report of the National Reading Panel (2000) that recognizes that “a common aspect of individual and multiple strategy instruction is the active involvement of motivated readers who read more text as a result of the instruction. These motivational and reading practice effects may be important to the success of multiple strategy instruction” (p. 4-47).

The link between reading motivation and student strategy use was empirically tested in a study conducted by Guthrie and his colleagues (Guthrie, Wigfield, Metsala, & Cox, 1999). In this study they compared student reading outcomes in the intervention program Concept Oriented Reading Instruction (CORI) with those of traditional reading program in a sample of third-graders and fifth-graders. By means of structural equation modeling, these researchers found that students in the motivation supportive instructional program (CORI) were significantly better in strategy use than those in the traditional instructional program. Additionally, CORI students experienced significantly higher growth in conceptual knowledge relative to their baselines than the control students. Guthrie and his colleagues also found that the CORI effect on student conceptual knowledge was mediated by strategy use. That is, CORI directly fostered student intrinsic motivation, which in turn, enhanced student strategy use and increased student conceptual knowledge. Just as Taboada, Tonks, Wigfield, and Guthrie (2009) explicated that

Internally motivated readers have a desire to comprehend text. This desire to understand energizes the use of reading strategies by causing the reader to be metacognitive, whether it is by asking a question, forming a summary of what has been read, or activating background knowledge to build a fuller text representation (p. 98).

This may explain why highly intrinsically motivated students generally score higher in standardized assessments and performance assessments.

The positive association between intrinsic reading motivation and reading achievement was also observed among secondary students (Retelsdorf, Köller, & Möller, 2011). In this study, reading intrinsic motivation was conceptualized as reading enjoyment (i.e., “I enjoy reading books”) and reading for personal interest (i.e., “I read to learn about my topics of interest”), while reading extrinsic motivation was defined as reading for competition. Measures of student cognitive abilities, such as decoding skills and reasoning ability, were collected as well. Using the latent growth curve modeling approach, Retelsdorf, Köller, and Möller found a significant positive effect of intrinsic reading motivation on student reading performance. More importantly, intrinsic reading motivation strongly predicted the growth of reading, even after controlling for student family and demographic backgrounds as well as cognitive abilities.

The majority of existing literature on intrinsic reading motivation seems to suggest a positive association between intrinsic reading motivation to reading comprehension (Schiefele, Schaffner, Moller, & Wigfield, 2012). However, a negative correlation between intrinsic reading motivation and reading comprehension is observed in the study conducted by Wigfield, Cambria, and Ho (2012). In such study the researchers examined the relations between seventh-graders’ reading motivation (i.e., intrinsic motivation, avoidance, value, devalue, self-efficacy, perceived difficulty, peer value, peer devalue) and reading comprehension of informational texts. They noted that seventh-graders’ intrinsic reading motivation correlated significantly and negatively with reading comprehension of informational texts. These researchers attributed this finding to

the study's focus on informational books, which were considered by these seventh-graders as boring, hard, and irrelevant to their lives (Guthrie, Wigfield & Klauda, 2012). Interestingly, in another study conducted by their colleague with the focus on adolescents' motivation for reading literary texts, Coddington (2009) observed positive correlation between adolescents' motivation for reading literary texts and reading comprehension. These seemingly discrepant findings suggest that the relation between reading motivation and reading comprehension should be distinguished by text types (i.e., informational texts and literary texts).

Despite the abundant literature on intrinsic reading motivation, a large majority of the existing literature primarily focus on elementary students. Although attention to adolescent readers has been steadily growing in recent years (Guthrie, Wigfield, & Klauda, 2012), there is still much we need to learn about this understudied population. A troubling reality we do know from the literature is a declining trend of intrinsic motivation between elementary school and secondary school (Gottfried, 1985, 1990; Gottfried, Fleming, & Gottfried, 2001). That is, as students transition from elementary school to secondary school, their intrinsic motivation diminishes dramatically. Given the declining trend of intrinsic motivation and the converging evidence for a positive association between intrinsic motivation and reading achievement, a plausible explanation for the American adolescent literacy crisis could be low intrinsic motivation. However, this hypothesis is yet to be empirically tested. Additionally, there is still much we need to know about whether the association between adolescents' intrinsic reading motivation and reading comprehension may vary from informational texts to literary texts.

In summary, student valuing of reading and reading intrinsic motivation decline as they progress from elementary school to secondary school. Adolescents' low reading motivation may provide a plausible explanation for adolescents' poor reading achievement. However, this link still needs to be empirically tested. Given the American adolescent literacy crisis documented in chapter one, it is unfortunate that there is currently a lack of research investigating the link between the different components of reading motivation and reading comprehension among adolescent readers. This study examines the associations between reading motivation and adolescents' reading comprehension of informational and literary texts.

### **2.2.3. School Reading Amount**

Student reading amount has traditionally been operationalized as student reading amount in school or out of school (Anderson, Wilson, & Fielding, 1988; Stanovich & Cunningham, 1992; Wigfield & Guthrie, 1997). In one study examining reading motivation of fourth- and fifth-graders, Wigfield and Guthrie (1997) measured student out-of-school reading amount (number of minutes per day students read outside of school) and breadth (kinds of books student read). Guthrie and Wigfield (1997) found that intrinsic motivation significantly predicted student breadth of reading and extrinsic motivation significantly predicted student reading amount, thus establishing the link between reading motivation and reading amount.

Furthermore, the link between reading amount and reading competence is supported by research on student school reading and non-school reading (Duckworth, Peterson, Matthews, & Kelly, 2007; Guthrie, Wigfield, Metsala, & Cox, 1999; Ladd & Dinella, 2009; Schwinger, Steinmayr, & Spinath, 2009). Guthrie, Wigfield, Metsala, and

Cox, (1999) examined the relation between non-school reading and reading comprehension with a nationally representative sample of 10th-graders. Non-school reading amount was conceptualized as reading for enjoyment and was measured using items such as “How much additional reading do you do each week outside of school not in connection with school work?” with responses on a six-point Likert scale. Guthrie, Wigfield, Metsala, and Cox found that non-school reading amount was a significant predictor for text comprehension, even after controlling for background variables such as past achievement, reading motivation, reading efficacy, and student socioeconomic status.

In addition to non-school reading, the mediating role of reading amount is demonstrated for student school reading as well. Guthrie, Wigfield, Metsala, and Cox (1999) investigated the relation between school reading and reading comprehension of informational and literary texts among elementary students. In this quasi-experimental study, student school reading amount and reading amount for enjoyment were collected as indicators of student behavioral engagement in reading. Reading motivation was measured with questionnaire (MRQ) and reading comprehension was measured with performance assessments. These researchers found that intrinsic reading motivation positively and significantly predicted student school reading amount, above and beyond the contributions of past achievement, prior knowledge, and reading efficacy. Student school reading amount, in turn, strongly predicted student reading comprehension of informational and literary texts. Therefore, intrinsic reading motivation energized student amount in reading, which in turn, enhanced student reading comprehension.

Even though most existing studies on the relationship between reading amount and reading comprehension primarily focus on elementary students, the findings from the few existing studies seem to suggest a positive association between adolescents' school reading and reading comprehension of informational texts (Guthrie, Wigfield, & Klauda, 2012). Based on extensive interview with seventh-graders, these researchers examined the correlation between student behavioral engagement and reading achievement. Behavioral engagement was operationalized as the amount of school reading. These researchers found that the amount of school reading was significantly and positively associated with reading comprehension as measured in standardized assessment. Notably, this association between behavioral engagement and reading achievement was much stronger for African American students than for European American students, suggesting that increasing behavioral engagement among African American students may enhance their reading achievement and thus may have the potential to reduce the achievement gap between African American students and European American students.

However, this positive correlation between student school reading and reading achievement did not control for potential confounding variables, such as reading motivation. Given the strong associations between reading motivation, reading engagement, and reading comprehension, reading motivation and reading engagement should be examined simultaneously to control for potential confounding effect. Moreover, the positive correlation between behavioral engagement in school reading and reading comprehension, which was obtained among seventh-graders, needs to be replicated in other grade levels, such as the eighth-grade level. This study will examine the association between eighth-graders' reading engagement and reading comprehension,

using a nationally representative sample. Thus, the result may be reasonably generalized to the population of American eighth-graders.

In summary, the existing literature demonstrates that reading amount plays an important role in reading comprehension. However, despite the widely documented positive effect of student reading amount on reading achievement, a growing body of literature has indicated that a dilemma faced by many teachers in the U.S. is a lack of student engagement in academic activities and this is especially true for adolescent readers (Balfanz, Herzog, & Mac Iver, 2007; Finn & Zimmer, 2012; Reschly & Christenson, 2012; Skinner & Pitzer, 2012). Given the significant role that reading amount plays in academic achievement and the dilemma of adolescents' disengagement in reading activities, students' low reading amount may very well explain American adolescents' poor reading performance and deserve more attention for further investigation. One of the goals in this study is to examine the association between student school reading amount and reading comprehension.

#### **2.2.4. Student demographics**

**2.2.4.1. Gender.** Gender plays an important role in student reading achievement. For instance, the 2011 NAEP Reading results indicated that female students scored higher on average than male students in both grade 4 and grade 8 (National Center of Education Statistics, 2011a). This same pattern has also been observed in the NAEP results in the past 20 years. However, it is still not clear whether adolescent girls have an advantage over adolescent boys in both literary texts and informational texts.

**2.2.4.2. Race/ethnicity.** The persistent achievement gap between White students and minority students, many of whom come from disadvantaged backgrounds, is a

pressing educational issue. The 2011 NAEP Reading results reported that 33% of White fourth-graders were proficient readers, compared with only 14% of Black fourth-graders and 16% of Hispanic fourth-graders as proficient readers. On the other hand, only 22% of White fourth-graders was below basic level, whereas 51% of Black fourth-graders and 49% of Hispanic fourth-graders below basic level.

Eighth graders show the same stark performance gap. For White eighth-graders, 38% was proficient readers, as opposed to only 14% of Black eighth graders and 18% of Hispanic eighth graders as proficient readers (National Center of Education Statistics, 2011a). Furthermore, only 15% of White eighth graders was below basic level, whereas 41% of Black eighth graders and 36% of Hispanic eighth graders were below basic level. Additionally, 44% of Black eighth graders and 45% of Hispanic eighth graders were at basic level. Overall, it is safe to say that 8 out of 10 Black fourth-graders/eighth graders are struggling readers and the same is true for Hispanic fourth-graders/eighth-graders. Therefore, a disproportionally higher percentage of Black and Hispanic students struggle in reading. There is a great need for more research to investigate this achievement gap and inform policy makers and practitioners on how to better serve these disadvantaged students and reduce the persistent achievement gap. This study examines reading comprehension of literary texts and informational texts for each subgroups of eighth-graders, including White, Black, Asian, Hispanic, and American Indian students.

**2.2.4.3. Socioeconomic status.** Student socioeconomic status has long been established as a significant predictor of student academic achievement (White, 1982). Students from low-income families are more likely to be at risk than students from middle-income families (Snow, Burns, & Griffin, 1998). The NAEP 2011 Reading



results indicated that among those eighth graders who were at the bottom 25 percentile in the 2011 distribution, 67% was eligible for free/reduced-price school lunch, compared with only 21% eligible for free/reduced-priced school lunch in the top 25 percentile. Similarly, only 32% of the students at the bottom 25 percentile reported having at least one parent who were college graduates, as opposed to 71% in the top 25 percentile reported having at least one parent who were college graduates. Therefore, student socioeconomic status is an important student-level variable that is included in my investigation of eighth-graders' reading comprehension.

### **2.3. School-level Variables**

The influence of socioeconomic status on student achievement is also evident on the aggregate level, that is, at the school/community level (Snow, Burns, & Griffin, 1998). In other words, socioeconomic status is not only a student-level sociocultural factor, it is also a school-level/community-level sociocultural factor. The influence of school-level socioeconomic status on student academic achievement was probably first documented in a classic meta-analysis (White, 1982), which indicates that school-level socioeconomic status is strongly associated with student academic achievement, whereas student-level socioeconomic status is only moderately associated with student achievement. Putting it another way, a low-SES student attending an affluent suburban school is more likely to become a skilled reader than those attending a poverty-stricken urban school. Thus, I will include school-level socioeconomic status as an indicator of the sociocultural environment in the community/neighborhood area.

The impact of school environment on student achievement is also reflected in the NAEP results. The 2011 NAEP reading results indicated that eighth graders in private

schools scored on average higher than those in public schools. The same pattern holds true in the NAEP results for the past two decades (National Center of Education Statistics, 2011a). Braun, Jenkins, and Grigg (2006) examined results from the 2003 NAEP Reading and Mathematics Assessment and investigated the differences between public school and private schools in reading and math performance. They found that after adjusting for differences in student characteristics, the differences between public schools and private schools disappeared except for eighth-grade reading which still remained significant with private school having a higher mean than public schools. Their findings indicate that eighth-grades' membership in public school or private school influences their reading performance. Therefore, school type is an important factor to take into account when investigating adolescent reading comprehension.

#### **2.4. Adolescents' Reading of Informational Texts and Literary texts**

Reading researchers have proposed that American adolescents' poor performance in reading is partly due to the fact that these students are not well prepared for the challenging informational texts that they encounter in secondary school (Duke & Roberts, 2010). As students move from elementary school to secondary school, they are expected to tackle increasingly complex informational texts (e.g., science or history textbooks). Informational texts, specifically exposition, argumentation, and persuasive text, are hard to understand partly because these texts use a variety of text structures, such as description, sequence, causation, problem/solution, and comparison (Chambliss & Calfee, 1998). These structures are distinctly different from the structure of stories that most students are familiar with. Stories, as a typical form of literary texts, generally follow the "story structure" that refers to characters, plot, conflict, and climax (Graesser,

Golding & Long, 1991). Other forms of literary texts, such as literary nonfiction (e.g., autobiographies or biographies) and poetry, also follow structures distinctly different from that of informational texts. Due to the structural differences between informational texts and literary texts, students' knowledge about literary texts may not automatically transfer to their comprehension of informational texts (Duke & Roberts, 2010; Meyer, 1975; Meyer & Freedle, 1984). Therefore, students need to have rich experiences interacting with informational texts before they become skilled readers in this text type.

Unfortunately, student reading in elementary classrooms was historically dominated by stories (Duke, 2000; Pressley, Rankin & Yokoi, 1996; Yopp & Yopp, 2006). An emphasis on stories in the primary grades means students have little exposure to informational texts and few opportunities to practice reading strategies using informational texts. While progress has been observed in incorporating more informational texts into student's reading diet at the elementary school level (Moss, 2008; Ness, 2011), informational texts are still often neglected in reading instruction due to the fact that teachers are not well prepared to teach it (Rand Reading Study Group, 2002). Not surprisingly, as students move through secondary school they struggle with reading informational texts and this is clearly reflected in their poor reading performance in national assessment.

Furthermore, informational texts in content areas require specialized prior knowledge, syntax, technical vocabulary, and domain-specific strategies, all of which pose another challenge for adolescent readers (Alexander, 1998; Alexander & Jetton, 2003). Informational texts in secondary schools can be challenging to adolescent readers partly because of the technical and abstract vocabulary that are not familiar to adolescent readers

and thus may compromise their reading comprehension (Fang, 2008). Subject matter knowledge, including domain knowledge (the breadth of knowledge) and topic knowledge (background knowledge relative to a particular concept), also influences adolescent reader's reading comprehension of informational texts (Alexander, 1997; Alexander, Jetton & Kulikowich, 1995). A lack of either domain knowledge or topic knowledge makes it hard for adolescent readers comprehend informational texts (Coutant & Perchemlides, 2005).

Finally, secondary teachers are not equipped to teach adolescent readers how to tackle informational texts. The reading research literature demonstrates that explicit instruction on reading strategies enhances student comprehension of informational texts (Biancarosa & Snow, 2006; Heller & Greenleaf, 2007; Pressley, 2000; Rand Reading Report, 2002 Torgesen, Houston, Rissman, Decker, Roberts, Vaughn, et al., 2007). However, a disturbing finding from the Rand Reading Report (2002) shows that teachers in secondary school are not well prepared to teach comprehension strategies. In an observational study of instructional practices in middle and high school settings, Ness (2009) found that out of the 2,400 minutes of instructional time in secondary classrooms, only 3% was spent in reading comprehension instruction. During the interviews with these teachers, Ness found that these secondary teachers lacked professional training on reading comprehension instruction and thus they did not feel comfortable teaching it in class. Just as Alexander and Jetton (2000) noted that when the linguistic demands of text-based learning increases in secondary school, academic support (e.g., explicit comprehension instruction) for adolescent readers is decreasing. Therefore, it is not surprising that

informational texts are particularly challenging for American adolescent readers (Mullis, Martin, Foy, & Drucker, 2012).

Policy makers have recently called for a special attention to informational texts in literacy instruction. The newly released Common Core State Standards place a strong emphasis on informational texts due to “extensive research establishing the need for college and career ready students to be proficient in reading complex informational text independently in a variety of content areas, even in primary grades” (p.4, Common Core State Standards Initiative, 2012). The Common Core Standards set up the standard for 50% of student reading in elementary school to be in informational texts and a much higher proportion in secondary school (55% in grade eight and 70% in grade twelve). This allows students to have more opportunities to interact with informational texts and practice reading strategies using informational texts. Furthermore, the Common Core State Standards have clearly defined grade-specific standards for literary texts and informational texts across K-12 grade levels. For instance, at the end of eighth grade, students are expected to acquire skills in summarizing main ideas, analyzing how the author responds to conflicting evidence/viewpoint, assessing the reasoning in an argument, and evaluating specific claims in an informational text.

The Common Core State Standards is not alone in its emphasis on informational texts. The 2009 NAEP reading assessment makes a clear distinction between literary texts and informational texts and measures student comprehension in these two different text types respectively. As indicated in Table 1, the 2009 NAEP reading assessment has increasing proportion of informational texts in secondary grade levels. For the first time in the NAEP history, student comprehension in literary texts and informational texts were

reported separately as two subscales (0-500 scale) in the 2009 NAEP reading assessment. Unfortunately, to this date no research has been conducted utilizing the rich data collected in the NAEP 2009 reading assessment to explore how adolescent’s reading comprehension in different text types are associated with student-level variables (e.g., reading strategies, reading motivation) and school-level variables.

Table 1. Percentage of passages by text type and grade

Grade	Literary texts	Informational texts
4	50% 30% literary narrative 10% literary nonfiction 10% poetry	50% 40% exposition 10% argumentation/persuasive (2-4 embedded within procedural text)
8	45% 20% literary narrative 15% literary nonfiction 10% poetry	55% 30% exposition 25% argumentation/persuasive (2-3 embedded within procedural text)
12	30% 20% literary narrative 5% literary nonfiction 5% poetry	70% 30% exposition 30% argumentation/persuasive (2-3 embedded within procedural text) 10% stand-alone procedural (2-3 embedded)

Sources: National Center for Education Statistics (2009).

Moreover, findings from the reading research literature and motivation literature suggest that the examination of reading comprehension should be differentiated between informational texts and literary texts. The 2011 PIRLS results show that American students scored lower on informational texts than on literary texts (Mullis, Martin, Foy, & Drucker, 2012). This implies that different reading processes/strategies may have been involved when students are engaged with literary and informational texts. Similarly, findings from the motivation literature also seem to suggest that the relation between

reading motivation and reading comprehension should be differentiated between informational texts and literary texts (Wigfield, Cambria, & Ho, 2012). In this study I examine eighth-graders' reading comprehension of informational and literary texts. In addition, I also examine whether the associations among student-level variables, school-level variables and eighth-graders' reading comprehension vary as a function of text type.

### **2.5. The 2009 National NAEP Reading Assessment**

The NAEP is the largest nationally representative assessment measuring American students' academic achievement in grades four, eight, and twelve (NCES, 2015). According to the NAEP legislation, the goal of NAEP is "to provide, in a timely manner, a fair and accurate measurement of student academic achievement and reporting of trends in such achievement in reading, mathematics, and other subjects" (section 303(b)(1), National Assessment of Educational Progress Reauthorization Act, P.L. 107-279). The NAEP assessments include national assessment, state assessment, the Trial Urban District Assessment (TUDA), and the long-term trend assessment (LTT). In the current study, I will examine the 2009 national NAEP reading assessment, with a particular focus on eighth-graders' reading comprehension.

The rationale for using this dataset is as follows: (a) The conceptual framework of the 2009 NAEP reading assessment was grounded in current scientifically-based research on literacy education compared with the old framework used between 1992 and 2007; (b) For the first time in the NAEP history, student comprehension in literary texts and informational texts were reported separately in the 2009 NAEP reading assessment, which allows me to examine adolescents' reading comprehension as differentiated in these two dimensions; (c) The 2009 national NAEP reading assessment provides valid

and reliable reading measures and high quality data to investigate my research questions;

(d) Since I am interested in American adolescent's reading practices in school, this national dataset allows me to take a closer look at their reading practices and provides me with the opportunity to further examine the associations between their reading practices and their reading comprehension. Additionally, results from the analyses based on the 2009 national reading assessment can be reasonably generalized to the population of American eighth-graders.

In the following section, I will review (1) the NAEP assessment format, (2) the procedure for selecting reading materials, (3) the scoring procedure, (4) the item response theory scaling, (5) the construct validity of NAEP reading assessment, as well as (6) reliability of the NAEP assessment. In reviewing these topics, I argue that although the assessment format and testing situation may not necessarily reflect adolescents' actual daily reading experiences, the 2009 national NAEP reading assessment provides valid and reliable reading measures.

### **2.5.1. Assessment Format**

The 2009 NAEP reading assessment is a paper-pencil assessment, including multiple choice and constructed response items. It is administered to test-takers in two 25-minute blocks. Students receive a test booklet containing the reading materials and comprehension questions. Students demonstrate how well they understand reading materials by responding to multiple-choice items and constructed-response items which give students the opportunities to explain, elaborate, and support their ideas. Each multiple-choice item has four options, only one of which is correct. About half of the questions are multiple-choice items and the other half constructed – response questions,



NAEP booklets use balanced incomplete block (BIB) spiraling design to assign blocks of cognitive items to student test booklet, which allows each student to respond to two blocks of items -- about 20-25 items per student within limited testing time. More specifically, cognitive items and background questions are assembled into booklet, according to the design presented in Table 2. In a BIB design, the cognitive blocks are balanced, which means each cognitive block appears an equal number of times in every possible position. Each cognitive block is also paired with every other cognitive block in a test booklet exactly the same number of times (NAGB, 2009). The total number of cognitive items per block is 10-12 items, including 4-5 multiple-choice items, 4-5 short-constructed response items, and 1 extended constructed-response item. An example of the 2009 NAEP reading booklet configuration is presented in Table 2. Because not every student answers every item, this BIB design is in line with NAEP's goal of making inferences about reading achievement for groups of students (e.g, White students, Black students), rather than that of individual students or schools.

Table 2. Examples of 2009 NAEP reading booklet configuration by section, block, and booklet number

<b>Booklet number</b>	<b>Section 1 Cognitive block 1</b>	<b>Section 2 Cognitive block 2</b>	<b>Section 3 General student background questions</b>	<b>Section 4 Reading background questions</b>
1	R1	R2	D1	RB1
2	R1	R3	D1	RB1
3	R2	R3	D1	RB1
4	R2	R4	D1	RB1
5	R3	R4	D1	RB1
6	R3	R5	D1	RB1
7	R4	R5	D1	RB1
8	R4	R6	D1	RB1

Sources: National Center of Educational Statistics (2011)

### **2.5.2. Reading Materials Selection Procedure**

While the testing situation in the 2009 eighth-grade NAEP reading assessment may not necessarily reflect adolescents' actual daily reading experiences, the high quality reading materials and the use of well-crafted test items all lend support to the validity of the 2009 NAEP reading assessment as a measure of reading comprehension. In the 2009 NAEP eighth-grade reading assessment, the reading passages are taken from authentic texts typical of those read by eighth graders in their daily life (National Assessment Governing Board, 2009). The selected texts are nearly identical to the original sources, which reflects NAEP's intention to approximate students' actual daily reading experiences. The length of reading passages is from 400 to 1000 words. The passages range in difficulty from the level of least proficient readers (about two grade levels below an average eighth-graders) to the most proficient readers (about four grade levels above the average eighth-graders). Several methods of evaluating reading passages are used to ensure the best quality reading materials appropriate for eighth-graders, including expert judgement, passage mapping, sensitivity issues, and readability formulas (National Assessment Governing Board, 2008). Released reading passages from the 2009 national NAEP reading assessment are presented in Appendix A. The considerations for selecting reading materials for the 2009 national NAEP reading assessment are presented in Table 3.

A closer look at the released passages from the 2009 NAEP reading assessment -- one exposition text (*Alien Invasion*) and one argumentation text (*Home on the Range*), suggest that these authentic reading materials have the characteristics that are shown in good quality informational books, including organization (problem and solution), content

features (e.g., topics and supporting ideas), and graphic features (e.g., titles, subheadings, captions, photos, bold print).

Table 3. Considerations for selecting stimulus material for the 2009 NAEP reading assessment

Literary Text	Informational Text
<p><u>Essential characteristics</u></p> <ul style="list-style-type: none"> <li>• Ability to engage reader</li> <li>• Well-written, rich text</li> <li>• Recognized literary merit</li> <li>• Theme/topic appropriateness by grade level</li> </ul>	<p><u>Essential characteristics</u></p> <ul style="list-style-type: none"> <li>• Ability to engage reader</li> <li>• Well-written, rich text</li> <li>• Recognized literary merit</li> <li>• Theme/topic appropriateness by grade level</li> </ul>
<p><u>Grade Appropriateness</u></p> <ul style="list-style-type: none"> <li>• Complexity of characters</li> <li>• Number of characters</li> <li>• Vocabulary</li> <li>• Sophistication in use of literary devices</li> <li>• Complexity of dialogue</li> <li>• Point of view</li> <li>• Complexity of theme (major/minor)</li> <li>• Use of time (flashback, progressive/digressive)</li> <li>• Illustrations</li> </ul>	<p><u>Grade Appropriateness</u></p> <ul style="list-style-type: none"> <li>• Topic</li> <li>• Vocabulary</li> <li>• Concepts (number, familiarity, abstractness)</li> <li>• Curricular appropriateness at grade level</li> <li>• Integrity of structure</li> <li>• Types of adjunct aids</li> <li>• Explicitness of perspective</li> <li>• Style</li> </ul>
<p><u>Balance</u></p> <ul style="list-style-type: none"> <li>• Reflective of our literary heritage</li> <li>• Style</li> <li>• Variety of sentence and vocabulary complexity</li> <li>• Appropriateness of mode (prose vs. poetry)</li> <li>• Traditional as well as contemporary</li> <li>• Representative of varied historical periods, cultures, socio-economic backgrounds, etc.</li> <li>• Genre</li> </ul>	<p><u>Balance</u></p> <ul style="list-style-type: none"> <li>• Varied content areas</li> <li>• Style</li> <li>• Genre</li> <li>• Variety of sentence and vocabulary complexity</li> <li>• Appropriateness of mode</li> </ul>

Sources: National Center for Education Statistics (2009).

### **2.5.3. The Scoring Procedure**

The rigorous scoring procedure contributes to the reliability and validity of the 2009 NAEP reading assessment. In the scoring procedure, for each of the multiple-choice items students either get a correct answer (1 point) or an incorrect answer (0 point). Students' generated answers for the constructed-response items are scored by trained scorers. These graders use standardized scoring guides in their scoring of constructed-response items. Some short-constructed-responses items are scored dichotomously, either acceptable (1 point) or unacceptable (0 point), while other short constructed-responses items are scored on a three-category scale (2 = correct, 1= partial, 0= incorrect). Extended constructed-responses items are scored on a four-category scale: extensive (3 points), essential (2 points), partial (1 point), and incorrect (0 point). Measures are taken to ensure a rigorous quality control in the scoring procedure. Results of the 2009 national NAEP reading assessment are reported as average scores for subgroups of students (e.g., White, Black) on the NAEP 0- 500 scale. Percentage of students in each of the three achievement levels (i.e., basic, proficient, advanced) is also reported.

The rationale for the NAEP scoring procedure is the following: In order to ensure reliable, valid, and quick scoring, NAEP uses a combination of automated scoring system and human graders. The use of automated scoring for multiple-choice items increases the efficiency of scoring and is considered to be cost effective. Because the use of human graders in scoring constructed-response items is likely to introduce error to the scoring process, NAEP assessment uses measures such as screening, training graders, using the standardized scoring guide, monitoring inter-rater reliability, back reading to ensure

consistent, valid and reliable scoring. The NAEP assessment takes these measures in the scoring procedure in order to reduce sources of uncertainty and enhance the quality of the information obtained from the scoring process.

#### **2.5.4. The Item Response Theory Scaling**

Item response theory (Lord, 1980) is used in the NAEP to provide a common scale for comparing student performance. Item response theory was originally developed to measure individual students' abilities, but each individual student should respond to at least 50 or more test items to get precise estimation (Mislevy, Johnson, & Muraki, 1992). In the NAEP assessment, however, each individual student is only administered a fifth or a sixth of the total test items (20-25 test items), which makes it impossible to obtain accurate estimation of each individual student's proficiency level. Therefore, the goal of NAEP assessment is not to get accurate estimation of each individual student's reading proficiency. Instead, the goal is to get accurate estimation of reading proficiency for subgroups of student defined by various characteristics (e.g., Black, female). Item response theory is used in the NAEP reading assessment to estimate the national average scale score and average scale scores for each subgroup of students. Most importantly, in the NAEP assessment, each student only takes a small section of the test items, yet IRT modeling can still put student performance on a common scale and compare student performance across groups (Allen, Donoghue, & Schoeps, 2001).

In addition to putting student performance on a common scale, item response theory (IRT) is also used in the NAEP to model *item level* parameters, including the difficulty parameter, the discrimination parameter, and the guessing parameter for each test item. The item difficulty parameter is an index for the difficulty level of the specific

item. The item discrimination parameter is an index for how well a specific test item differentiates among the students at different proficiency levels. The item guessing parameter is the probability of students at low ability levels scoring right at a very hard item (Ayala, 2009). Currently three types of IRT models are used in the NAEP reading assessment: the two-parameter (2PL) IRT model estimating item difficulty and discrimination parameters for the short constructed-response items that are scored dichotomously, the three-parameter IRT model (3PL) estimating item difficulty, discrimination, and guessing parameters for the multiple-choice items which are scored dichotomously, and the generalized partial credit IRT model for the polytomous items (Allen, Donoghue, & Schoeps, 2001). In summary, the NAEP reading assessment uses IRT models as a link between students' reading comprehension proficiency and their responses to multiple-choice and constructed-response items. A graphic representation of the relation between IRT models and the observable variables in the 2009 NAEP reading assessment is presented in Figure 1.

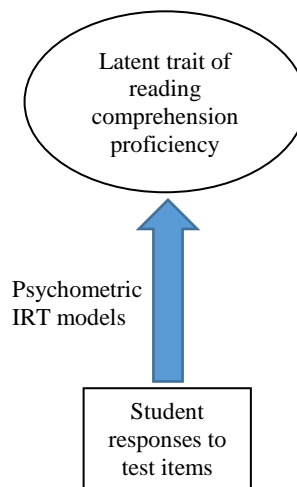


Figure 1. The IRT model links the latent reading comprehension and the observable variables in the 2009 NAEP assessment

In summary, item response theory is the modeling machinery linking what can be observed (student responses to a specific item) and what can not be directly observed (student reading comprehension proficiency). This measurement approach ensures the validity of the scale scores reported in the NAEP assessment.

### **2.5.5. Construct Validity of the 2009 NAEP Reading Assessment**

Construct validity is vitally important before making valid inferences about student proficiency levels measured in educational assessments. Messick (1994) point out, in designing assessment, it is important to keep in mind (a) the construct that we intend to make inference about, (b) students' behaviors or performances that reveal the construct we care about. This echoes the "nomological network" proposed by Cronbach and Meehl (1995) where the laws "may relate (a) observable properties or quantities to each other; or (b) theoretical constructs to observables" (p. 290). In other words, test designers need to first consider what knowledge, skills, strategies are involved in the construct that they are trying to measure and then take a construct-centered approach in their task design so that their tasks was able to elicit, capture, and measure students' behaviors and abilities. If the tasks fail to capture a complete picture of the construct, there was serious problems of underrepresentation of the construct. Therefore, I will first examine the construct of reading that the 2009 NAEP intends to make inferences about, and then examine how it is measured in the 2009 NAEP reading assessment.

According to National Assessment Governing Board (2009), the construct of reading in the 2009 NAEP reading assessment is conceptualized as an "active and complex process that involves understanding written text, developing and interpreting meaning, and using meaning as appropriate to type of text, purpose, and situation"

(National Assessment Governing Board, 2008, p. 2). More specifically, this conceptualization of reading distinguishes between two major dimensions, namely informational texts and literary texts. Across these two text types, three thinking processes involved in reading comprehension are measured in the 2009 NAEP reading assessment, including the abilities to (a) locate and recall information from text, (b) integrate and interpret information and ideas presented in text, (c) critique and evaluate information and ideas in text and the ways in which authors present text. Therefore, the construct that the 2009 NAEP reading assessment intends to make inferences about is students' reading comprehension proficiency, which is measured by tapping into students' three cognitive processes across the two dimensions of informational texts and literary texts. A detailed description of the cognitive targets measured in the 2009 NAEP reading assessment is presented in Table 4.

Table 4. Cognitive targets measured in the 2009 NAEP reading assessment

<b>Locate/Recall</b>		<b>Integrate/Interpret</b>	<b>Critique/Evaluate</b>
<b>Both Literary and Informational Text</b>	Identify textually explicit information and make simple inferences within and across texts, such as: <ul style="list-style-type: none"> <li>• Definitions.</li> <li>• Facts.</li> <li>• Supporting details.</li> </ul>	Make complex inferences within and across texts to describe problem and solution, cause and effect: <ul style="list-style-type: none"> <li>• Compare or connect ideas, problems, or situations.</li> <li>• Determine unstated assumptions in an argument.</li> <li>• Describe how an author uses literary devices and text features.</li> </ul>	Consider text(s) critically to: <ul style="list-style-type: none"> <li>• Judge author's craft and technique.</li> <li>• Evaluate the author's perspective or point of view within or across texts.</li> <li>• Take different perspectives in relation to a text.</li> </ul>
<b>Specific to Literary Text</b>	Identify textually explicit information within and across texts, such as:	Make complex inferences within and across texts to: <ul style="list-style-type: none"> <li>• Infer mood or tone.</li> </ul>	Consider text(s) critically to: <ul style="list-style-type: none"> <li>• Evaluate the role of literary devices in conveying meaning.</li> </ul>



	<ul style="list-style-type: none"> <li>• Character traits.</li> <li>• Sequence of events or actions.</li> <li>• Setting.</li> <li>• Identify figurative language.</li> </ul>	<ul style="list-style-type: none"> <li>• Integrate ideas to determine theme.</li> <li>• Identify or interpret a character’s motivations and decisions.</li> <li>• Examine relations between theme and setting or characters.</li> <li>• Explain how rhythm, rhyme, or form in poetry contribute to meaning.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine the degree to which literary devices enhance a literary work.</li> <li>• Evaluate a character’s motivations and decisions.</li> <li>• Analyze the point of view used by the author.</li> </ul>
<p><b>Specific to Informational Text</b></p>	<p>Identify textually explicit information within and across texts, such as:</p> <ul style="list-style-type: none"> <li>• Topic sentence or main idea.</li> <li>• Author’s purpose.</li> <li>• Causal relations.</li> <li>• Locate specific information in text or graphics.</li> </ul>	<p>Make complex inferences within and across texts to:</p> <ul style="list-style-type: none"> <li>• Summarize major ideas.</li> <li>• Draw conclusions and provide supporting information.</li> <li>• Find evidence in support of an argument.</li> <li>• Distinguish facts from opinions.</li> <li>• Determine the importance of information within and across texts.</li> </ul>	<p>Consider text(s) critically to:</p> <ul style="list-style-type: none"> <li>• Analyze the presentation of information.</li> <li>• Evaluate the way the author selects language to influence readers.</li> <li>• Evaluate the strength and quality of evidence used by the author to support his or her position.</li> <li>• Determine the quality of counterarguments within and across texts.</li> <li>• Judge the coherence, logic, or credibility of an argument.</li> </ul>

Sources: National Center for Education Statistics (2009).

A further analysis of the three cognitive processes and the test items released from the 2009 NAEP reading assessment indicates that overall the construct of reading comprehension proficiency is adequately captured. As presented in Table 4, each of the three cognitive targets is operationalized as a set of distinct student behaviors in reading informational texts and literary texts. A closer examination of the released test items of

the exposition text “Alien Invasion” and argumentation text “Home on the Range” indicates that among the ten items, eight items are designed to measure student high-order thinking process and two items are designed to measure student vocabulary. Among the eight items, four items are designed to measure student thinking process of locating information, including identifying author’s purpose and locating specific information from text. Two items are designed to measure student thinking process of integrating and interpreting, including providing supporting information and finding evidence in support of an argument. Additionally, three items are designed to measure student thinking process of evaluating and critique, including analyzing the presentation of information, evaluating the way the author selects language to influence readers, judging the coherence, logic, or credibility of an argument. Overall these items adequately capture the reading construct conceptualized in the 2009 NAEP reading assessment.

#### **2.5.6. Reliability of the 2009 NAEP Reading Assessment**

The accuracy or precision of an assessment is another important issue to take into account in analyzing secondary dataset. If the assessment is not reliable, then the inferences to be made about students’ reading proficiency levels may be meaningless (Afflerbach, 2007). The NAEP reading assessment has taken many measures to ensure a high reliability of this assessment. For instance, multiple measures (e.g., using the standardized scoring guide, monitoring inter-rater reliability) are taken in the scoring procedure to make sure valid and reliable scores are obtained. In addition, a consistent and uniform administration procedure is used in the administration stage to rule out the

plausible alternative explanation of variations caused by the different administration procedures.

In summary, as a high quality large-scale assessment, the NAEP has made every effort to maintain its rigorous quality control in almost every aspect of this assessment, including item selection and development stage, the administration stage, and the scoring stage. These efforts are made to ensure a high validity and reliability in the national NAEP assessment so that test analysts was able to make valid inferences about students' proficiency levels in reading.

### CHAPTER THREE: METHOD

The goal of this study was to investigate the associations among student-level characteristics (e.g., reading motivation, school reading amount), school-level characteristics (e.g., public or private school), and eighth-graders' reading comprehension of informational and literary texts in the 2009 NAEP assessment. In particular, I explored the demographic, cognitive, motivational, and school factors that contributed to the White-Black achievement gap and the White-Hispanic achievement gap. More specifically, in accordance with hierarchical linear modeling (HLM), this study explored three research questions:

Research question 1. *How are student characteristics (e.g., gender, ethnicity, socioeconomic status, reading motivation) associated with eighth-graders' reading comprehension of informational and literary texts?*

Research question 2. *Does the White-Black achievement gap narrow after controlling all the student-level variables? Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?*

Research question 3. *How are school characteristics associated with eighth-graders' reading comprehension of informational texts and literary texts? How are school characteristics associated with the White-Black achievement gap? How are school characteristics associated with the White-Hispanic achievement gap?*

The rationale for analyzing the 2009 NAEP reading assessment to answer these research questions was as follows: (a) The conceptual framework of the 2009 NAEP reading assessment was grounded in current scientifically-based research on literacy education compared with the old framework used between 1992 and 2007; (b) For the

first time in the NAEP history, student comprehension in literary texts and informational texts were reported separately in the 2009 NAEP reading assessment, which allowed me to examine adolescents' reading comprehension as differentiated in these two dimensions; (c) The 2009 national NAEP reading assessment provided valid and reliable reading measures and high quality data to investigate my research questions; (d) Since I was interested in literacy development during early adolescence years, this national dataset allowed me to take a closer look at their reading practices and provided me with the opportunity to further examine the associations between adolescents' reading practices in school and their reading comprehension. Additionally, results from the analyses based on the 2009 national reading assessment can be reasonably generalized to the population of American eighth graders.

I begin this chapter with an overview of the sampling design of the 2009 NAEP reading assessment. Next, I describe briefly the participants and the instruments used in the 2009 NAEP reading assessment. Then I present a detailed account of the method I employ in this study and a graphic representation of the research design. I close this chapter with statistical issues involved in analyzing the NAEP data and my data analysis plan.

### **3.1. Sampling Design of 2009 NAEP Reading Assessment**

The national NAEP assessment uses a multi-stage complex sample design to obtain nationally representative samples in grades 4, 8, and 12. More specifically, in stage one, samples from the population of geographic primary sampling units are drawn with probabilities proportional to population. Primary sampling units refer to counties or groups of counties which have a minimum population of 50,000 people. There are about

1,000 primary sampling units across the U.S. For instance, these primary sampling units are primarily defined by states and first classified into four Regions, with each region having about one fourth of the population in the U.S., including Northeast, Southeast, Central, and West. Across these four regions, twenty-two largest primary sampling units are included with certainty, due to their large size. One such example is Washington, DC metropolitan area in the Northeast region. The remaining primary sampling units are drawn with probabilities proportional to their respective population, which means the probabilities of selection may vary a lot among these remaining primary sampling units (Allen, Donoghue, & Schoeps, 2001).

In stage two, samples of schools are randomly drawn from each selected primary sampling unit with probabilities proportional to assigned measures of size (Allen, Donoghue, & Schoeps, 2001). At this stage of sampling, schools were the sampling units. For instance, all the public and private schools serving eighth graders are systematically listed for selection, based on sorting variables, such as region, private/public classification, type of location, high/low minority classification, etc. Each school is assigned a measure of size, reflecting the probability of being selected. For instance, schools that have a very high percentage of Black and Hispanic student get higher measures of size and are oversampled in order to get adequate sample size and increase the reliability of estimates for these students. Similarly, private schools are oversampled as well. Since in stage 1 and stage 2 the selection probability is proportional to the size of primary sampling units and the assigned measures of size, a differential selection probability is involved in sampling. This is different from simple random sampling procedure in which all the sampling units have equal and independent chances of being

selected. Hence, differential sampling rates are used in the first and second stage of sampling design.

In stage three, students within selected schools are randomly selected with equal probability. That is, students within designated schools have equal and independent chances of being selected. In the third stage of sampling students were the sampling units (Allen, Donoghue, & Schoeps, 2001).

According to the National Center for Education Statistics (NCES), this multi-stage sampling design is more efficient in obtaining nationally representative samples and improves reliability of assessment results (Allen, Donoghue, & Schoeps, 2001) as compared with a simple random sampling procedure. As we know, under the simple random sampling procedure all the cases in the population have equal and independent chances of being selected. Yet under the multi-stage sampling design schools and students have differential probabilities of being selected and these differential sampling rates should be taken into account in analysis to produce accurate estimation of population and subpopulation characteristics. The NAEP assessments use weighting procedures to reflect the multi-stage complex sampling design and produce unbiased estimates of population parameters (Allen, Donoghue, & Schoeps, 2001), which was addressed in the section of statistical considerations for analyzing the 2009 NAEP reading assessment.

## **3.2. Participants**

### **3.2.1. Eighth-graders**

The student sample for the 2009 NAEP reading assessment contained a nationally representative sample of 160,900 eighth graders from 7,030 schools. The student sample

represented the target population of all eighth graders in the U.S. who are enrolled in public schools, private schools, Bureau of Indian Education schools, and Department of Defense schools (NCES, 2009). Student participation in NAEP assessment was voluntary. However, states and school districts that received title I funding were required to participate in the NAEP math and reading assessment (NCES, 2011b). School participation rates in the 2009 NAEP reading assessment ranged from 96 to 100 percent in all the states and jurisdictions (NCES, 2011b). Students with disabilities (SD) and English language learners (ELL) who could participate in the assessment with allowable accommodations were included in the sample. Examples of permitted accommodations included extra testing time, larger print test booklet, small group testing or individual testing as opposed to the standard test administration in a group of 30 students.

### **3.2.2. School Principals**

Principals of schools participating in the 2009 NAEP reading assessment were asked to fill out a questionnaire about school-wide student population demographics, school policies, and school characteristics. School environment variables, such as the percentage of students eligible for free and reduced lunch (FARMS), are collected in the principals' questionnaire.

### **3.3. Instrumentation**

The 2009 NAEP reading assessment used a student questionnaire and a school questionnaire to collect information about classroom instructional practices, adolescents' beliefs in reading, the contextual factors that may influence adolescents' reading comprehension, including student race/ ethnicity, socioeconomic status as well as school



environment. The student questionnaire was presented in Appendix B and the school questionnaire was presented in Appendix C.

### **3.3.1. Measure of Adolescent's Reading Comprehension**

The 2009 eighth-grade NAEP reading assessment was administered to test-takers in two 25-minute blocks. Students received a test booklet containing the reading passage and comprehension questions. Student comprehension was measured with multiple-choice items and constructed-response items. Each multiple-choice item had four options, only one of which was correct. About half of the questions were constructed-response format questions, in which students explained, elaborated, and supported their ideas related to comprehension of texts. There were 166 cognitive questions in the 2009 NAEP reading assessment. But no student took all the questions. Instead each student only took a portion of the assessment and the 166 questions were distributed across 25 sets of passages and items. Each set had 10 questions, including both multiple choice and constructed response questions. In terms of cognitive processes, 30% of the test items measured adolescents' ability to critique and evaluate, 50% of the test items on adolescents' ability to integrate and interpret, and 20% of the test items on adolescents' ability to locate and recall (NCES, 2009).

In the 2009 NAEP reading assessment, 55% of the eighth-grade reading passages were informational texts. Eighth-graders' reading comprehension of informational texts, specifically exposition, argumentation, and persuasive text, was measured using their responses to test items that followed an informational text. A sample of released questions and passages in the 2009 NAEP reading assessment is provided in Appendix A. A subscale of reading comprehension in informational texts was provided in the 2009

NAEP reading assessment as a measure of adolescent's reading comprehension in this particular genre.

In the 2009 NAEP reading assessment 45% of the eighth-grade reading passages were literary texts. A subscale of reading comprehension in literary texts was provided in the 2009 NAEP reading assessment as a measure of adolescent's comprehension in this particular text type. Eighth-graders' reading comprehension of literary texts, specifically fiction, literary nonfiction, and poetry, was measured using their responses to cognitive items that follow a literary text.

### **3.3.2. Measure of Teacher's Prompting for Adolescents to Use Reading Strategies**

Reading strategies are defined as deliberate, goal-directed attempts to control and modify the reader's efforts to construct meanings of text (Afflerbach, Pearson, & Paris, 2008). The significance of reading strategies in student reading comprehension has been well established in the literature (Alexander, 2005; Alexander, Graham, & Harris, 1998; Alexander, Kulikowich, & Jetton, 1994; Alexander & Murphy, 1998; Murphy & Alexander, 2002; NICHD, 2000; Pressley & Afflerbach, 1995; Rand Reading Report, 2002). In this study, the student questionnaire was used to collect information about teacher's prompting for students to use reading strategies. Student background questionnaire was included in Appendix B. For instance, the questionnaire asked the question "In your English/Language arts class this year, when reading a story, an article, or other passage, how often does your teacher ask you to do the following?" This question was followed by four items: (a) summarize the passage, (b) interpret the meaning of the passage, (c) question the motives or feelings of the character, and (d) identify the main themes of the passage. There were four options for each of these items,

including “never or hardly ever”, “once or twice a month”, “once or twice a week”, and “every day or almost every day”.

### **3.3.3. Measure of Adolescents’ Reading Motivation**

Reading motivation is defined as individual’s beliefs about reading (Guthrie & Wigfield, 2000). In this study, the student questionnaire was used to collect information about adolescents’ reading motivation. More specifically, the items related to reading motivation were as follows: “when I read books, I learn a lot” (valuing of reading) and “reading is one of my favorite activities” (intrinsic motivation) “reading for fun on your own time” (intrinsic motivation) “talk with your friends or family about something you have read” (pro-social goal).

Given the large amount of research documenting the relationship between student motivation and reading comprehension, it is unfortunate that the 2009 NAEP student questionnaire had very limited number of items on adolescents’ reading motivation. Admittedly, there is a gap between what could have been measured regarding adolescents’ reading motivation and what was actually measured in the 2009 NAEP student questionnaire.

### **3.3.4. Measure of School Reading Amount**

School reading amount refers to the amount of reading that students engaged in school. Student reading amount has traditionally been operationalized as student reading amount in school or out of school (Anderson, Wilson, & Fielding, 1988; Stanovich & Cunningham, 1992; Wigfield & Guthrie, 1997). This study focused on school reading amount, which is defined as the number of pages that students read for school on an average day. One item in student questionnaire asked student this question “about how

many pages a day do you have to read in school and for homework?” followed by 5 options, including (a) 5 or fewer (b) 6-10 (c) 11-15 (d) 16-20 (e) more than 20. Student responses are coded on a 5-point scale, with “5 or fewer” coded as 1, “6-10” coded as 2, “11-15” coded as 3, “16-20” coded as 4, and “more than 20” coded as 5.

### **3.3.5. Measure of Student Characteristics**

The 2009 NAEP reading assessment student questionnaire asked students questions on demographic variables, such as gender, race/ethnicity, and socioeconomic status. I included these variables in this study because these variables provided valuable information about the sociocultural backgrounds in which adolescents lived and learned to read. My goal for including these variables was to see how these demographic variables were associated with reading comprehension of informational texts and literary texts.

**3.3.5.1. Gender.** Gender plays a role in student reading achievement. For instance, the 2011 NAEP Reading results indicated that female students scored higher on average than male students in both grade four and grade eight (National Center of Education Statistics, 2011a). This same pattern has also been observed in the NAEP results in the past 20 years. However, it is still not clear whether adolescent girls have an advantage over adolescent boys in both literary texts and informational texts. In this study the school record of gender was used to investigate whether there is a gender difference in adolescents’ reading comprehension of informational texts and literary texts. It was a dummy coded variable, with female coded as 1 and male coded as 0.

**3.3.5.2. Race/ethnicity.** The persistent achievement gap between White students and minority students, many of whom come from disadvantaged backgrounds, is a

pressing educational issue. A disproportionately higher percentage of African-American and Hispanic students struggle in reading. In this study the student-reported race/ethnicity variable was used as an indicator of student membership in ethnic groups. There were five categories in this variable: White, Black, Hispanic, Asian, and American Indian. A series of dummy coded variables was used to indicate each subgroup of students, including Black, Asian, Hispanic, American Indian, and the reference group White students.

**3.3.5.3. Socioeconomic status.** Student socioeconomic status has long been established as a significant predictor of student academic achievement (White, 1982). Students from low-income families are more likely to be at risk for failure than students from middle-income families (Snow, Burns, & Griffin, 1998). Therefore, student socioeconomic status was an important student-level variable that I included in this investigation of eighth-graders' reading comprehension. In this study adolescents' socioeconomic status was measured using student eligibility for National School Lunch Program based on school records, and mother's education as well as father's education. The decision to use these variables as a proxy for student socioeconomic status aligned well with the convention in educational research stated in the influential National Research Council Report "socioeconomic differences are conventionally indexed by such demographic variables as household income and parents' education and occupation, alone or in some weighted combination" (p.125, Snow, Burns, & Griffin, 1998). Student eligibility for National School Lunch Program was a dummy coded variable, whereas parental education was a continuous variable.

### **3.3.6. Measure of School Characteristics**

School characteristics included in this study were the following: School socioeconomic status, school type, and school academic environment.

**3.3.6.1. School-level socioeconomic status.** The influence of socioeconomic status on student achievement is also evident on the aggregate level, that is, at the school/community level (Snow, Burns, & Griffin, 1998). In other words, socioeconomic status is not only a student-level sociocultural factor, it is also a school-level/community-level sociocultural factor. In the National Research Council Report, Snow, Burns, and Griffin (1998) note that “In educational studies, furthermore, the socioeconomic level of a school or district may be estimated by the percentage of the enrollment qualifying for federal lunch subsidies” (p.125). Hence, in this study the percentage of students eligible for National School Lunch Program was used as a proxy for school-level socioeconomic status. Additionally, school participation in Title I funding and school aggregate of parental educational level were also included as proxy for school-level socioeconomic status. The proportion of Black, Hispanic, Asian, and American Indian students were also included to capture school demographic characteristics.

**3.3.6.2. School type.** The impact of school environment on student achievement is also reflected in the NAEP results. The 2011 NAEP Reading results indicated that eighth graders in private schools scored on average higher than those in public schools. The same pattern holds true in the NAEP results for the past two decades (National Center of Education Statistics, 2011a). Previous studies on NAEP assessments indicated that after adjusting for differences in student characteristics, the differences between public schools and private schools in reading comprehension among eighth graders still

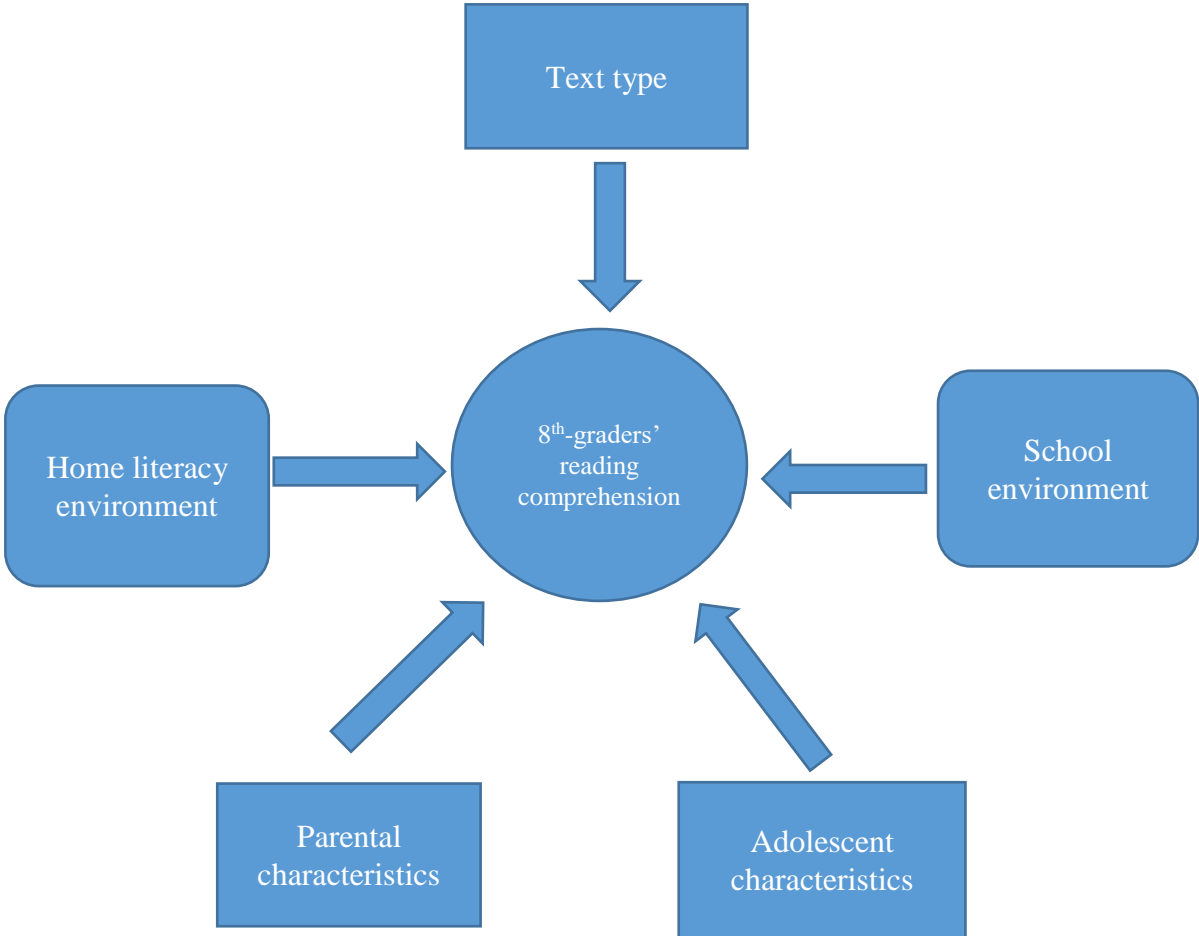
remained significant, with private school having a higher mean than public schools (Braun, Jenkins, & Grigg, 2006). Their findings indicated that eighth-graders' membership in public school or private school influenced their reading performance. Therefore, school type as indicated as public or private was included in this study as a dummy coded variable, with private coded as 1 and public coded as 0.

**3.3.6.3. School-level academic environment.** In addition to school-level socioeconomic status and school type, this study also included school-level academic environment that was captured in the following variables: Student-level aggregate of items related to eighth-graders' use of reading strategies, student-level aggregate of reading motivation, reading amount, reading skills/strategies, group reading activities, individual reading activities, and percent of students absent on average day.

### **3.4. Conceptual Framework in this Study**

The goal of this dissertation was to analyze the 2009 NAEP reading assessment for eighth graders and investigate the interplay among student characteristics, school characteristics, home literacy environment, parental characteristics, and eighth-graders' reading comprehension of informational and literary texts. More specifically, student-level characteristics referred to student demographics, their use of reading strategies, reading motivation, and school reading amount. School-level characteristics referred to school type, school demographics, school socioeconomic status, and school academic environment. Home literacy resources referred to magazines, newspapers, books, encyclopedias, and computers at home. Parental characteristics referred to parental educational level and family income. A graphic representation of the conceptual framework in this study is presented in Figure 2.

Figure 2. Graphic representation of the conceptual framework





## **3.5. Data Analysis Plan**

### **3.5.1. Factor Analysis**

Factor analysis is a data-reduction procedure used to identify the interrelationships among a large set of observed variables/items and then, through a series of structural-analyzing procedure achieve the goal of dimension reduction of multivariate data (Nunnally & Berstein, 1994). A factor is a linear combination of related observed variables that represents a specific underlying dimension of a construct. Factor analysis can be used for theory and instrument development. In this study factor analysis was used for scale construction. Factor analysis is necessary in this study to determine how well the questionnaire items load on the underlying latent factors which are not directly observable. More specifically, I used principle axis factoring to capture the factor underlying the questionnaire items.

Once factors are extracted, rotation is an important decision. There are two kinds of rotation: orthogonal and oblique rotation. Orthogonal rotation preserves the independence of the underlying factors, whereas oblique rotation has the assumption that the underlying factors are not independent, but related to one another (Pett, Lackey, Sullivan, 2003). In this study I used oblique rotation because there were theoretical and empirical evidence to believe that each set of the questionnaire items used to capture the underlying latent variables were interrelated rather than independent from one another. So based on theoretical and empirical reasons, I used oblique rotation in the analysis. Based on factor analysis results, I retained those variables with loadings higher than .4, creating the scale, summing up student responses to each of the items in the scale. Then I computed the reliability of the factor-based scale.

### **3.5.2. Hierarchical Linear Modeling**

I used the hierarchical linear modeling approach (HLM) to model the nested data structure (i.e., students nested within schools) in the 2009 NAEP reading assessment in order to answer my research questions. The decision to use hierarchical linear modeling approach was based on my research questions and the multistage sampling design employed in the NAEP assessment. Raudenbush and Bryk (2002) point out that ignoring the hierarchical data structure will result in aggregation bias and misestimated precision, which undermines the accuracy of inferences drawn from research. I chose to use hierarchical linear modeling as the analytical approach in my research also because HLM was highly recommended by the National Center of Education Statistics and the National Assessment Governing Board as the appropriate approach to analyze large-scale datasets, such as the NAEP assessment.

More specifically, I used a two-level analysis with students at the first level and schools at the second level. HLM 7 software was used for this analysis, with full maximum likelihood estimation. At the first level, I examined the associations between student-level characteristics and reading comprehension of informational and literary texts. At the second level, I investigated the associations between school characteristics and reading comprehension of informational and literary texts.

### **3.5.3. Statistical Considerations for Analyzing the 2009 NAEP Reading Assessment**

The multi-stage sampling design and the balanced incomplete block (BIB) design employed in the NAEP assessment make standard statistical procedures inappropriate for analyses using NAEP data. In the following section, I cover statistical considerations for conducting analysis on NAPE results, including (1) weighting procedures, (2) plausible

values, (3) estimation of standard errors, (4) centering decision, (5) missing data, (6) testing HLM assumptions.

**3.5.3.1. Weighting procedures.** The multi-stage complex sampling design used in the NAEP assessments involves oversampling certain groups of schools and students (i.e., public schools with high percentage of Black and/or Hispanic students) in order to obtain sufficient sample sizes to make inferences about the subpopulation characteristics. This sampling procedure produces resulting samples in which certain groups of students are overrepresented than there are in actual population. In other words, differential sampling rates are used in the multi-stage complex sampling design to enhance the precision of estimates of subpopulation characteristics. This differential sampling rates must be taken into account to reflect the appropriate representation of various groups of students in the population (Allen, Donoghue, & Schoeps, 2001; Johnson, 1989). The NAEP assessments use student weights and school weights to achieve unbiased estimation of population parameters.

Each student in the national NAEP assessments are assigned a weight, which takes into account the differential sampling rates and appropriately reflects the proportion of subgroups of students in the population. The final student weights are calculated based on student base weights, adjustment of school base weights, nonresponse adjustment, trimming adjustment, and poststratification adjustment. (Allen, Donoghue, & Schoeps, 2001; NCES, 2011b). Student base weight reflects how many students in the population of interest are represented by each sampled student. Similarly, each school is assigned a school weight which is a function of school base weight, adjustment of nonresponse, and trimming adjustment. School base weight reflects the number of schools each sampled

school represents. Thus, sampling weights should be utilized in all statistical analysis to ensure unbiased and precise estimates of population parameters.

**3.5.3.2. Plausible values.** Item response theory was originally developed to measure individual students' abilities, but each individual student should respond to at least 50 or more test items to get precise estimation (Mislevy, Johnson, & Muraki, 1992). In the NAEP assessment, however, each individual student is only administered a fifth or a sixth of the total test items (20-25 test items), which makes it impossible to obtain accurate estimation of each individual student's proficiency level. Nevertheless, plausible values are provided in the NAEP assessment to represent the proficiency distribution for each individual student (Mislevy, Johnson, & Muraki, 1992). Plausible values are randomly selected values from the distribution of potential proficiency scale scores for each student (Johnson, 1989). The NAEP assessment provides each individual student with five plausible values, since five values make it possible to compute appropriate standard errors. These plausible values were used to estimate the population parameters of various NAEP reporting groups, such as White students, Black, Hispanic, and Asian students (NCES, 2011b). When the underlying models are correctly specified, the plausible values provide valid estimates of population characteristics. However, these plausible values are not test scores, instead these values are just partial computations used to estimate group performance. I used plausible values in my analysis.

**3.5.3.3. Estimation of standard errors.** Standard error is the measure of the variability of a sample statistic (e.g., sample mean) which indicates how well the sample statistic estimates the corresponding population parameter (NCES, 2009). The higher the value of a standard error, the larger the variability of the sample statistics, and the less

certain we are about the population parameter's value. Standard error is often used in tests of statistical significance. Differences of the same magnitude may or may not be statistically significant, depending on the standard error of the estimate (NCES, 2009). For instance, a 5-point change in average score for White students may be statistically significant, whereas a 5-point change in average score for American Indian students may not be statistically significant due to a large standard error. The standard formulas to compute standard error is inappropriate in the NAEP assessment due to the multistage sampling design. The multistage sampling design employed in the NAEP assessment results in the dependence of observations, which violates the independence assumption in simple random sampling procedure. Therefore, it is inappropriate to use standard formulas for estimating the standard error of sample statistics, since this will most likely result in underestimated standard errors and overestimated statistically significant results (inflated type I error rate higher than alpha). In this study I used the standard error formula suggested by Hox, van Buuran, and Jolani (2016) for multiple-level data to compute standard errors of parameters of interest.

**3.5.3.4. Centering.** Centering decisions are important decisions in conducting multilevel modeling analysis. McCoach points out (2010) that in multilevel modeling centering decisions impact the interpretation of the parameter estimates. There are generally two main centering techniques for independent variables in multilevel modeling analysis, namely *grand mean centering* and *group mean centering* (McCoach, 2010). In grand mean centering, the overall mean of the variable is subtracted from all scores. In group mean centering, the group mean is subtracted from the score for each person in that cluster. That is, all the between-school variations are removed from the variables and thus

producing accurate and unbiased regression coefficient estimates (Enders & Tofighi, 2007; Raudenbush & Bryk, 2002). As such, the transformed score captures a person's standing relative to other members in the group. Centering decisions are especially important for the lower-level (level 1) continuous independent variables because the choice of centering at the lower level (level 1) impacts the interpretation of both the lower- and higher-level (level 2) parameter estimates.

Following McCoach's (2010) suggestion, I used group-mean centering for all the student-level variables. In addition, I introduced aggregates of the group-mean centered variables at the school level to account for the between-cluster variability. The rationale for group-mean centering these variables was based on the consideration that these student-level variables are of substantive interest in this study. In group-mean centering these key variables all the between-school variations were removed from these predictors and thus producing accurate and unbiased regression coefficient estimates (Enders & Tofighi, 2007; Raudenbush & Bryk, 2002).

**3.5.3.5. Missing data.** The extent and pattern of missing data for all variables at level 1 and level 2 was reported in this study. Graham and Hofer (2000) suggested that we should always use some effective procedures to deal with missing data, rather than simply discarding those cases with missing data. I used multiple imputation to deal with the missing data issue.

**3.5.3.6. Testing assumptions in HLM.** Assumptions regarding level-1 and level-2 models was tested to see whether these assumptions are adequately satisfied. More specifically, the following assumptions was tested: (1) level-1 residuals ( $r_{ij}$ ) are independent and normally distributed with a mean of 0 and variance  $\sigma$ , (2) the level-1

predictors are independent of residuals ( $r_{ij}$ ), (3) the vectors of random errors at level-2 are multivariate normal and the random-error vectors are independent among the level-2 units, (4) the level-2 predictors are independent of level-2 residuals (Raudenbush & Bryk, 2002).

To test these assumptions, I ran the HLM models and created files with residuals, predicted values, and observed values for the variables that are specified in the level-1 and level-2 models. To address the level-1 normal residual distribution assumption, I examined the QQ plot with observed values against expected values and see if there is any serious deviation from the straight line. The way to examine whether level-1 residuals have a mean of 0 and a variance of  $\sigma^2$  was to create a scatter plot with the fitted values on the x-axis and the level-1 residuals on the y-axis. In addition, I examined a box plot in which the x-axis is the grouping variable and the y-axis is the level-1 residuals. In this box plot I examined whether the residuals are centered at 0 and whether the variances are constant across groups. Finally, I conducted a statistical test for homogeneity of variance in HLM and see whether the homogeneity of variance assumption was adequately satisfied. HLM is fairly robust to moderate violations of homogeneity of variance and non-normality, so if the violation was not extreme, I do not worry too much about the violation of assumptions.

For the level-2 assumptions, I created a scatterplot in which Mahalanobis distances were plotted on the x-axis and chi-square percentages were plotted on the y-axis. I examined if there was any serious deviation from the straight line or not. To test the level-2 residual constant variance assumption, I examined the scatterplot of fitted values and residuals. Additionally, I created scatterplots for each level-2 predictors and

the level-2 residuals (intercept or slopes) to test the assumption about the independence between level-2 predictors and level-2 residuals. The scatter plot should be randomly distributed. Violation of level-2 assumption was not as problematic as level-1 assumption. Level-2 coefficients should remain unbiased even for heterogeneous data (Raudenbush & Bryk, 2002).

#### **3.5.4. Data Analysis Plan to Address Research Questions**

My first research question is: *How are student-level variables (e.g., reading motivation, gender, ethnicity) associated with eighth-graders' reading comprehension of informational and literary texts?* I entered student-level variables (i.e., gender, race/ethnicity, FARMS, parental education) to the model, with each of these variables group-mean centered. I also entered the interaction terms to the level-1 model.

My second research question is: *Does the White-Black achievement gap narrow after controlling all the student-level variables? Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?* I entered student-level variables (i.e., gender, race/ethnicity, FARMS, parental education) to the model, with each of these variables group-mean centered. I also entered the interaction terms to the level-1 model.

My third research question is: *How are school-level factors associated with eighth-graders' comprehension of informational texts and literary texts? How are school characteristics associated with the White-Black achievement gap? How are school characteristics associated with the White-Hispanic achievement gap?* I entered school-level variables into the level-2 model, including school type, school-level FARMS, student-level aggregate of items on eighth-graders' use of reading strategies, reading



motivation, student-level aggregate of items on parental education, and percent absent on average day. These variables were grand centered. I examined the proportion reduction in the intercept and slope variances to see how well these school-level variables accounted for the variations in student reading comprehension and the relations between student-level variables and reading comprehension.

In terms of model building at both levels (student-level and school-level), I dropped non-significant variables one by one to get a more parsimonious model for adolescents' reading comprehension. More specifically, I started from the student-level non-significant variables. For instance, among all the non-significant student-level variables, I first dropped the variable with the highest  $p$ -value, reran the model. Then in the new model dropped the non-significant variable with the highest  $p$ -value and rerun the model. I repeated this procedure to get a more parsimonious student-level model and school-level model.

### Summary

This study intended to investigate the associations among student-level characteristics (e.g., reading motivation, reading amount), school-level characteristics (e.g., public vs. private school), and eighth-graders' reading comprehension of informational and literary texts as measured in the 2009 NAEP assessment. In particular, this study explored the demographic, cognitive, motivational, and school factors that contributed to the White-Black and White-Hispanic achievement gap. While NAEP reading assessment provided valid and reliable measure for reading comprehension, there are some statistical considerations that should be taken into account for secondary analysis of NAEP data. The statistical issues included the multi-stage sampling design,

weighting, plausible values, estimation of standard error, centering decision, missing data, and testing HLM assumptions. The software HLM 7 with full maximum likelihood estimation was used in this study to analyze the 2009 NAEP reading assessment data and address my research questions.

## CHAPTER FOUR: RESULTS

The goal of this study was to investigate how student demographic, cognitive, and motivational variables as well as school variables were associated with eighth-grader's reading comprehension of informational texts and literary texts. More specifically, the following research questions are examined in this study:

Research question 1. *How are student characteristics (e.g., gender, race/ethnicity, socioeconomic status, reading motivation) associated with eighth-graders' reading comprehension of informational and literary texts?*

Research question 2. *Does the White-Black achievement gap narrow after controlling all the student-level variables? Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?*

Research question 3. *How are school characteristics associated with eighth-graders' reading comprehension of informational texts and literary texts? How are school characteristics associated with the White-Black achievement gap? How are school characteristics associated with the White-Hispanic achievement gap?*

These research questions were addressed by using the hierarchical linear modeling approach (HLM), because this approach accounted for the nested data structure (students nested within schools) and the multistage sampling design employed in the 2009 NAEP reading assessment. The decision to use HLM was also due to the multi-level nature of my research questions. A two-level HLM analysis was used in this study. The first level (level-1) analysis examined the associations between student-level variables and reading comprehension of informational and literary texts. The second level

(level-2) analysis examined the associations between school-level variables and student reading comprehension of informational and literary texts.

As part of the 2009 NAEP reading assessment, a questionnaire was administered to eighth graders to collect information on student demographics, their beliefs in reading, as well as their participation in school reading activities. Similarly, school principals were asked to fill out a school questionnaire about school-wide student demographics and school characteristics. Responses to the student questionnaire and the school questionnaire were analyzed to address my research questions.

In the following section, the statistical analyses results were reported, including (1) descriptive statistics, (2) factor analyses results of items used as indicator of teacher's prompting for students to use reading skills/strategies, reading motivation, and classroom reading activities, and (3) HLM analyses results that addressed the multi-level research questions.

## **4.1. Descriptive Statistics**

### **4.1.1. Student-Level Descriptive Statistics**

Descriptive statistics on student-level variables were reported in the following section, including student demographic variables, home literacy resources, teacher's prompting for students to use reading skills/strategies, reading motivation, school reading amount, and participation in classroom reading activities. Multiple imputation was used to deal with the missing data issue (van Buuren, 2012). Population mean estimates and standard errors for student-level variables before multiple imputation and after multiple imputation were also reported in this section.

**4.1.1.1. Demographic background.** Descriptive information on student demographic characteristics (i.e., gender, race/ethnicity, eligibility for the National School Lunch Program, and parental educational level) were presented in Table 5. Fifty percent of the participants in the 2009 NAEP reading assessment were male and 49% female. In terms of race/ethnicity, 58% were White, 15% Black, 19% Hispanic, 5% Asian American, and 1% American Indian.

Student eligibility for the National School Lunch Program and parental educational level were used as proxies for student socioeconomic status. Forty-three percent of the eighth graders were eligible for National School Lunch Program, whereas 53% were not eligible for National School Lunch Program. The amount of missing data for student eligibility for the National School Lunch Program was 3%.

Table 5. Characteristics of student sample (N= 160,870)

Student characteristics	Percent
Gender	
Male	50.3%
Female	49.7%
Missing	0%
Race/ethnicity/ethnicity	
White	58.1%
Black	15.0%
Hispanic	19.5%
Asian American/ Pacific Islander	5.1%
American Indian/Alaska Native	1.1%
Unclassified	1.2%
Missing	0%
National School Lunch Program Eligibility	
Eligible	43.4%
Not eligible	53.5%
Missing	3.1%
Parental education	
Did not finish high school	7.2%
Graduated from high school	16.1%
Some education after high school	16.4%
Graduated from college	48.8%
Missing	11.5%

Notes: Results based on strata variable "REPGRP1", cluster variable "JKUNIT", sample weight "ORIGWT"

When we break down these numbers to different ethnic groups, we get troublesome results. As indicated in Table 6, 67% of Black students, 70% of Hispanic students, 62% of American Indian students were eligible for the National School Lunch Program, compared with 22% of White students eligible for the National School Lunch Program. In contrast, 70% of White students were not eligible for the National School Lunch Program, as opposed to 29% of Black and 27% of Hispanic students. Thus, a disproportionately high percentage of Black, Hispanic, and American Indian students were especially disadvantaged in terms of family income.

As for the other indicator of socioeconomic status – parental educational level, 7% percent of eighth graders reported that their parents did not finish high school, as opposed to 16% who reported that their parents finished high school. Furthermore, 16% reported that their parents had some education after high school and almost half of the eighth graders reported that their parents had college degree. The extent of missing data for parental education was 11.5%.

Table 6. Eligibility for the National School Lunch Program across ethnic groups

Natl School Lunch Program eligibility	White	Black	Hispanic	Asian American	American Indian	Un-classified	Total
Eligible	21.8%	67.3 %	69.5%	35.3%	61.6%	36.0%	39.3%
Not eligible	69.8%	29.2 %	26.8%	57.0%	35.6%	52.8%	54.1%
Info not available	8.4%	3.5%	3.7%	7.7%	2.7%	11.2%	6.7%
Total	100.0 %	100.0 %	100.0%	100.0%	100.0%	100.0%	100.0%

Notes: Results based on strata variable “REPGRP1”, cluster variable “JKUNIT”, sample weight “ORIGWT”

When we break down parental educational levels to different ethnic groups, Hispanic students turned out to be especially disadvantaged. As indicated in Table 7,

about 4% of White students reported that their parents did not finish high school, as opposed to 20% of Hispanic students who reported so. In contrast, approximately 58% of White students reported that their parents graduated from college, as opposed to only 24% of Hispanic students reported that their parents had college degrees.

Table 7. Parental educational level across ethnic groups

	White	Black	Hispanic	Asian American	American Indian	Un-classified	Total
Multiple	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%
Did not finish high school	3.9%	5.0%	19.5%	5.1%	7.9%	4.8%	7.2%
Graduate high school	14.5%	19.1%	19.6%	10.7%	22.3%	14.4%	16.1%
Some education after high school	16.5%	19.0%	15.8%	9.0%	19.9%	18.2%	16.4%
Graduated from college	57.7%	44.8%	23.6%	58.0%	31.8%	53.1%	48.8%
I Don't Know	6.6%	11.0%	20.5%	16.2%	12.5%	7.7%	10.5%
Omitted	0.8%	1.1%	0.9%	1.0%	5.7%	1.7%	0.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Notes: Results based on strata variable "REPGRP1", cluster variable "JKUNIT", sample weight "ORIGWT"

**4.1.1.2. Home literacy resources.** Student home literacy resources are defined as magazines, newspapers, books, encyclopedias, and computers at home (Turner, Crassas, & Segal, 2016). Descriptive statistics on home literacy resources were presented in Table 8. Approximately 37% of eighth graders reported that their families got a newspaper at least four times a week, as opposed to 42% who reported "no" to this question. Sixty-three percent of eighth graders indicated that their family got magazines regularly, compared with 26% who said "no" to this question. Nine out of ten eighth graders reported that there was a computer at home and seven out of ten eighth graders reported

that there was an encyclopedia in their homes. Eight out of ten eighth graders said that there were more than eleven books in their homes.

Student responses to the survey questions on newspaper, magazine, computer, and encyclopedia at home were dummy coded, with “yes” coded as 1 and “no” coded as 0. Student responses to the question “About how many books are there in your home?” were coded on a four-point scale, with “0-10 books” coded as 1, “11-25 books” coded as 2, “26-100 books” coded as 3, and “More than 100 books” coded as 4. The amount of missing data for each of these variables were also presented in Table 8. Student responses to these five items were summed up as the scale score for home literacy resources.

Table 8. Student home literacy resources (n= 160,870)

Questionnaire items	Percent
Does your family get a newspaper at least four times a week?	
Yes	36.5%
No	41.9%
Missing	22.4%
Does your family get any magazines regularly?	
Yes	62.9%
No	26.1%
Missing	12.4%
Is there a computer at home that you use?	
Yes	90.6%
No	7.3%
Missing	3.5%
Is there an encyclopedia in your home? It could be a set of books, or it could be on the computer.	
Yes	72.4%
No	13.8%
Missing	15.4%
About how many books are there in your home?	
0-10 books	13.6%
11-25 books	20.5%
26-100 books	34.9%
More than 100 books	30.4%
Missing	2.0%

Notes: Results based on strata variable “REPGRP1”, cluster variable “JKUNIT”, sample weight “ORIGWT”



**4.1.1.3. Reading motivation.** Descriptive statistics on student motivation were reported in Table 9. These questionnaire items were selected in relation to theories of reading motivation (Guthrie & Wigfield, 2000). Student responses to these items were coded on a four-point scale, with “strongly disagree” coded as 1, “disagree” coded as 2, “agree” coded as 3, and “strongly agree” coded as 4. As shown in Table 9, 75% of eighth graders were positive about the statement “when I read books I learn a lot.” In contrast, about 22% of eighth graders reported that they did not agree with that statement. The mean of this item was 2.86, which was close to the mean of the construct “valuing school reading” (mean = 2.78) obtained in another study of seventh-graders’ reading motivation (Wigfield, Cambria, & Ho, 2012).

Table 9. Student reading motivation (n = 160,870)

Questionnaire items	Percent
When I read books, I learn a lot.	
Strongly agree	13.0%
Agree	62.5%
Disagree	19.0%
Strongly disagree	3.8%
Missing	3.1%
Reading is one of my favorite activities	
Strongly agree	13.0%
Agree	22.5%
Disagree	36.5%
Strongly disagree	25.2%
Missing	4.1%
Reading for fun on your own time	
Never or hardly ever	31.2%
Once or twice a month	22.6%
Once or twice a week	23.8%
Almost every day	20.8%
Missing	3.1%
Talk with your friends or family about something you have read	
Never or hardly ever	35.6%
Once or twice a month	28.6%
Once or twice a week	23.9%
Almost every day	9.3%
Missing	4.0%

Notes: Results based on strata variable “REPGRP1”, cluster variable “JKUNIT”, sample weight “ORIGWT”

The item “reading is one of my favorite activities” was used as an indicator of student intrinsic reading motivation. Approximately 35% of eighth graders agreed with this statement, as opposed to about 62% who disagreed with this statement. The mean of this item was 2.24, indicating that on average these eighth graders tended not to consider reading as their favorite activity. Another item for student intrinsic reading motivation was “reading for fun on your own time.” Approximately three out of ten eighth graders reported that they never or hardly ever read for fun on their own time, compared with six out of ten eighth graders reported that they did read for fun in their own time. More specifically, 22% eighth graders reported that they read for fun on their own time once or twice a month. Another 24% of eighth graders reported that they read for fun on their own time once or twice a week. Approximately 21% of eighth graders reported that they read for fun on their own time almost every day. The mean of this item was 2.35, indicating that on average these eighth graders tended to read for fun on their own time once or twice a month. The mean of these two items on intrinsic motivation was 2.29, which was a bit higher than the mean of the scale “intrinsic motivation for school reading” (mean = 2.14) obtained in the Wigfield, Cambria, and Ho (2012) study.

Most likely, the pro-social aspect of reading motivation was captured in the item “talk with your friends or family about something you have read.” Around one third eighth graders reported that they never did that, whereas 29% reported that they did that once or twice a month. Another 33% reported that they talked with their friends or family about something they had read once or twice a week or almost every day. Student responses to these two items were coded on a four-point scale, with “never or hardly ever” coded as 1, “once or twice a month” coded as 2, “once or twice a week” coded as 3,

and “almost every day” coded as 4. The extent of missing data was also reported in Table 9. The mean of this item was 2.07, indicating that on average these eighth graders talked with their friends or family about something they had read once or twice a month.

#### 4.1.1.4. Teacher’s prompting to use reading skills and strategies.

Questionnaire items tapping teacher’s prompting for students to use reading skills and strategies were selected in relation to theories of reading skills/strategies (Pressley & Afflerbach, 1995; Afflerbach, Pearson, & Paris, 2008). Descriptive statistics on these items were presented in Table 10. In the questionnaire, students were asked “in your English/language arts class this year, when reading a story, article, or other passage, how often does your teacher ask you to do the following? (a) when reading summarize the passage, (b) when reading interpret meaning of passage, (c) when reading question motives or feelings of the characters, (d) when reading, identify main themes of the passage.” Student responses to these items were coded on a four-point scale, with “never or hardly ever” coded as 1, “once or twice a month” coded as 2, “once or twice a week” coded as 3, and “almost every day” coded as 4.

Table 10. Teacher’s prompting for students to use reading skills/strategies (n = 160,870)

Questionnaire items	Never or hardly ever	Once or twice a month	Once or twice a week	Every day or almost every day	Missing
when reading summarize the passage	16.5%	31.1%	35.0%	14.4%	4.2%
when reading interpret meaning of passage	14.8%	27.7%	36.3%	17.9%	4.6%
when reading question motives or feelings of the characters	13.4%	26.0%	37.0%	20.0%	4.8%
when reading, identify main themes of the passage	10.0%	23.6%	38.2%	24.5%	4.8%

Notes: Results based on strata variable “REPGRP1”, cluster variable “JKUNIT”, sample weight “ORIGWT”

Approximately 17% reported that they were never asked to summarize the passage, whereas about 80% reported that they were asked to summarize the passage when reading. The mean of this item was 2.49, indicating that on average these eighth graders were asked to summarize the main themes of the passage once or twice a month. Fifteen percent reported that they were never asked to interpret the meaning of the passage, as opposed to 82% who reported otherwise. The mean of this item was 2.59, indicating that on average these eighth graders were asked to interpret the meaning of the passage once or twice a week. Furthermore, 13% reported that they were never asked to question the motive or feelings of the character, whereas 83% reported that they were asked to do this when reading. The mean of this item was 2.66, indicating that on average these eighth graders were asked to interpret the meaning of the passage once or twice a week. One out of ten eighth graders reported that they were never or hardly ever asked to identify the main theme of the passage, as opposed to 86% who reported that their teachers asked them to do this when reading. The mean of this item was 2.80, indicating that on average these eighth graders were asked to interpret the meaning of the passage once or twice a week. The extent of missing data was also reported in Table 10.

**4.1.1.5. Participation in school reading activities.** Information about eighth-grader's participation in school reading activities was collected in the 2009 NAEP student questionnaire, in which students were asked the question "for your English class this year, how often do you do each of the following? (a) Have a class discussion about something that the whole class has read, (b) work in pairs or small groups to talk about something that you have read." Additionally, students were asked another question "in your English/language arts class this year, how often does your class do each of the

following? (a) read aloud; (b) read silently; (c) discuss new or difficult vocabulary; (d) explain what we have read; (e) do a group activity or project about what we have read; (f) read books we have chosen ourselves; (g) discuss different interpretations of what we have read.”

Descriptive statistics on student participation in school reading activities were presented in Table 11. Seventeen percent of eighth graders reported that their class never read aloud, whereas about 82% reported they read aloud in their English/language arts class. The mean of this item was 2.65, indicating that on average these eighth graders read aloud once or twice a week. Approximately 8% reported that they never or rarely read silently in their English/language arts class, as opposed to 91% who reported that they read silently in class. The mean of this item was 3.09, indicating that on average these eighth graders were asked to read silently in class once or twice a week. One out of ten eighth graders indicated that they never or rarely discussed vocabulary in their English/language arts class. In contrast, 88% reported that they discussed vocabulary in class. The mean of this item was 2.81, indicating that on average these eighth graders discussed vocabulary once or twice a week. About three out of ten eighth graders reported they never or rarely read books of their own choosing in their English/language arts class, as opposed to 68% who reported otherwise. The mean of this item was 2.43, suggesting that on average these eighth graders chose their own reading once or twice a month.

Moreover, 12% reported that their class never or rarely explained what was read in class, whereas 86% reported that their class explained what was read in class. The mean of this item was 2.86, demonstrating that on average these eighth graders explained

their reading once or twice a week. Eleven percent of eighth graders indicated that they did not have class discussion about what they had read, compared with 87% who stated that they did have class discussion on what they had read. The mean of this item was 3.07, suggesting that on average these eighth graders had class discussion on readings once or twice a week. Two out of ten eighth graders said that their class never or rarely worked in groups to talk about readings, whereas 78% reported differently. The mean of this item was 2.05, suggesting that on average these eighth graders worked in groups to talk about readings once or twice a month. Almost a quarter eighth graders reported that their class never or rarely discussed different interpretations of reading, compared with 73% who reported otherwise. The mean of this item was 2.36, suggesting that on average these eighth graders discussed different interpretations of reading once or twice a month.

Table 11. Student participation in classroom reading activities (n = 160,870)

Questionnaire items	Never or hardly ever	Once or twice a month	Once or twice a week	Every day or almost every day	Missing
In class read aloud	17.1%	24.8%	31.9%	24.9%	2.6%
In class read silently	7.8%	15.6%	34.6%	40.5%	2.8%
In class discuss new or difficult vocabulary	10.1%	21.2%	44.3%	22.7%	3.1%
In class explain what we have read	12.0%	20.4%	34.9%	30.5%	3.6%
In class do a group activity or project about what we have read	29.4%	42.9%	20.9%	6.8%	3.3%
In class read books we have chosen ourselves	29.9%	22.3%	20.1%	25.8%	3.2%
In class discuss different interpretations of what we have read	25.4%	27.8%	29.4%	15.8%	2.9%
Have a class discussion about something that the whole class has read	10.8%	17.2%	23.9%	46.3%	3.2%
Work in pairs or small groups to talk about something that you have read	20.0%	19.1%	32.9%	26.0%	3.3%

Notes: Results based on strata variable "REPGRP1", cluster variable "JKUNIT", sample weight "ORIGWT"

#### 4.1.2. School-level Descriptive Statistics

Descriptive statistics of school-level variables were presented in Table 12. About two thirds of schools were public schools, compared with one third of private school. Approximately 85% of schools participated in the National School Lunch Program and 48% received Title I funding. In terms of the percentage of students absent on an average day, about one half of the schools had 3-5% students absent on an average day. Furthermore, 37% schools had 0-2% students absent on an average day and 13% schools had 6-10% students absent on an average day.

Table 12. Characteristics of school sample (N= 7028)

School characteristics	Percent
School type	
Public	65.6%
Private	34.4%
Other	2.1%
School in National School Lunch Program	
Yes	85.4%
No	7.3%
Missing	7.3%
Receive Title I funding	
Yes	48.4%
No	44.1%
Missing	7.5%
Percent of students absent on average day	
0-2%	36.5%
3-5%	50.5%
6-10%	16.6%
More than 10%	2.0%
Missing	8.1%

Notes: Results based on school weight SRSBASW

As shown from Table 5 through Table 12, the extent of missing data for student-level and school-level variables ranged from 2% to 22%. If traditional approaches had been utilized to deal with the missing data, such as listwise deletion or pairwise deletion,

numerous data points would have been lost. This would yield biased estimates of the parameters of interest. Other methods of dealing with missing data, such as imputation by an overall mean or imputation by a group-wise mean, have been documented in the literature to be inappropriate as well because these approaches result in biased estimates of parameters and underestimation of standard errors (Little & Rubin, 2002; Schafer & Graham, 2002).

In the missing data literature, multiple imputation has been documented to be the appropriate approach to handle missing data (van Buuren, 2012). Imputation means filling in values for the missing data points, which would lead to a complete data set. Multiple imputation works in three steps: (1) Starting from observed and incomplete data, the multiple imputation procedure creates several complete data sets. In each of these data sets the missing values are replaced by plausible values which are random draws from the distribution of missing data, conditional on the observed and incomplete data set. In other words, the multiple imputed data sets are based on the original incomplete data set, but the plausible values in these imputed data sets may differ from one another. (2) The parameters of interest and standard errors in each of these imputed data sets are estimated following regular statistical analytical approaches. (3) The parameter estimates and standard errors across the multiple imputed data sets are pooled together to yield a single set of results.

In this study, five multiple imputed data sets were created for the student-level incomplete data set, using the Multiple Imputation Module in SPSS 22. One multiple imputed data set was created for the school-level incomplete data set, using the Multiple Imputation Module in SPSS 22. Descriptive statistics of the five imputed data set, such as



mean, were computed using the Complex Samples Module in SPSS 22. Standard errors were computed using the formula suggested by Hox, van Buuren, and Jolani (2016).

Descriptive statistics before multiple imputation and after multiple imputation were presented in Table 13 for comparison.

Table 13: Item level descriptive statistics before multiple imputation and after multiple imputation (n = 160,870)

Constructs	Questionnaire items	Before multiple imputation		After 5 multiple imputations	
		Population mean estimate	Standard error	Population mean estimate	Standard error
Reading skills/strategies	When reading summarize the passage	2.488	.006	2.488	.007
	When reading interpret the meaning of the passage	2.591	.006	2.588	.007
	When reading question the motive or feelings of the characters	2.660	.006	2.656	.007
	When reading identify the main themes of the passage	2.801	.006	2.797	.007
Reading motivation	When I read books, I learn a lot	2.862	.003	2.861	.004
	Reading is one of my favorite activities	2.240	.005	2.242	.006
	Reading for fun on own	2.348	.006	2.349	.007
	Talk with your friends or family about something you have read	2.071	.005	2.075	.006
School reading engagement	Pages you have to read in school and for homework	2.769	.014	2.770	.015
	In class discuss different	2.360	.007	2.360	.008

	interpretations of what we have read				
	In class explain what we have read	2.858	.007	2.855	.008
	In class do a group activity or project about what we have read	2.052	.006	2.055	.007
	Have a class discussion about something that the whole class has read	3.077	.006	3.072	.007
	Work in pairs or small groups to talk about something that you have read	2.663	.009	2.661	.010
	In class read aloud	2.654	.009	2.653	.010
	In class discuss vocabulary	2.811	.006	2.809	.007
	In class read silently	3.094	.008	3.091	.009
	In class read books we have chosen ourselves	2.426	.011	2.427	.012

Notes: Results based on strata variable "REPGRP1", cluster variable "JKUNIT", sample weight "ORIGWT"

## 4.2. Factor Analyses

Factor analysis was used to describe the structural interrelationships among the survey items and determine the factors underlying these survey items. The following section presents the factor analysis results, including (a) factor structure and rotation, (b) explained variance, (c) internal consistency – reliability measure of Cronbach's alpha ( $\alpha$ ) for scales of reading skills/strategies, group reading activities in class, and reading motivation.

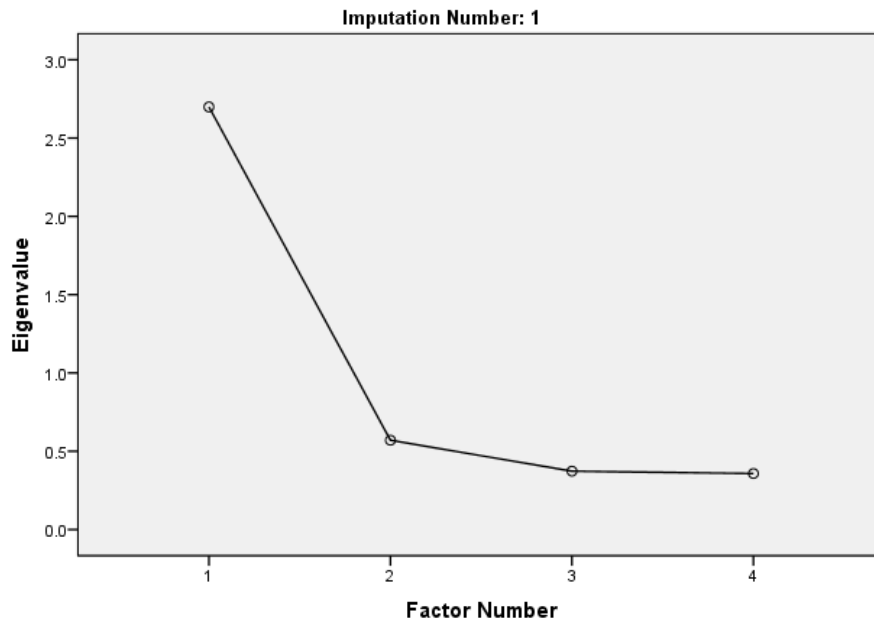
#### 4.2.1. Teacher's Prompting to Use Reading Skills/Strategies

Principal axis factoring was used in factor analyses to explore the latent factor(s) underlying the four items hypothesized to capture teacher's prompting for eighth graders to use reading skills/strategies. These four items were as follows: (1) When reading, summarize passage; (2) When reading, interpret meaning of passage; (3) When reading, question motives of characters; (4) When reading, identify main themes of passage.

As shown in Table 14 and the scree plot in Figure 3, one single factor (eigenvalue higher than one) emerged with excellent loadings on each of the four items. The loadings of the four items were presented as follows: (1) When reading, summarize passage (.686); (2) When reading, interpret meaning of passage (.808); (3) When reading, question motives of characters (.759); (4) When reading, identify main themes of passage (.780). This single factor explained 58% of the total variance in the four items. The Cronbach alpha for the scale was .84, demonstrating good internal consistency. Student responses to these four items were summed up as the scale score, which were to be used in HLM analysis as a predictor for eighth-grader's reading comprehension of informational and literary texts.

Variables measuring student use of reading skills	Factor 1 loadings
When reading, summarize passage	.686
When reading, interpret meaning of passage	.808
When reading, question motives of characters	.759
When reading, identify main themes of passage	.780

Figure 3. Reading Strategies Scree Plot



Analysis weighted by Student weight (unadjusted) - Unpoststratified

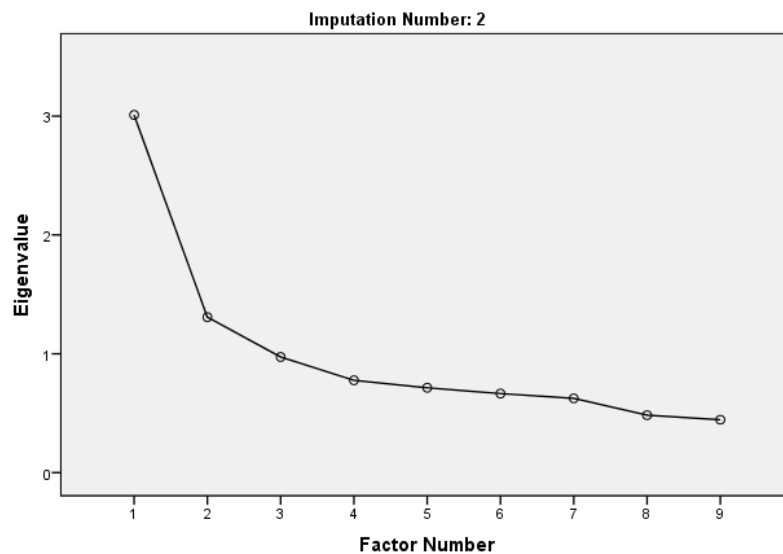
#### 4.2.2. Student Participation in School Reading Activities

Principal axis factoring was used in factor analyses to explore the latent factor(s) underlying the nine items hypothesized to capture eighth-grader's participation in reading activities in class. Oblique rotation was used to allow the factors to correlate with one another. The nine items were as follows: (1) Have a class discussion about something that the whole class has read; (2) Work in pairs or small groups to talk about something that you have read; (3) In class read aloud; (4) In class read silently; (5) In class discuss vocabulary; (6) In class explain what was read; (7) In class do a group activity or project about what we have read; (8) In class read books we have chosen ourselves; (9) In class discuss interpretations of reading.

As shown in Table 15 and the scree plot in Figure 4, two distinct factors (eigenvalue higher than one) emerged from analyses. The seven items that loaded on the first factor with loadings higher than .4 were presented as follows: (1) Have a class

discussion about something that the whole class has read (.572); (2) Work in pairs or small groups to talk about something that you have read (.512); (3) In class read aloud (.528); (4) In class discuss vocabulary (.471); (5) In class explain what was read (.753); (6) In class do a group activity or project about what we have read (.506); (7) In class discuss interpretations of reading (.672). I believe these seven items focused on group reading activities in class. I decided to call this factor group reading activities.

Figure 4. Participation in Classroom Reading Activities Scree Plot



Analysis weighted by Student weight (unadjusted) - Unpoststratified

Table 15. Factor analyses results of student participation in school reading activities (n = 160,870)

Variables measuring student reading engagement	Factor 1 loadings	Factor 2 loadings
In class read aloud	.528	-.066
In class read silently	.098	.528
In class discuss vocabulary	.471	.036
In class explain what was read	.753	-.075
In class do a group activity or project about what we have read	.506	.098

In class read books we have chosen ourselves	-.071	.659
In class discuss interpretations of reading	.672	-.011
Have a class discussion about something that the whole class has read	.572	-.029
Work in pairs or small groups to talk about something that you have read	.512	.080

**4.2.2.1. Group reading activities in class.** The scale of group reading activities in class had a Cronbach's  $\alpha$  of .77, demonstrating reasonably good internal consistency. Student responses to these items were summed up as the scale score for student participation in group reading activities in class and were to be entered into the HLM analyses as a predictor for eighth-grader's reading comprehension of literary texts and informational texts.

**4.2.2.2. Individual reading.** The items that had loadings higher than .4 on the second factor were presented in Table 15 and as follows: (1) In class read silently (.528); (2) In class read books we have chosen ourselves (.659). All the other items had close to zero loadings on the second factor, indicating a "simple structure" (Thurstone, 1947). I decided to call the second factor individual reading in class. The two items on individual reading had a correlation of .35 ( $p < .01$ ). Student responses to these two items were summed up as the scale score for individual reading in class and were to be entered into the HLM analyses as a predictor for eighth-grader's reading comprehension of literary texts and informational texts.

In summary, the two factors in student participation in school reading activities explained 35% of the total variance in the nine items. Individually, the first factor – group

reading activities, explained 27% of the total variance in the nine items, whereas the second factor – individual reading, explained 7% of the total variance in the nine items.

### 4.2.3. Reading Motivation

Principal axis factoring was used in factor analyses to explore the latent factor(s) underlying the four items hypothesized to capture eighth-grader’s reading motivation. These four items were as follows: (1) Learn a lot when reading books; (2) Reading is a favorite activity; (3) Read for fun on own; (4) Talk with friends about what you read.

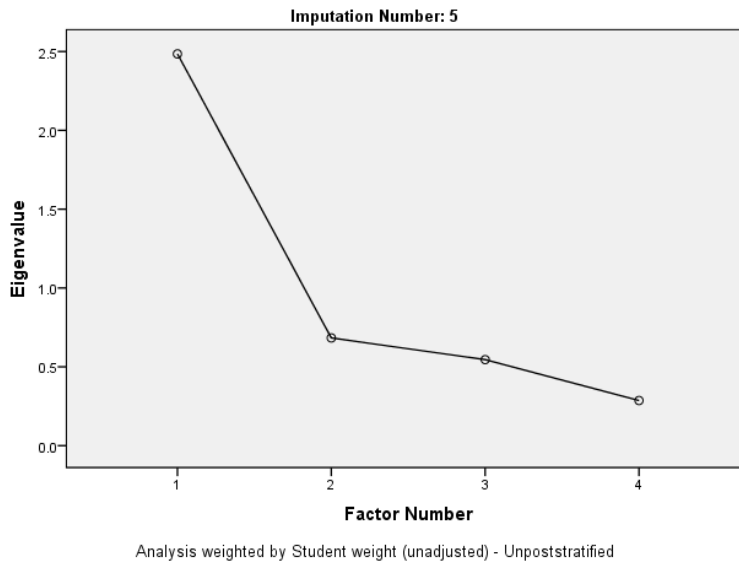
As shown in Table 16 and the scree plot in Figure 5, one single factor emerged with excellent loadings on all four items. The loadings were reported as follows:

(1) Learn a lot when reading books (.803); (2) Reading is a favorite activity (.847); (3) Read for fun on own (.872); (4) Talk with friends about what you read (.782). This factor explained 68% of the total variance in these four items. Guthrie and Wigfield’s theory of reading motivation (2000) has informed the selection of these items. They define reading motivation as “individual’s personal goals, values, and beliefs with regard to the topics, processes, and outcomes of reading” (p. 405). I decided to label this factor as reading motivation, since it touched on the various aspects of the construct of reading motivation, including intrinsic motivation, valuing of reading, and the pro-social aspect of reading motivation.

Table 16. Factor analyses of reading motivation scale (n = 160,870)

Variables measuring student reading motivation	Factor 1 loadings
Learn a lot when reading books	.803
Reading is a favorite activity	.847
Read for fun on own	.872
Talk with friends about what you read	.782

Figure 5. Reading Motivation Scree Plot



The scale of reading motivation had a Cronbach's  $\alpha$  of .79. Student responses to these four items were summed as the scale score for reading motivation and were to be entered into the HLM analyses as a predictor for eighth-grader's reading comprehension of literary and informational texts.

### 4.3. HLM Analyses

The five student-level imputed data sets and the one school-level imputed data set were used for further HLM analyses. The following steps were taken to create student-level and school-level files for HLM analyses: (1) The first imputed student file and the one imputed school file were entered into HLM 7 software, yielding a set of parameter estimates and standard errors. (2) The second imputed student file and the one imputed school file were entered into HLM 7 software, yielding another set of parameter estimates and standard errors. This procedure was repeated until all five imputed student file and the one school file were entered into the HLM analyses, yielding five sets of parameter estimates and standard errors. (3) The average values of coefficients were computed across the five sets of parameter estimates. Standard errors were computed using the



formula suggested by Hox, van Buuren, and Jolani (2016). Results of the unconditional model were reported in Table 17. Results of within-school model and between-school model were reported in Table 18 and Table 19.

The HLM analyses results were presented in the following section, including (1) results of the fully unconditional model which partitioned the variability in the dependent variable – eighth-graders’ reading comprehension into between-school variance and within-school variance; (2) results of the within-school (level-1) model in which the associations between student-level (level-1) variables and reading comprehension were examined; and (3) results of between-school model in which the associations between school-level (level-2) characteristics and reading comprehension were examined.

#### **4.3.1. HLM Fully Unconditional Model**

The first step in conducting HLM analyses is to run a fully unconditional model in which there are no predictors. The only variable in the fully unconditional model is the outcome variable/dependent variable. The purpose of running a fully unconditional model is to determine how much variance in the dependent variable occurs between schools. A substantial variance between schools justifies the need to use hierarchical linear modeling approach (HLM) and warrants further analysis utilizing HLM.

The results from the fully unconditional model were presented in Table 17. The fully unconditional model partitioned the variability in the dependent variable – eighth-graders’ reading comprehension into between-school variance and within-school variance. The proportion of student reading comprehension between schools was

expressed in an index – intraclass correlation (ICC). The formula to compute ICC is as follows:  $ICC = \text{between-school variance } (\tau) / \text{total variance } (\tau + \sigma^2)$ .

Table 17: Estimates from the unconditional model for reading comprehension of literary texts and informational texts (160,870 students nested within 7,028 schools)

	literary texts	informational texts
Tau ( $\tau$ )	.21	.21
Sigma-squared ( $\sigma^2$ )	.74	.66
Lambda-reliability ( $\lambda$ )	.84	.86
Intraclass Correlation [ICC]	22%	24%

As shown in Table 17, 22% of the variance in eighth-grader’s reading comprehension of literary texts occurred between schools. More specifically, the between-school variance ( $\tau$ ) was .21 and within-school variance ( $\sigma^2$ ) was .74. The intraclass correlation (ICC), or the proportion of variance in student reading comprehension of literary texts between schools was as follows:  $ICC = \text{between-school variance } (\tau) / \text{total variance } (\tau + \sigma^2) = .21 / (.21 + .74) = 22\%$ , which meant that 22% of the variance in eighth-grader’s reading comprehension of literary texts occurred between schools. This substantial variation across schools justified the need to use HLM for further analysis.

Similarly, 24% of the variance in eighth-grader’s reading comprehension of informational texts occurred between schools. The between-school variance ( $\tau$ ) for eighth-grader’s reading comprehension of informational texts was .21, and within-school variance ( $\sigma^2$ ) was .66. Therefore, the intraclass correlation (ICC), or the proportion of variance in student reading comprehension of informational texts between schools was as follows:  $ICC = \text{between-school variance } (\tau) / \text{total variance } (\tau + \sigma^2) = .21 / (.21 + .66) = 24\%$ . This meant about a quarter of the variance in eighth-grader’s reading

comprehension of informational texts occurred between schools, which may be explained by school-level variables.

As indicated in Table 17, the intercept for reading comprehension of literary texts had a reliability of .84, whereas the intercept for reading comprehension of informational texts had a reliability of .86. Results of random effect indicated that eighth-grader's reading comprehension of informational texts varied significantly across schools, so did reading comprehension of literary texts.

#### **4.3.2. HLM Within-School (level-1) Model**

The second step in conducting HLM analyses is to run a within-school (level-1) model in which student-level (level-1) variables are entered to model the dependent variable. The within-school (level-1) model stays unconditional at level-2 (between-school), which means no school-level variables are included to model the dependent variable.

Student-level variables included in the analyses consisted of dummy variables and continuous variables. The dummy variables were as follows: gender (male coded as 0 and female coded as 1), eligibility for free and reduced lunch (yes for 1 and no for 0), Black (Black students coded as 1 and all others coded as 0), Hispanic (Hispanic students coded as 1 and all others coded as 0), Asian (Asian students coded as 1 and all others coded as 0), American Indian (American Indian students coded as 1 and all others coded as 0), and other (other coded as 1 and all others coded as 0). The continuous variables were the following: number of pages read for school a day, parental educational level, home literacy resources, reading motivation, classroom group reading activities, classroom individual reading activities, teacher's prompting for students to use reading

skills/strategies, and interaction terms between each of the continuous variables and student ethnicity.

All the variables included in the analyses were group-mean centered. Centering decisions are important decisions in conducting multilevel modeling analysis. McCoach points out (2010) that in multilevel modeling centering decisions impact the interpretation of the parameter estimates. There are generally two main centering techniques for independent variables in multilevel modeling analysis, namely *grand mean centering* and *group mean centering* (McCoach, 2010). In grand mean centering, the overall mean of the variable is subtracted from all scores. In group mean centering, the group mean is subtracted from the score for each person in that cluster. That is, group mean centering removes all the between-school variations from the variables and thus producing accurate and unbiased regression coefficient estimates (Enders & Tofghi, 2007; Raudenbush & Bryk, 2002). As such, the transformed score captures a person's standing relative to other members in the group. In addition, aggregates of the group-mean centered variables were introduced at the school-level (level-2) model to account for the between-cluster variability.

The equations for the final within-school model was specified as follows:

#### **Level-1 Model**

$$\begin{aligned}
 RRPS21_{ij} = & \beta_{0j} + \beta_{1j}*(female_{ij}) + \beta_{2j}*(black_{ij}) + \beta_{3j}*(hispanic_{ij}) + \beta_{4j}*(asian_{ij}) + \\
 & \beta_{5j}*(american\_indian_{ij}) + \beta_{6j}*(other_{ij}) + \beta_{7j}*(reading\ amount_{ij}) + \\
 & \beta_{8j}*(parental\_education_{ij}) + \beta_{9j}*(FARMS_{ij}) + \beta_{10j}*(motivation_{ij}) + \\
 & \beta_{11j}*(group\_reading_{ij}) + \beta_{12j}*(home\_literacy\_resources_{ij}) + \beta_{13j}*(strategies_{ij}) + \\
 & \beta_{14j}*(individual\_reading_{ij}) + \beta_{15j}*(motivation*black_{ij}) +
 \end{aligned}$$

$$\beta_{16j}*(\text{motivation*hispanic}_{ij}) + \beta_{17j}*(\text{black*female}_{ij}) + \beta_{18j}*(\text{hispanic*female}_{ij}) +$$

$$\beta_{19j}*(\text{parental\_education*black}_{ij}) + \beta_{20j}*(\text{parental\_education*hispanic}_{ij}) +$$

$$\beta_{21j}*(\text{home\_literacy\_resources*black}_{ij}) + \beta_{22j}*(\text{reading amount*hispanic}_{ij}) + r_{ij}$$

### **Level-2 Model**

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + u_{3j}$$

$$\beta_{4j} = \gamma_{40}$$

...

$$\beta_{22j} = \gamma_{220}$$

in which  $RRPS2I_{ij}$  represented a set of five plausible values measuring eighth-grader's reading comprehension of informational texts for student  $i$  in school  $j$ ,  $\beta_{0j}$  was the intercept or reading comprehension of informational texts for a student whose values on all the other independent variables were 0,  $\beta_{1j}$  was the relationship between gender and reading comprehension of informational texts, with 1 as female and 0 as male,  $\beta_{2j}$  was the relationship between Black students and reading comprehension of informational texts,  $\beta_{3j}$  was the relationship between Hispanic students and reading comprehension of informational texts,  $\beta_{4j}$  was the relationship between Asian students and reading comprehension of informational texts,  $\beta_{5j}$  was the relationship between American Indian students and reading comprehension of informational texts, and so on.

In the final within-school (level-1) model, the slopes of the Black students and Hispanic students were allowed to vary, using a random coefficient regression model. A

random coefficient regression model tests whether the association between a student-level variable (e.g., Black) and the dependent variable (i.e., reading comprehension of literary texts and informational texts) may vary between schools and whether this variation is significant. For instance, a random coefficient regression model of the Black slope tests whether the relationship between Black students and reading comprehension of literary texts and/or informational texts varies significantly across schools. The random slopes in the final within-school model were Black slope and Hispanic slope.

My first research question is “*How are student-level variables associated with eighth-graders’ reading comprehension of informational texts and literary texts?*” To address this question, the results of within-school (level-1) model were presented in Table 18. The results indicated a significant gender effect – female students scored significantly higher than male students in both literary texts and informational texts, even after controlling for all the other variables in the model,  $\gamma_{literary\_texts} = 4.495$ ,  $\gamma_{informational\_texts} = 3.930$ . The gamma coefficients indicated that on average female students scored 4.495 points higher in literary texts and 3.930 points higher in informational texts than male students. This held true even after controlling for all the other variables in the model.

In addition, there was an interaction effect between gender and Black students,  $\gamma_{literary\_texts} = 4.207$ ,  $\gamma_{informational\_texts} = 3.544$ . Based on the coding of the dummy-coded Black variable (Black students coded as 1 and White students coded as 0) and the coding of the dummy-coded gender variable (female coded as 1 and male coded as 0), this interaction effects meant that Black female eighth graders (coded 1 in both gender and

Black) scored significantly higher than Black male eighth graders in both literary and informational texts.

The number of pages that students read for school on a daily basis, or school reading amount, was significantly associated with eighth-grader's reading comprehension in both literary and informational texts,  $\gamma_{literary\_texts} = .999$ ,  $\gamma_{informational\_texts} = .877$ . The gamma coefficients indicated that one page increase in school reading amount was associated with .999 point increase in reading comprehension of literary texts and .877 point increase in reading comprehension of informational texts. This held true even after controlling for all the other variables in the model, including gender, ethnicity, socioeconomic status, home literacy resources, reading motivation, and participation in classroom reading activities. This finding is consistent with the well-documented positive role of reading amount on student reading comprehension (Anderson, Wilson, & Fielding, 1988; Guthrie, Klauda, & Morrison, 2012; Ladd & Dinella, 2009; Schwinger, Steinmayr, & Spinath, 2009; Stanovich & Cunningham, 1992; Wigfield & Guthrie, 1997).

Notably, there was an interaction effect between school reading amount and Hispanic students,  $\gamma_{literary\_texts} = 1.228$ ,  $\gamma_{informational\_texts} = 1.259$ , which meant the relationship between reading amount and reading comprehension was significantly stronger for Hispanic students, compared with White students (Hispanic students coded as 1 and White students coded as 0). In other words, above and beyond the main effect of reading amount  $\gamma_{literary\_texts} = .999$ ,  $\gamma_{informational\_texts} = .877$ , with one unit increase in reading amount, Hispanic students gained more in reading comprehension, compared

with White students. More specifically, the effect of reading amount for Hispanic students was  $\gamma_{literary\_texts} = .999 + 1.228 = 2.227$  for literary texts and

$\gamma_{informational\_texts} = .877 + 1.259 = 2.136$  for informational texts.

Table 18: Within-school model (160,870 students nested within 7028 schools)

<b>Fixed Effect</b>	<b>Literary texts</b>	<b>Informational texts</b>
Intercept	264.724	267.603
Gender	4.495	3.930
Black	.825 (ns)	4.002 (ns)
Hispanic	7.560	8.549
Asian	1.058 (ns)	2.752
American Indian	-4.999	-4.865
Other	-1.647 (ns)	-0.674 (ns)
School reading amount	.999	.877
Parental education	2.918	3.090
Eligibility for the National School Lunch Program	-7.588	-7.562
Home literacy resources	2.619	2.780
Reading motivation	2.784	2.594
Group reading activities	-.143	-.103
Individual reading	-.854	-.719
Teacher's prompting to use reading skills/strategies	.622	.495
<b>Interaction terms</b>		
Interaction between gender and ethnicity		
Black female	4.207	3.544
Hispanic female	3.045	-.113 (ns)
Interaction between parental education and ethnicity		
Parental education * Black	-1.241	-1.341
Parental education * Hispanic	-2.622	-2.642
Interaction between motivation and ethnicity		
Motivation * Black	-.948	-.901
Motivation * Hispanic	-1.048	-1.060
Interaction between reading amount and ethnicity		
Reading amount * Hispanic	1.228	1.259
<b>Random Effect</b>	<b>Literary texts</b>	<b>Informational texts</b>
INTRCPT, $u_0$	309.526	324.540
Black slope, $u_2$	41.884	32.818
Hispanic slope, $u_3$	66.060	67.781
level-1, $r$	837.151	778.848

Notes: Results based on student weight variable "ORIGWT" and school weight variable "SRSBASW"  
All results are significant at .05 level.



Parental education was significantly associated with student reading comprehension in both literary texts and informational texts,  $\gamma_{literary\_texts} = 2.918$ ,  $\gamma_{informational\_texts} = 3.090$ . The gamma coefficients indicated that one unit increase in parental educational level was associated with 2.918 point increase in student reading comprehension of literary texts and 3.090 point increase in student reading comprehension of informational texts. This held true even after controlling for the other variables in the model.

However, the effect of parental educational levels varied across the ethnic groups. First, there was an interaction effect between parental educational level and Black students,  $\gamma_{literary\_texts} = -1.241$ ,  $\gamma_{informational\_texts} = -1.341$ , which meant the relationship between parental educational level and reading comprehension was significantly weaker for Black students compared with White students. In other words, the association between parental educational level and reading comprehension for Black students was  $\gamma_{literary\_texts} = 2.918 - 1.241 = 1.677$  for literary texts and  $\gamma_{informational\_texts} = 3.090 - 1.341 = 1.749$  for informational texts. Compared with Black students, White students benefited more from the positive and significant relationship between parental educational level and reading comprehension.

Secondly, there is an interaction between parental educational level and Hispanic students,  $\gamma_{literary\_texts} = -2.622$ ,  $\gamma_{informational\_texts} = -2.642$ , which meant the relationship between parental educational level was significantly weaker for Hispanic students, compared with White students. More specifically, the association between parental educational level and reading comprehension for Hispanic students was  $\gamma_{literary\_texts} = 2.918 - 2.622 = .296$  for literary texts and  $\gamma_{informational\_texts} = 3.090 - 2.642 = .448$  for

informational texts. Compared with Hispanic students, White students benefited more from the positive and significant relationship between parental educational level and reading comprehension.

Student eligibility for free and reduced lunch turned out a strong student-level predictor in both literary and informational texts,  $\gamma_{literary\_texts} = -7.588$ ,  $\gamma_{informational\_texts} = -7.562$ , demonstrating that those who were eligible for free and reduced lunch were 7.588 points lower in literary texts and 7.562 points lower in informational texts. These results were in accordance with the current reading research literature that documents the role of socioeconomic status on student reading performance (Rand Reading Group, 2002; Snow, Burns, & Griffin, 1998).

Home literacy resources was significantly associated with student reading comprehension of literary texts,  $\gamma_{literary\_texts} = 2.619$ ,  $\gamma_{informational\_texts} = 2.780$ , indicating that one-unit increase in home literacy resources was associated with 2.619 point increase in student reading comprehension of literary texts and 2.780 point increase in student reading comprehension of informational texts, after controlling for the other variables in the model.

Teacher's prompting for students to use reading skills/strategies were positively and significantly associated with student reading comprehension in both literary and informational texts,  $\gamma_{literary\_texts} = .622$ ,  $\gamma_{informational\_texts} = .495$ , with one unit increase in teachers' prompting for students to use reading skills/strategies associated with .622 point increase in student reading comprehension of literary texts, compared with .495 point increase in student reading comprehension of informational texts.

Reading motivation was significantly associated with student reading comprehension of literary texts,  $\gamma_{literary\_texts} = 2.784$ ,  $\gamma_{informational\_texts} = 2.594$ , demonstrating that one-unit increase in student reading motivation was associated with 2.784 point increase in reading comprehension of literary texts and 2.594 point increase in reading comprehension of informational texts, even after controlling for the other variables in the model. More importantly, there was an interaction effect between motivation and Black students,  $\gamma_{literary\_texts} = -.948$ ,  $\gamma_{informational\_texts} = -.901$ , which meant the relationship between motivation and reading comprehension was significantly weaker for Black student, compared with White students. More specifically, the relationship between reading motivation and reading comprehension for Black students was  $\gamma_{literary\_texts} = 2.784 - .948 = 1.836$  for literary texts and  $\gamma_{informational\_texts} = 2.594 - .901 = 1.693$  for informational texts.

Similarly, there was an interaction effect between motivation and Hispanic students,  $\gamma_{literary\_texts} = -1.048$ ,  $\gamma_{informational\_texts} = -1.060$ , which meant the relationship between motivation and reading comprehension was significantly weaker for Hispanic student, compared with White students. More specifically, the relationship between reading motivation and reading comprehension for Hispanic students was  $\gamma_{literary\_texts} = 2.784 - 1.048 = 1.736$  for literary texts and  $\gamma_{informational\_texts} = 2.594 - 1.060 = 1.534$  for informational texts. Taken together, these two motivation interaction effects indicated that Black and Hispanic students benefited less from the positive association between reading motivation and reading comprehension, compared with their White peers.

Group reading activities in class were negatively and significantly associated with student reading comprehension of literary texts,  $\gamma_{literary\_texts} = -.143$ , and  $\gamma_{informational\_texts} =$

-.103 for informational texts. The gamma coefficient indicated that that one unit increase in group reading activities in class was associated with .143 points lower in student reading comprehension of literary texts and .103 points lower in student reading comprehension of informational texts.

Individual reading was negatively and significantly associated with student reading comprehension of literary texts and informational texts,  $\gamma_{literary\_texts} = -.854$ ,  $\gamma_{informational\_texts} = -.719$ , with one-unit increase in reading silently and reading books of their choosing in class associated with .854 point decrease in reading comprehension of literary texts and .719 points lower in reading comprehension of informational texts, after controlling for the other variables in the model.

My second research question is “*Does the White-Black achievement gap narrow after controlling all the student-level variables? Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?*”

One important finding obtained in this study was that there was no significant difference between Black and White students in literary and informational texts, after controlling all the variables in the within-school model, including gender, socioeconomic status, reading amount, school reading motivation, participation in classroom reading activities, and all the interaction effects. This meant the White-Black achievement gap disappeared after controlling student-level variables included in the within-school model. When compared with their White peers at the same socioeconomic level, who were equally motivated and skilled/strategic in reading, who read the same number of pages on an average day, and who participated in the same amount of group and individual reading activities, Black students performed equally well as White students in both literary and

informational texts. In other words, after taking these student characteristics into account, the White-Black achievement gap has disappeared.

One hypothesis for the reasons why the White-Black achievement gap disappeared was that Black and White students might differ significantly in some of the student-level variables included in this study. Because all these variables are documented to be strong predictors for reading comprehension. This might explain why after controlling these variables, the gap disappeared. As I mentioned before in this chapter, a disproportionately high percentage of Black students were disadvantaged in terms of socioeconomic status. The high percentage of Black students eligible for free and reduced lunch, coupled with the finding that student eligibility for free and reduced lunch as the strongest predictor of reading comprehension, definitely contributed to the achievement gap between Black and White students.

I conducted further analysis to see whether Black and White students differed significantly in other student-level variables. The results revealed that Black students were significantly lower in terms of home literacy resources ( $\gamma_{black} = -.510$ ), but there was no significant difference between Black and White students in reading motivation or school reading amount. Considering the positive association between home literacy resources and reading comprehension, I believe the difference in home literacy resources between Black and White students also contributed to the achievement gap.

Another important finding on ethnic profiles in reading was with regard to Hispanic students' reading comprehension. Hispanic students scored significantly higher than White students in both informational and literary texts, after controlling all the variables in the within-school model. That is, when compared with White peers at the

same socioeconomic level, who were equally motivated and skilled/strategic in reading, who read the same number of pages on an average day, and who participated in the same amount of group and individual reading activities, Hispanic students performed significantly better than White students in both literary and informational texts. In other words, after taking these student characteristics into account, the White-Hispanic achievement gap not only disappeared, but turned in the other direction as well. This finding may sound counterintuitive.

A hypothesis for the reasons why the White-Hispanic achievement gap not only disappeared but turned in favor of Hispanic students might be because Hispanic students were significantly lower in most of the variables included in this study. Since these variables are all documented to be significant predictors of reading comprehension that might explain why after controlling these variables, the gap disappeared. The results of this study supported this hypothesis. First, Hispanic students were especially disadvantaged both in family income and parental educational level. The 2009 NAEP data showed that approximately 70% of Hispanic students were eligible for the National School Lunch Program, compared with 22% of White students eligible for the National School Lunch Program. Furthermore, only about 4% of White students reported that their parents did not finish high school, as opposed to 20% of Hispanic students reported so. In contrast, approximately 58% of White students reported that their parents graduated from college, as opposed to only 24% of Hispanic students reported that their parents had college degrees. The finding of a disproportionately high percentage of Hispanic students disadvantaged in terms of socioeconomic status, coupled with the significant role that

socioeconomic status played in reading comprehension, accounted for the achievement gap between White and Hispanic students.

I conducted further analysis to see whether Hispanic and White students differed in other student-level variables in addition to socioeconomic status. The results revealed that Hispanic students were significantly lower in terms of home literacy resources ( $\gamma_{Hispanic} = -1.040$ ), school reading amount ( $\gamma_{Hispanic} = -.116$ ), and reading motivation ( $\gamma_{Hispanic} = -.397$ ). Given the significant and positive contribution of these variables (i.e., home literacy resources, reading amount, and reading motivation) to reading comprehension, it is not surprising that when all these variables were controlled, the achievement gap not only disappeared, but turned in favor of Hispanic students.

Furthermore, the interaction effect between reading amount and reading comprehension for Hispanic students might also contribute to the finding why Hispanic students outperform White students, after controlling all the variables in the within-school model. The results of this study indicated an interaction effect between reading amount and Hispanic students,  $\gamma_{literary\_texts} = 1.228$ ,  $\gamma_{informational\_texts} = 1.259$ , which meant the relationship between reading amount and reading comprehension was significantly stronger for Hispanic students, compared with White students (Hispanic students coded as 1 and White students coded as 0). In other words, above and beyond the main effect of reading amount  $\gamma_{literary\_texts} = .999$ ,  $\gamma_{informational\_texts} = .877$ , Hispanic students benefited more from the positive relationship between reading amount and reading comprehension. More specifically, the effect of reading amount for Hispanic students is  $\gamma_{literary\_texts} = .999 + 1.228 = 2.227$  for literary texts and  $\gamma_{informational\_texts} = .877 + 1.259 = 2.136$  for informational texts. This finding meant that one unit increase in reading amount

translated into more gains in reading comprehension for Hispanic students, compared with White students.

There was no significant difference between White and Asian students in reading comprehension of literary texts, but Asian students outperformed White students in informational texts,  $\gamma_{\text{informational\_texts}} = 2.752$ . The finding was consistent with existing literature on academic achievement of Asian students (Mulligan, Hastedt, & McCarroll, 2012). Further analysis indicated that Asian students were significantly higher in school reading amount, reading motivation, and reading strategies, but significantly lower in home literacy resources. Therefore, Asian students' high school reading amount, reading motivation and reading strategies may have made up for their disadvantage in home literacy resources.

American Indian scored significantly lower than White students in both literary texts and informational texts. The finding regarding American Indian students was consistent with the current literature. Further analysis indicated that American Indian students were significantly lower in home literacy resources ( $\gamma_{\text{American\_Indian}} = -.513$ ) and parental educational level ( $\gamma_{\text{American\_Indian}} = -.227$ ). Descriptive statistics obtained in this study indicate that 62% of American Indian students were eligible for the National School Lunch Program, compared with 22% of White students eligible for the National School Lunch Program. Therefore, the low socioeconomic status of American Indian students definitely contributed to the achievement gap between White and American Indian students.

The proportion of the student-level variance in reading comprehension of literary texts explained by the student-level variables was as follows:  $(.74 - .58)/.074 = 22\%$ .



This showed that one fifth of the student-level (within-school) variance in eighth-grader's reading comprehension of literary texts was explained by the student-level variables, which included gender, ethnicity, eligibility for free and reduced lunch, parental educational level, pages read for school on an average day, home literacy resources, reading motivation, group reading activities, individual reading activity. Similarly, the proportion of the student-level variance in reading comprehension of informational texts explained by the student-level variables in the within-school model was as follows:  $(.66 - .55)/.66 = 17\%$ . That is, 17% of the student-level variance in reading comprehension of informational texts was explained by the student-level variables included in this study.

A test of random effect tells us whether the association between a student-level variable (e.g., Black) and the dependent variable (i.e., reading comprehension of literary texts and informational texts) may vary significantly among schools. For instance, a test of the Black slope random effect refers to a test examining whether the relationship between Black students and reading comprehension of literary texts and/or informational texts varies significantly across schools. The random effect results indicated that the relationship between Black students and reading comprehension in both informational texts and literary texts varied significantly across schools. Similarly, the relationship between Hispanic students and reading comprehension in both literary and informational texts varied significantly across schools, demonstrating that the relationship between Hispanic students and reading comprehension did not remain constant among the schools.

### 4.3.3. HLM Between-School (level-2) Model

In the between-school (level-2) model, school-level variables were entered to model the outcome variables. The school-level variables included the following: school type (public vs. private), school-level absenteeism, school-level percentage of Black, Hispanic, Asian, American Indian students, school participation in the National School Lunch Program, school proportion of students eligible for the National School Lunch Program, school-level aggregate of parental educational level, school-level aggregate of reading motivation, school-level aggregate of reading skills/strategies, school-level aggregate of home literacy resources, school-level aggregate of classroom group reading activities, and individual reading activity. The final HLM model for reading comprehension of informational texts was composed of level-1 model (student-level model) and level-2 model (school-level model). The equations for the level-1 model (student-level model) and the level-2 model (school-level model) were specified as follows:

#### Level-1 Model

$$\begin{aligned} RRPS2I_{ij} = & \beta_{0j} + \beta_{1j}*(female_{ij}) + \beta_{2j}*(black_{ij}) + \beta_{3j}*(hispanic_{ij}) + \beta_{4j}*(asian_{ij}) + \\ & \beta_{5j}*(american\_indian_{ij}) + \beta_{6j}*(other_{ij}) + \beta_{7j}*(reading\_amount_{ij}) + \\ & \beta_{8j}*(parental\_education_{ij}) + \beta_{9j}*(FARMS_{ij}) + \beta_{10j}*(motivation_{ij}) + \\ & \beta_{11j}*(group\_reading_{ij}) + \beta_{12j}*(home\_literacy\_resources_{ij}) + \beta_{13j}*(strategies_{ij}) + \\ & \beta_{14j}*(individual\_reading_{ij}) + \beta_{15j}*(motivation*black_{ij}) + \\ & \beta_{16j}*(motivation*hispanic_{ij}) + \beta_{17j}*(black*female_{ij}) + \beta_{18j}*(hispanic*female_{ij}) + \\ & \beta_{19j}*(parental\_education*black_{ij}) + \beta_{20j}*(parental\_education*hispanic_{ij}) + \\ & \beta_{21j}*(home\_literacy\_resources*black_{ij}) + \beta_{22j}*(reading\_amount*hispanic_{ij}) + r_{ij} \end{aligned}$$

## Level-2 Model

$$\begin{aligned} \beta_{0j} = & \gamma_{00} + \gamma_{01}*(\text{proportion of students absent}_j) + \gamma_{02}*(\text{proportion of Asian}_j) + \\ & \gamma_{03}*(\text{proportion of Black}_j) + \gamma_{04}*(\text{proportion of Hispanic}_j) + \gamma_{05}*(\text{proportion of} \\ & \text{indian}_j) + \gamma_{06}*(\text{proportion of FARM students}_j) + \gamma_{07}*(\text{reading amount}_j) + \\ & \gamma_{08}*(\text{parental education}_j) + \gamma_{09}*(\text{motivation}_j) + \gamma_{010}*(\text{group reading}_j) + \gamma_{011}*(\text{home} \\ & \text{literacy resources}_j) + \gamma_{012}*(\text{strategies}_j) + \gamma_{013}*(\text{individual reading}_j) + u_{0j} \end{aligned}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}*(\text{PUBLIC}_j) + \gamma_{22}*(\text{SSCHBLK}_j) + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31}*(\text{PUBLIC}_j) + \gamma_{32}*(\text{SSCHHSP}_j) + u_{3j}$$

$$\beta_{4j} = \gamma_{40}$$

...

$$\beta_{22j} = \gamma_{220}$$

in which  $RRPS2I_{ij}$  represented a set of five plausible values measuring eighth-grader's reading comprehension of informational texts for student  $i$  in school  $j$ ,  $\beta_{0j}$  was the intercept or the average reading comprehension of informational texts for a student whose values on all the other independent variables are 0,  $\beta_{1j}$  was the relationship between gender and reading comprehension of informational texts, with 1 as female and 0 as male,  $\beta_{2j}$  was the relationship between Black students and reading comprehension of informational texts,  $\beta_{3j}$  was the relationship between Hispanic students and reading comprehension of informational texts,  $\beta_{4j}$  was the relationship between Asian students and reading comprehension of informational texts,  $\beta_{5j}$  was the relationship between American Indian students and reading comprehension of informational texts,  $\beta_{7j}$  was the relationship between school reading amount and reading comprehension of informational

texts,  $\beta_{8j}$  was the relationship between parental education and reading comprehension of informational texts, and so on.

In level-2 model, the intercept – reading comprehension of informational texts for a student whose values on all the other independent variables, was modeled by the school-level variables, including school-level absenteeism with coefficient  $\gamma_{01}$ , school proportion of Asian students with coefficient  $\gamma_{02}$ , school proportion of Black students with coefficient  $\gamma_{03}$ , school proportion of Hispanic students with coefficient  $\gamma_{04}$ , school proportion of American Indian students with coefficient  $\gamma_{05}$ , school proportion of students eligible for the National School Lunch Program with coefficient  $\gamma_{06}$ , school-level aggregate of reading amount with coefficient  $\gamma_{07}$ , school-level aggregate of parental educational level with coefficient  $\gamma_{08}$ , school-level aggregate of reading motivation with coefficient  $\gamma_{09}$ , school-level aggregate of group reading activities with coefficient  $\gamma_{010}$ , school-level aggregate of home literacy resources with coefficient  $\gamma_{011}$ , school-level aggregate of reading strategies with coefficient  $\gamma_{013}$ , and school-level aggregate of individual reading activity with coefficient  $\gamma_{013}$ . Similarly, the final HLM model for eighth-grader’s reading comprehension of literary texts consisted of level-1 model (student-level model) and level-2 model (school-level model). In level-2 model, the Black slope and the Hispanic slope were modeled by school type (private vs. public).

My third research question is “*How are school-level factors associated with eighth-graders’ comprehension of informational and literary texts? How are school characteristics associated with the White-Black achievement gap? How are school characteristics associated with the White-Hispanic achievement gap?*” To address these questions, the results of the final between-school model are presented in Table 19. As

shown in Table 19, school-level absenteeism was negatively and significantly associated with the average reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = -1.545$ ,  $\gamma_{informational\_texts} = -1.497$ . The gamma coefficients indicated that one percent increase in school-level absenteeism was associated with 1.545 points lower in reading comprehension of literary texts and 1.497 points lower in reading comprehension of informational texts.

School-level percentage of Black, Hispanic, Asian, and American Indian students was negatively and significantly associated with reading comprehension of literary and informational texts. For example, one percent increase of Black students in the student population was associated with .226 points lower in reading comprehension of informational texts,  $\gamma_{informational\_texts} = -.226$ , and .247 points lower in reading comprehension of literary texts,  $\gamma_{literary\_texts} = -.247$ . Similarly, one percent increase of Hispanic students in the student population was associated with .102 points lower in reading comprehension of informational texts,  $\gamma_{informational\_texts} = -.102$ , and .106 points lower in reading comprehension of literary texts,  $\gamma_{literary\_texts} = -.106$ . One percent increase of American Indian students in the student population was associated with .196 points lower in reading comprehension of informational texts,  $\gamma_{informational\_texts} = -.196$ , and .180 points lower in reading comprehension of literary texts,  $\gamma_{literary\_texts} = -.180$ .

Table 19. Final Between-school model (160,870 students nested within 7028 schools)

Fixed Effects	Literary texts	Informational texts
INTRCPT1, $\beta_0$		
INTRCPT2, $\gamma_{00}$	261.148	263.997
Absenteeism, $\gamma_{01}$	-1.545	-1.497
Proportion of Asian students, $\gamma_{02}$	-.091	-.057
Proportion of Black students, $\gamma_{03}$	-.247	-.226
Proportion of Hispanic students, $\gamma_{04}$	-.106	-.102
Proportion of American Indian students, $\gamma_{05}$	-.180	-.196
Proportion of FARM students, $\gamma_{06}$	-.970	-1.016
Aggregate of school reading amount, $\gamma_{07}$	1.644	2.359
Aggregate of parental education, $\gamma_{08}$	6.510	7.435
Aggregate of school-wide reading motivation, $\gamma_{09}$	2.266	1.942
Aggregate of group reading activities, $\gamma_{010}$	-.450 (ns)	-.504(ns)
Aggregate of home literacy resources, $\gamma_{011}$	5.849	6.266
Aggregate of reading skills/strategies, $\gamma_{012}$	1.633	1.488
Aggregate of individual reading activities, $\gamma_{013}$	-.980	-1.089
For BLACK slope, $\beta_2$		
INTRCPT2, $\gamma_{20}$	1.012 (ns)	2.597 (ns)
PUBLIC, $\gamma_{21}$	-8.788 (ns)	-7.696
For HISPANIC slope, $\beta_3$		
INTRCPT2, $\gamma_{30}$	6.948	7.260
PUBLIC, $\gamma_{31}$	-7.360	-8.241
Random Effect		
INTRCPT1, $u_0$	81.186	79.503
BLACK slope, $u_2$	35.171	25.812
HISPANIC slope, $u_3$	57.926	57.828
level-1, $r$	841.474	783.306

Notes: Results based on student weight variable “ORIGWT” and school weight variable “SRSBASW”  
 All results are significant at .05 level.

As a proxy for school-level socioeconomic characteristics, school proportion of students eligible for the National School Lunch Program was negatively and significantly associated with reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = -.970$ ,  $\gamma_{informational\_texts} = -1.016$ . This meant as the percentage of students eligible for the National School Lunch Program increased, reading comprehension of literary and informational texts decreased, even after controlling for all the other variables in the

model. One percent increase in the percentage of students eligible for the National School Lunch Program was associated with .970 point decrease in literary text comprehension and 1.016 point decrease in informational text comprehension.

School-level aggregate of student reading motivation was positively and significantly associated with reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = 2.266$ ,  $\gamma_{informational\_texts} = 1.942$ . One unit increase in the school wide reading motivation was associated with 2.266 point increase in reading comprehension of literary texts and 1.942 point increase in reading comprehension of informational texts.

School-level aggregate of parental education was significantly and positively associated with eighth-grader's reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = 6.510$ ,  $\gamma_{informational\_texts} = 7.435$ . One unit increase in school wide parental education was associated with 6.510 point increase in reading comprehension of literary texts and 7.435 point increase in reading comprehension of informational texts.

School-level aggregate of school reading amount was positively and significantly associated with eighth-grader's reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = 1.644$ ,  $\gamma_{informational\_texts} = 2.359$ , with one unit increase in school wide reading amount associated with 1.644 point increase in reading comprehension of literary texts and 2.359 point increase in reading comprehension of informational texts.

School-level aggregate of home literacy resources was positively and significantly associated with eighth-grader's reading comprehension of literary texts,  $\gamma_{literary\_texts} = 5.849$ ,  $\gamma_{informational\_texts} = 6.266$ . The gamma coefficients indicate that one unit increase in school-level home literacy resources was associated with 5.849 point increase in reading

comprehension of literary texts and 6.266 point increase in reading comprehension of informational texts.

School-level aggregate of reading skills and strategies was positively and significantly associated with eighth-grader's reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = 1.633$ ,  $\gamma_{informational\_texts} = 1.488$ . One unit increase in school wide use of reading skills and strategies was associated with 1.633 point increase in reading comprehension of literary texts and 1.488 point increase in reading comprehension of informational texts.

School-level aggregate of individual reading activity was negatively and significantly associated with reading comprehension of literary and informational texts,  $\gamma_{literary\_texts} = -.980$ ,  $\gamma_{informational\_texts} = -1.089$ . This means one unit increase in school wide individual reading activity was associated with .980 point decrease in reading comprehension of literary texts and 1.089 point decrease in reading comprehension of informational texts.

Additionally, school type was significantly associated with the relationship between Hispanic students and reading comprehension in both informational and literary texts,  $\gamma_{literary\_texts} = -7.360$ ,  $\gamma_{informational\_texts} = -8.241$ . This meant the relationship between Hispanic students and reading comprehension was significantly weaker in public schools. Similarly, school type was significantly associated with the relationship between Black students and reading comprehension in informational texts,  $\gamma_{informational\_texts} = -7.696$ , but not in literary texts. This meant the relationship between Black students and reading comprehension of informational texts was significantly weaker in public schools.



Substantial variance in the between-school models for literary and informational texts was explained by the school-level variables, which include school type (public vs. private), school-level absenteeism, school-level percentage of Black, Hispanic, Asian, and American Indian students, school proportion of students eligible for the National School Lunch Program, school-level aggregate of parental educational level, school-level aggregate of reading motivation, school-level aggregate of reading skills/strategies, and school-level aggregate of home literacy resources.

The between-school variance that remained to be explained after entering the school-level variables was 81.186 for literary texts and 79.503 for informational texts. Therefore, the explained variance in reading comprehension of literary texts by the school-level variables was  $(309.526 - 81.186)/309.526 = 74\%$ , indicating the school-level variables explained 74% of the total variation of student reading comprehension of literary texts which occurred between schools. The explained variance in the average reading comprehension of informational texts by the school-level variables was  $(324.540 - 79.503)/324.540 = 76\%$  for informational texts, indicating the school-level variables explained 76% of the total variation of student reading comprehension of informational texts which occurred between schools. In summary, the main findings are presented in Table 20, table 21, and table 22.

Table 20. Summary of the first research question and main findings

<i>1. How are student-level variables associated with eighth-graders' reading comprehension of literary text/ informational texts?</i>	
Findings in both literary texts and informational texts	1a. Female students scored significantly higher than male students.
	1b. Black female adolescents outperformed Black male students.
	1c. Parental education, home literacy resources, school reading amount, reading motivation, teacher's prompting to use reading skills/strategies were significantly and positively associated with student reading comprehension.
	1d. Student eligibility for the National Lunch Program, group reading activities, and individual reading activities were negatively and significantly associated with reading comprehension.
	1e. The relationship between parental educational and reading comprehension was weaker for Black students.
	1f. The relationship between parental educational and reading comprehension was weaker for Hispanic students.
	1g. The relationship between motivation and reading comprehension was weaker for Black students.
	1h. The relationship between motivation and reading comprehension was weaker for Hispanic students.
	1i. The relationship between school reading amount and reading comprehension was stronger for Hispanic students.

Table 21. Summary of the second research question and main findings

<p><i>2a. Does the White-Black achievement gap narrow after controlling all the student-level variables?</i></p> <p><i>2b. Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?</i></p>	
<p>Findings in both literary texts and informational texts</p>	<p>2a. After controlling student characteristics (e.g., gender, eligibility for the National School Lunch Program, home literacy resources, school reading amount, reading motivation), the White-Black achievement gap in literary and informational texts disappeared in the within-school model.</p>
	<p>2b. Hispanic students scored significantly higher than White students in both informational and literary texts, after controlling all the student variables in the within-school model.</p>

Table 22. Summary of the third research question and main findings

<p><i>3a. How are school-level variables associated with eighth-graders' reading comprehension of literary text/informational texts?</i></p> <p><i>3b. How are school characteristics associated with the White-Black achievement gap?</i></p> <p><i>3c. How are school characteristics associated with the White-Hispanic achievement gap?</i></p>	
<p>Findings in both literary texts/informational texts</p>	<p>3a. School-level absenteeism, percentage of Black, Hispanic, Asian, and American Indian, proportion of students eligible for the National Lunch Program were negatively and significantly associated with reading comprehension</p>
	<p>3a. School-level aggregates of reading motivation, parental education, reading amount, home literacy resources, teacher's prompting of using reading skills/strategies were positively and significantly associated with reading comprehension</p>
	<p>3b. In private schools, no significant difference was observed between White and Black students in literary or informational texts.</p>
	<p>3c. In private schools Hispanic students outperformed White students in both informational and literary texts. However, in public schools Hispanic students scored significantly lower in both informational and literary texts compared to White students.</p>

## **CHAPTER FIVE: CONCLUSIONS**

This study examined the relationships among student characteristics, school characteristics, and eighth-graders' reading comprehension of informational and literary texts in the 2009 NAEP reading assessment. In this chapter, I first review the rationale and goal of this study, followed by the research questions and methodology. Next, I present a discussion of the main findings. I conclude this chapter with the contributions of this study to the field, directions for future research, the limitations of this study, and recommendations to NCES.

### **5.1. Recapture of the Study Design**

The current literature on adolescent literacy has identified variables that might contribute to American adolescents' poor reading performance as reflected in national literacy assessment results. These variables include student race/ethnicity (Hemphill & Vanneman, 2011; Vanneman et al., 2009), socioeconomic status (Grissmer et al., 1994; National Center for Educational Statistics, 2015), reading strategies (Alexander, 2005; Alexander et al., 1998; Pressley & Afflerbach, 1995), reading motivation (Guthrie & Wigfield, 2000), reading amount (Guthrie et al., 2012), and school type (Braun et al., 2006). Together, these variables provide a possible means for better understanding the intricacies of adolescent reading and its development. Despite the growing body of literature on adolescent literacy, much is still not understood about the influences and interactions of these variables. Even less is known about the factors contributing to the persistent White-Black achievement gap and the White-Hispanic achievement gap in reading.

In this study, I analyzed the 2009 NAEP reading assessment with a particular focus on eighth graders, looking into both student and school characteristics. The

rationale for using this dataset with a focus on eighth graders was as follows: (a) The conceptual framework of the 2009 NAEP reading assessment was grounded in current scientifically-based research on literacy education compared with the old framework used between 1992 and 2007; (b) For the first time in NAEP history, student reading comprehension in literary and informational texts was reported separately in the 2009 NAEP reading assessment; (c) The 2009 national NAEP reading assessment provided valid and reliable reading measures and high quality data to investigate my research questions; (d) I was interested in literacy development during early adolescence years, since early adolescence is a developmental period in which children face many life changes. For many of the youth this life stage marks the beginning of a downward trajectory leading to delinquency, behavioral/psychological problems, school failure, and dropout (Eccles, 1999; Wigfield et al., 2006; Wigfield et al., 2015). Therefore, I decided to focus on eighth graders and explore the factors associated with eighth-graders' reading comprehension in general and the White-Black achievement gap as well as the White-Hispanic achievement gap in particular. Finally, given that the 2009 NAEP national reading assessment had a nationally representative sample, the results based on the analyses could be reasonably generalized to the population of American eighth graders, thus informing educators, researchers, and policy makers about adolescent literacy practices in school.

The goal of this dissertation was to investigate the associations between student characteristics, school characteristics and eighth-graders' reading comprehension of informational and literary texts. In particular, I explored the demographic, motivational,

and school factors that contributed to the White-Black achievement gap and the White-Hispanic achievement gap. This study investigated the following research questions:

Research question 1. *How are student characteristics (e.g., gender, race/ethnicity, socioeconomic status, reading motivation) associated with eighth-graders' reading comprehension of informational and literary texts?*

Research question 2. *Does the White-Black achievement gap narrow after controlling all the student-level variables? Does the White-Hispanic achievement gap narrow after controlling all the student-level variables?*

Research question 3. *How are school characteristics associated with eighth-graders' reading comprehension of informational texts and literary texts? How are school characteristics associated with the White-Black achievement gap? How are school characteristics associated with the White-Hispanic achievement gap?*

I addressed these research questions by using the hierarchical linear modeling approach (HLM), because this approach accommodated the nested data structure (students nested within schools) and the multistage sampling design employed in the 2009 NAEP reading assessment. The decision to use HLM was also due to the multi-level nature of my research questions. I used a two-level HLM analysis in this study. The first level (level-1) analysis examined the associations between student-level characteristics and reading comprehension of informational and literary texts. The second level (level-2) analysis examined the associations between school-level characteristics and reading comprehension of informational and literary texts.

Responses to the 2009 NAEP student questionnaire and school questionnaire were analyzed to address my research questions. As part of the 2009 NAEP reading

assessment, a questionnaire was administered to eighth graders to collect information on student characteristics and their participation in school reading activities. Similarly, school principals responded to a school questionnaire about school-wide student demographics and school characteristics. The dependent variables were the five plausible values for reading comprehension of literary texts and the five plausible values for reading comprehension of informational texts. The independent variables included both student-level variables and school-level variables. These student-level and school-level variables are summarized as follows:

Table 21. Summary of student-level and school-level variables

	<b>School type</b>	<b>School demographics</b>	<b>School academic environment</b>	<b>School-level socioeconomic characteristics</b>
<b>School-level variables</b>	Public vs. private	School-level percentage of Black, Hispanic, Asian, and American Indian students	a. School wide absenteeism b. School aggregate of reading amount, c. School aggregate of reading motivation, d. School aggregate of teacher prompting for using reading skills/strategies, e. School aggregate of group reading activities f. School aggregate of individual reading activities	a. School participation in the National School Lunch Program b. School participation in Title I funding, c. The proportion of students eligible for the National School Lunch Program, d. School aggregate of home literacy resources
<b>Student-level variables</b>	<b>Student demographics</b>	<b>Student socioeconomic status</b>	<b>Student cognitive variables</b>	<b>Student motivation and behavioral variables</b>

	a. Gender, b. Race/Ethnicity	a. Eligibility for the National School Lunch Program b. Parental educational level c. Home literacy resources	Teacher prompting for students to use reading skills/strategies	a. Reading motivation b. School reading amount c. Participation in group reading activities d. Participation in individual reading activities
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## 5.2. Summary of the Main Findings

In this section, I first present the findings regarding the White-Black achievement gap and the White-Hispanic achievement gap. I then present the findings on the associations between eighth-grader’s reading comprehension and student as well as school characteristics. In each subsection I present the new findings first, followed by the findings that support what is already established in the literature.

### 5.2.1. The White-Black Achievement Gap

The White-Black achievement gap is a pressing issue in the field of educational research. It is consistently documented in the NAEP assessment results (National Center for Education Statistics, 2009, 2011a, 2013, 2015). Previous studies have identified student socioeconomic status (i.e., parental education and family income) as an important factor contributing to the White-Black achievement gap (Jeynes, 2015; Snow & Biancarosa, 2003). Socioeconomic status alone, however, does not fully account for the achievement gap (Grissmer et al., 1994). So the question remains – what are the other factors contributing to the White-Black achievement gap?



**5.2.1.1. New findings.** A new finding in this study was that after controlling student characteristics (e.g., gender, eligibility for the National School Lunch Program, home literacy resources, school reading amount, reading motivation), the White-Black achievement gap in literary and informational texts among eighth graders disappeared in the within-school model. This finding was not without precedent. Similar findings were reported among elementary students. For instance, in analyzing the Early Childhood Longitudinal Study data, Fryer and Levitt (2004, 2006) found that the substantial White-Black score gap in reading and math among incoming kindergarteners disappeared after controlling student characteristics, including socioeconomic status and children's books at home. The present study indicated that it was student characteristics that accounted for the differences in reading comprehension of informational and literary texts between White and Black eighth graders who were in the same school.

Furthermore, the present study offered empirical evidence to support the different achievement levels between Black male and female eighth graders in reading comprehension of informational and literary texts. Most of the current literature on the White-Black achievement gap does not examine the intersection between gender, race/ethnicity, and reading comprehension of different text types. This study extends our understanding of the White-Black achievement gap literature by documenting the different achievement levels of Black male and female eighth graders in informational and literary texts.

Poor academic achievement of Black males is consistently documented in the literature (Fashola, 2005). The current research has identified factors such as socioeconomic status (Grissmer et al., 1994; Wilson, 2009), racial segregation (Sharkey,

2009), teacher expectation (Irvine, 1991), and negative influence of peer pressures (Ogbu, 2003) as possible explanations for the poor academic achievement of Black students. In particular, the underachievement and disengagement of Black male adolescents might be due to the fear of “acting white” among black male peer groups. According to Ogbu, Black students develop “oppositional identities” that view schooling as imposing White cultural values on Black cultural values. Peer pressures among Black male adolescents are likely to be negative toward academic engagement and schooling activities (Fordham & Ogbu, 1986). Research indicates that academic dis-identification is present among the Black male students but not the Black female students (Cokley, McClain, Jones & Johnson, 2011). Research has also found that Black female students value academic engagement and have higher academic expectations than Black male students (Mello & Swanson, 2007; Wood, Kaplan, & McLoyd, 2007), all of which might have contributed to the different achievement levels between Black male and female students. Another plausible explanation for the underachievement of Black male adolescents might be related to their gender identity. Research has shown that Black male students perceive schooling activities as feminine and irrelevant to their masculine sense of self (Noguera, 2003).

**5.2.1.2. Findings supporting the current literature.** The findings of the present study confirmed the influence of parental education and family income in eighth-graders’ reading comprehension of informational and literary texts. In this study family income and parental education, as indicators of student socioeconomic status, were significantly and positively associated with eighth-graders’ reading comprehension, even after controlling all the other student variables. This finding indicated that all other things

being equal, students from high socioeconomic status tended to score higher than students from low socioeconomic status.

In addition to student socioeconomic status, the present study indicated that student and school characteristics, such as home literacy resources and school type, as contributing factors to the White-Black achievement. Among these findings, the relationship between school type and the achievement gap is well established in the achievement gap literature (Braun et al, 2006; Lubienski & Lubienski, 2006). Similarly, home literacy resources (e.g., number of books at home) is often included in the achievement gap literature as an indicator of socioeconomic status (Fryer & Levitt, 2004, 2006). The impact of home literacy environment on students' early literacy development is also well documented in the reading research literature (Burgess et al., 2002; Tracey & Morrow, 2002; Turner et al, 2016).

**5.2.1.2.1. Student characteristics.** In the present study the low family income and the lack of literacy resources at home contributed to the White-Black achievement gap. This study indicated that eighth-grade Black students were especially disadvantaged in terms of family income and home literacy resources. Specifically, 67% of Black students were eligible for the National School Lunch Program, compared with 22% of White students. The disproportionately high percentage of Black students who came from families with a low family income are not only less affluent than their White peers, but have fewer opportunities to get access to developmentally enriching materials both at home and outside of home (Bradley, Corwyn, McAdoo, & Coll, 2001).

In addition to family income, the present study indicated that Black students had significantly lower access to home literacy resources, such as newspapers, magazines,

encyclopedias, and books, compared with White peers. The current research indicates that home literacy resources, such as the number of books at home, are positively associated with reading achievement among elementary students across twenty-five countries (Park, 2008). This finding obtained in this study extends our understanding of the White-Black achievement gap in reading by documenting the gap between Black and White eighth graders in terms of home literacy resources. Taken together, the low family income and the lack of literacy resources at home contributed to the White-Black achievement gap.

Furthermore, the present study indicated that the relationship between parental education and reading comprehension was significantly weaker among Black students, compared to White students, after controlling all the other variables in the model. This weaker relationship indicated for every unit increase in parental education, Black students gained less in reading comprehension compared with White students. In other words, Black adolescents from well-educated families were not doing as well as comparable White peers. Similar findings were reported in Ogbu's (2003) study in which Black students in affluent communities fall behind their White peers.

According to Ogbu, one plausible explanation for the fact that Black students from affluent communities fall behind their White peers might be due to the negative influence of peer pressures. In his study Ogbu found that negative peer pressures were pervasive among middle and high school students, which led to disengagement from schoolwork. For instance, Black students avoided taking AP classes mostly due to peer pressure from other Blacks. Ogbu also found that Black middle school students in particular strongly felt that they had to fit in with peer group, even at the cost of not doing

well in school. Therefore, according to Ogbu, the poor academic performance of Black middle school students who came from affluent communities was partly due to the achievement norm of peer groups. He further concluded that it was not merely a matter of ability, bad teaching, or teacher expectations leading to academic disengagement among Black students. It was the peer pressure against “acting white” that adversely affected Black students’ academic engagement.

In addition to the interaction effect between parental education and reading comprehension, the present study indicated that the relationship between reading motivation and reading comprehension was significantly weaker for Black eighth graders, compared to White students, after controlling all the other variables in the model. This finding is similar to the findings of Baker and Wigfield (1999) in which intrinsic motivation correlated lower with reading achievement for Black fifth- and sixth-grade students than White students. In another study, Guthrie, Coddington, and Wigfield (2009) found that intrinsic motivation did not correlate significantly with reading comprehension for Black students, but was significantly correlated with reading comprehension for White students. In the present study the four items used as indicator of reading motivation included items tapping intrinsic reading motivation, valuing of reading, and pro-social goal. A plausible explanation for this weaker relationship between reading motivation and reading comprehension among Black eighth graders might be because Black students tend to devalue academic achievement due to peer pressure (Ogbu, 2003; Taylor & Braham, 2007) and dis-identify with academics (Cokley et al., 2011; Osborne, 1997).

**5.2.1.2.2. School characteristics.** In addition to these student characteristics, this study also demonstrated that school type was significantly associated with the White-Black achievement gap. More specifically, in public schools Black students scored significantly lower in both informational and literary texts, compared to White students. This finding was consistent with the White-Black achievement gap literature in public schools (Bohrnstedt et al., 2015; Lubienski & Lubienski, 2006; Venneman et al., 2009). In private schools, however, no significant difference was observed between White and Black students in literary or informational texts. In other words, Black students performed equally well as White students in private school settings.

This finding supported the private school research literature that identified unique social and organizational characteristics in private schools that particularly benefited disadvantaged students (Reardon, Kalogrides, & Shores, 2016; York, 1996). For instance, the literature indicates that private schools tend to have a strong focus on the core academic curriculum for all students, regardless of their background or future educational aspirations, which in particular benefits disadvantaged students. In contrast, the highly differentiated structure in public schools with many ability levels and an extensive elective curriculum tend to amplify initial social differences among students (Lee & Bryk, 1989). The literature has also found that disadvantaged students in general benefit from greater achievement gains in private schools because social class effects on educational achievement are significantly lessened in private schools (Bryk, Lee, & Holland, 1993)

Another plausible explanation might be related to the different demographic make-up in public and private schools. Public schools overall have a higher percentage

of Black and Hispanic students, whereas private schools have a lower percentage of these disadvantaged students (Aud, Fox, & Kewal Ramani, 2010; National Research Council, 2006). Research shows that Black student academic achievement is lower in schools with high concentration of Black students and thus the White-Black achievement gap is larger in schools that have a high percentage of Black students (Bohrnstedt et al., 2015).

Overall, these findings demonstrated the complexity of reading development among Black students and that a combination of student characteristics and school characteristics contributed to the White-Black achievement gap in reading comprehension of literary and informational texts.

### **5.2.2. The White-Hispanic Achievement Gap**

There is a consensus in the reading research literature that when examining poor reading performance of disadvantaged students, risk factors such as individual, familial, demographic, and school environment must be taken into account (Rand Reading Group, 2002; Snow et al., 1998). This approach was adopted in this study. The present study explored the White-Hispanic achievement gap in reading by incorporating both student and school characteristics in the analysis.

**5.2.2.1. New findings.** The findings obtained in the present study indicated that all else being equal, Hispanic eighth graders outperformed White students in both literary and informational texts in the within-school model. This finding may sound counterintuitive, since the White-Hispanic achievement gap has been consistently documented in the literature from kindergarteners to high school students. Yet many studies in the current literature are descriptive in nature (Aud et al., 2010; Excelencia in Education, 2015; Mulligan et al., 2012). Other studies either document the trend of the

achievement gap (Hemphill & Vanneman, 2011; Reardon & Galindo, 2009) or review relevant literature (Barton & Coley, 2009), rather than explore the factors contributing to the White-Hispanic achievement gap.

In fact, this finding was not without precedent. Previous studies reported similar results for elementary and high school students. For instance, based on analysis of the Early Childhood Longitudinal Study data, Fryer and Levitt (2004) found that much of the White-Hispanic score gap among incoming kindergarteners was accounted for by student characteristics, including socioeconomic status and children's books at home. In another study, Schneider, Martinez, & Owens (2006) analyzed the National Education Longitudinal Study data with a focus on high school students. They noted pronounced difference across ethnic groups in terms of academic preparation among these high school students. More specifically, Hispanic high school students were the least likely to take college preparatory courses, when background characteristics (e.g., family income, parental education) were not accounted for. However, once background characteristics were controlled, bilingual Hispanic students were more likely than comparable White peers to take advanced courses and the SAT. These researchers also found that highly prepared Hispanic students were more likely than comparable White peers to attend a four-year college versus a two-year college. Therefore, student characteristics should be taken into account when investigating the White-Hispanic achievement gap.

**5.2.2.1.1. Reading motivation.** This study pinpointed key student characteristics, such as reading motivation, as contributing to the White-Hispanic achievement gap. Reading motivation is rarely incorporated in studies examining the achievement gap, despite the abundant literature documenting reading motivation as important predictors



for student reading development (Guthrie & Wigfield, 2000, Guthrie et al., 2012, Wigfield et al., 2015). The present study indicated that Hispanic students reported significantly lower reading motivation, compared with their White peers. Given the positive association between reading motivation and reading comprehension, a plausible explanation for the White-Hispanic achievement gap among adolescent readers can be reasonably attributed to the difference between Hispanic and White students in reading motivation.

The reasons why Hispanic students reported significantly low reading motivation might be due to their dis-identification with academics. Studies have shown that Hispanic students tend to demonstrate higher levels of academic dis-identification, relative to White students (Griffin, 2002). This dis-identification might be related to a weak student-teacher relationship among Hispanic students. Research indicates that teacher behaviors promote student motivation and engagement (Furrer & Skinner, 2003; Skinner, Kindermann, & Furrer, 2009). Skinner and Blemont (1993) found that teacher involvement (i.e., a caring and close relationship with students), structure, and autonomy support predicted student behavioral and emotional engagement. The literature on student-teacher relationship, however, has demonstrated that White middle class teachers in urban schools have a hard time building the bond with Hispanic students (Rosenbloom & Way, 2004). Furthermore, teacher stereotypes of Hispanic students might have weakened the student-teacher relationship that is necessary for learning to occur (Valenzuela, 1999). Martinez (2003) found that Mexican American students felt better when they were not with their teachers. Similar results were reported in a longitudinal study in which Mexican American students were happier, felt better about themselves,

and believed that they were living up to their expectations when they were not with their teachers (Csikszentmihalyi & Schneider, 2000). The weak student-teacher relationship might adversely influence Hispanic students' reading motivation and engagement in school work, which may ultimately translate into poor academic achievement. In short, this new finding of significant low reading motivation among Hispanic eighth graders contributes to our understanding of the White-Hispanic achievement gap and thus highlights the importance of including reading motivation in future research when investigating the achievement gap in reading.

Furthermore, the present study indicated the relationship between reading motivation and reading comprehension was significantly weaker for Hispanic students than for White students. Considering the positive and significant association between reading motivation and reading comprehension, this weaker relationship suggested that with every unit increase in reading motivation, Hispanic students benefited less in their reading comprehension compared to their White peers. This finding is similar to the findings obtained by Unrau and Schlackman (2006) in which they examined reading motivation among Hispanic and Asian students. They found that intrinsic motivation was not a significant predictor of reading achievement for Latino middle school students, but was a significant predictor of reading achievement for Asian students. In the present study the four items used as indicator of reading motivation included items tapping intrinsic reading motivation, valuing of reading, and pro-social goal.

A plausible explanation for this weaker relationship between reading motivation and reading comprehension among Hispanic eighth graders might be due to the "stereotype threat" (Steel, 1992, 1997). According to Steele, when a student belongs to a

group for which a negative stereotype for a domain exists (e.g., the academic achievement of Hispanic students tend to be lower than White students), that student faces the threat of confirming that stereotype and this threat may negatively impair their academic performance. Studies have found that teachers tend to have low expectations of Hispanic students (Rosenbloom & Way, 2004), which may adversely influence Hispanic students' valuing of school reading and thus may weaken the relationship between reading motivation and reading achievement.

**5.2.2.1.2. School Reading amount.** Another new finding in this study was that school reading amount contributed to the White-Hispanic achievement gap. Despite the well-documented role of reading amount in student reading development (Anderson et al., 1988; Guthrie et al., 2012; Wigfield & Guthrie, 1997), school reading amount is rarely incorporated in studies examining the achievement gap. The present study found that Hispanic students were engaged in significantly less reading in school, compared with their White peers, which contributed to the White-Hispanic achievement gap. This finding was similar to the results of the Goodenow and Grady (1993) study in which Hispanic students reported significantly less effort in school work. A plausible explanation for the significantly less engagement in school reading might be due to Hispanic students' low reading motivation. Reading motivation predicts student behavioral engagement in reading (Guthrie, Wigfield, You, 2012). As I discussed in the previous section, Hispanic students reported significantly lower reading motivation, compared with their White peers. This low reading motivation, in turn, might have resulted in low reading amount in school.

Moreover, the present study indicated the relationship between school reading amount and reading comprehension was significantly stronger for Hispanic students than for White students. In other words, above and beyond the main effect of reading amount, with every unit increase in reading amount, Hispanic students benefited more in reading comprehension than White students. It was not clear why the relationship between reading amount and reading comprehension was stronger among Hispanic students. Future research should investigate the mechanism underlying this differential relationships across White and Hispanic students.

**5.2.2.1.3. Interaction effect between race/ethnicity and gender.** The present study contributed to the understanding of the White-Hispanic achievement gap by examining the intersection between race/ethnicity, gender and different text types. This study indicated that Hispanic female eighth graders scored significantly higher than Hispanic male eighth graders in both literary and informational texts. This finding extends our understanding of the White-Hispanic achievement gap by providing empirical evidence supporting the different achievement levels between Hispanic male and female eighth graders in literary and informational texts. A plausible explanation for the different achievement levels between Hispanic male and female eighth graders in reading might be because Hispanic female students tend to be more intrinsically motivated in reading and thus engaged in more reading than Hispanic male students, which in turn resulted in better reading achievement (Unrau & Schlackman, 2006).

#### **5.2.2.2. Findings supporting the current literature**

In the following section, I present the findings regarding the White-Hispanic achievement gap that confirmed what is already established in the current literature.

**5.2.2.2.1. Student characteristics.** The present study indicated that a disproportionately high percentage of Hispanic students were disadvantaged in both family income and parental education, which contributed to the White-Hispanic achievement gap. The 2009 NAEP data demonstrated that approximately 70% of Hispanic students were eligible for the National School Lunch Program, compared with 22% of White students. Furthermore, 20% of Hispanic students reported that their parents did not finish high school, compared with only about 4% of White students. In contrast, approximately 58% of White students reported that their parents graduated from college, compared to 24% of Hispanic students. This finding was consistent with the White-Hispanic achievement gap literature that demonstrates that Hispanic students were more likely to come from low-income families, compared with White students (Excelencia in Education, 2015; Hemphill & Vanneman, 2011).

**5.2.2.2.2. School characteristics.** Above and beyond these student characteristics, this study also indicated that school type was significantly associated with the White-Hispanic achievement gap. More specifically, in private schools Hispanic students outperformed White students in both informational and literary texts. However, in public schools Hispanic students scored significantly lower in both informational and literary texts compared to White students. This finding supported the research literature on private schools that demonstrated that Hispanic students in private schools had higher scores in reading than Hispanic students in public schools (Reardon, Kalogrides, & Shores, 2016). One plausible explanation for this better performance of Hispanic students in private schools might be related to the unique social, demographic, and organizational characteristics in private schools that particularly benefit disadvantaged students (Bryk et

al., 1993; Lee & Bryk, 1989). The literature indicates that private schools tend to have a strong focus on the core academic curriculum for all students, which in particular benefits disadvantaged students. In contrast, the highly differentiated structure in public schools tend to amplify initial social differences among students (Lee & Bryk, 1989). The literature has also found that disadvantaged students in general benefit from greater achievement gains in private schools because social class effects on educational achievement are significantly lessened in private schools (Bryk, Lee, & Holland, 1993)

Taken together, these findings indicated the complexity of reading development among Hispanic students. Both student characteristics and school characteristics contributed to the White-Hispanic achievement gap. When all the student variables were controlled in the within-school model, the White-Hispanic achievement gap did not only disappear, but turned in favor of Hispanic students. Furthermore, when both school and student characteristics were controlled in the final between-school model, the White-Hispanic achievement gap did appear in public schools, but not in private schools. In private schools, Hispanic eighth graders outperformed their White peers in both literary and informational texts.

### **5.2.3. Student Characteristics Associated with Adolescents' Reading Comprehension**

This study identified student characteristics that were significantly and positively associated with eighth-graders' reading comprehension in informational and literary texts. These student characteristics included socioeconomic status, home literacy resources, school reading amount, and reading motivation.

### **5.2.3.1. Findings supporting the current literature.**

In the following section, I present the findings regarding the associations between reading comprehension and student as well as school characteristics that confirmed what is already established in the current literature.

**5.2.3.1.1. Student socioeconomic status.** In this study parental education and student eligibility for the National School Lunch Program were two indicator variables for student socioeconomic status. Parental education was significantly and positively associated with student reading comprehension in both literary and informational texts, even after controlling all the other variables in the model. Similarly, student eligibility for the National School Lunch Program was significantly associated with reading comprehension in both literary texts and informational texts, with those eligible for the National School Lunch Program scoring significantly lower in both literary and informational texts, compared with those not eligible. This finding confirmed the current literature on the important role of student socioeconomic status when examining academic achievement (Grissmer et al., 1994; Rand Reading Group, 2002; Snow & Biancarosa, 2003).

**5.2.3.1.2. School reading amount.** The number of pages that students read for school was significantly and positively associated with eighth graders' reading comprehension in both literary and informational texts, even after controlling all the other student-level variables. This finding is consistent with the reading research literature in which reading amount predicts reading achievement (Anderson et al., 1988; Guthrie et al., 2012; Wigfield & Guthrie, 1997). This finding provides another piece of empirical

evidence to support the link between school reading amount and eighth-graders' reading comprehension in both informational texts and literary texts.

**5.2.3.1.3. Home literacy resources.** The results of this study indicated that home literacy resources were significantly and positively associated with eighth-graders' reading comprehension in literary and informational texts, with more home literacy resources associated with higher reading comprehension in both text types. This finding supports the well-documented role of home literacy environment on student's reading development (Burgess et al., 2002; Park, 2008; Turner et al., 2016). However, the majority of previous studies on the role of home literacy resources on reading development focuses on elementary students. This finding contributes to our understanding of adolescent literacy development by documenting the significant association between home literacy resources and reading development among adolescent readers.

Furthermore, the present study extends the current reading research literature by documenting the contextual effect of school-wide home literacy resources on eighth-graders' reading comprehension. In other words, when a student from low socioeconomic status attends a school in which her peers come from homes rich in home literacy resources, she is more likely to become a skilled reader. This finding highlights the significance of learning contexts on adolescent reading development.

**5.2.3.1.4. Reading motivation.** The results of this study indicated that reading motivation was significantly and positively associated with eighth-graders' reading comprehension in both literary and informational texts, with higher reading motivation associated with higher reading comprehension. This finding supports the current



literature on the positive association between the items included in the NAEP scale that I used as an indicator of reading motivation and reading achievement (Guthrie et al., 2012; Schiefele, Schaffner, Moller, & Wigfield, 2012) and in particular highlights the important role that reading motivation plays in adolescent reading development.

The finding in relation to reading motivation should be taken with caution, however, because of a serious limitation in the measure of this construct in the 2009 NAEP reading assessment. There are only four items on reading motivation, with two items on intrinsic reading motivation (“reading is one of my favorite activities” and “read for fun on own”), one item on valuing of reading (“learn a lot when reading books”), and one item on the pro-social goal of reading (“talk with friends about what you read”). Admittedly, the limited item pool would not fully capture the complexity of this powerful construct. I recommend that more items be developed in future NAEP assessment cycles to fully capture the various aspects of this construct, including intrinsic motivation, reading avoidance, self-efficacy, perceived difficulty valuing of reading, devaluing of reading, etc.

Despite this serious limitation in the measure of reading motivation in the 2009 NAEP reading assessment, this finding still has important implications for researchers and practitioners in secondary education. Low motivation for academic learning among adolescent learners is well documented in the reading motivation literature (Guthrie et al., 2012). This finding indicates that students with low reading motivation earn low reading comprehension scores. Therefore, designing instructional practices to enhance student reading motivation should be at the top of the agenda for secondary teachers.

#### ***5.2.4. School Characteristics Associated with Adolescents' Reading Comprehension***

In addition to student characteristics, the present study also identified school characteristics that were associated with eighth-graders' reading comprehension of informational texts and literary texts. These school characteristics included school type, school socioeconomic status, school demographic characteristics, and school academic environment.

##### **5.2.4.1. Findings supporting the current literature.**

In the following section, I present the findings regarding the associations between reading comprehension and school characteristics that confirmed what is already established in the current literature.

**5.2.4.1.1. School type.** School type was significantly associated with the White-Black achievement gap and the White-Hispanic achievement gap. In public schools Black eighth graders scored significantly lower in both informational and literary texts, compared to White students. Similarly, in public schools Hispanic students scored significantly lower in both informational and literary texts, compared to White students. These findings support the current literature that documents the achievement gap between disadvantaged students and White students in public schools (Bohrnstedt et al., 2015; Lubienski & Lubienski, 2006; Venneman et al., 2009).

In private schools, however, no significant difference was observed between White and Black students in reading comprehension. In other words, Black students performed equally well as White students in private school settings. Furthermore, Hispanic students outperformed White students in private schools. These findings are in accord with the private school research literature that identifies unique social,

demographic, and organizational characteristics in private schools that particularly benefit disadvantaged students (Bryk et al., 1993; Lee & Bryk, 1989; National Research Council, 2006).

**5.2.4.1.2. School socioeconomic status.** The present study indicated that as an indicator of school-level socioeconomic characteristics, the proportion of students eligible for the National School Lunch Program was significantly and negatively associated with eighth-graders' reading comprehension. That is, as the proportion of students eligible for the National School Lunch Program increases, reading comprehension decreased in both literary and informational texts.

Moreover, there was a contextual effect of school-level aggregate of parental education on eighth-graders' reading comprehension. Putting it another way, a low-SES student attending a school where her peers come from well-educated families was more likely to become a skilled reader than the same student attending a school where her peers' parents were not well educated. These findings highlights the significant role of school/community socioeconomic status on student reading comprehension (RAND Reading Report, 2002; Snow et al., 1998).

**5.2.4.1.3. School demographic characteristics.** The present study found that as an indicator of school demographic characteristics, school-level percentage of disadvantaged students (i.e., Black, Hispanic, Asian, and American Indian) was negatively and significantly associated with reading comprehension in literary and informational texts. As the percentage of disadvantaged students increased, eighth-graders' reading comprehension decreased. This finding lends support to the impact of school demographic make-up on student academic achievement (Bohrnstedt et al., 2015).

**5.2.4.1.4. School academic environment.** School academic environment was significantly associated with student reading comprehension in both literary and informational texts. School-level absenteeism was negatively and significantly associated with eighth-graders' reading comprehension, whereas school-level reading motivation and reading amount were positively and significantly associated with eighth-graders' reading comprehension. These findings support the role of school contextual factors on student academic achievement (Balfanz, & Byrnes, 2012; Gottfried, 2010).

In summary, the findings obtained in this study indicated that both student characteristics and school characteristics contributed to eighth-graders' reading comprehension in informational and literary texts. More importantly, this study identified student and school characteristics that accounted for the complexity of the White-Black achievement gap and the White-Hispanic achievement gap.

### **5.3. Limitations**

The results of this study shed light on the relationships among student characteristics, school characteristics, and eighth-graders' reading comprehension in informational and literary texts. However, it is not appropriate to draw causal claims about the relationships between student/school variables and adolescents' reading comprehension, since this study was a correlational study. Nor was this study designed to encourage causal inferences about the relationship between student/school variables and adolescents' reading comprehension.

Second, due to the constraints entailed in secondary data analysis, I had no control over what variables were collected in the NAEP reading assessment or how the reading comprehension scales were reported for further analyses. For example, the limited items

of reading motivation did not honor the complexity of this construct and its significant impact on student reading comprehension (Guthrie & Wigfield, 2000). There were only four items on reading motivation, with two items on intrinsic reading motivation (“reading is one of my favorite activities” and “read for fun on own”), one item on valuing of reading (“learn a lot when reading books”), and one item on the pro-social goal of reading (“talk with friends about what you read”). Similarly, the items on classroom reading activities only captured the frequency but not the quality of these activities.

In addition, I had no control over how the reading comprehension scales were reported for further analyses. In the NAEP 2009 reading assessment, reading comprehension was reported on two separate scales: literary texts and informational texts. According to the NAEP 2009 reading framework, literary texts included literary narrative, literary nonfiction, and poetry, whereas informational texts include exposition, argumentation/persuasive, and procedural text. However, the term literary texts used in NAEP were not a genre, but a broad classification which included literary narrative, literary nonfiction, and poetry. I would like to acknowledge that the literature that has driven this study mainly came from literary narrative texts and informational texts. Ideally, cognitive items on poetry and literary nonfiction should have been pulled out from literary texts so that I would have accomplished a cleaner analysis on reading comprehension between informational texts and literary narrative texts. Because I did not have access to the original reading passages, I was not able to differentiate which test items came from poetry, literary nonfiction, or narrative texts.

Third, this study used a demographically representative sample of American eighth graders, and the results can only be adequately generalized to the population of American eighth graders. The results of this study need to be replicated across other grade levels. Fourth, this study focused on adolescents' interaction with print-based text. Thus, the findings of this study can only be used to account for student reading achievement in traditional print-based literacies.

#### **5.4. Recommendations to NCES**

The results of this study suggest several recommendations for NCES, the organization that gathered the data I used in my research. First, given the abundant literature on the significant impact of reading motivation on student reading comprehension (Guthrie & Wigfield, 2000; Guthrie et al., 2012; Retelsdorf et al., 2011) and the very limited items included in the NAEP 2009 reading assessment that I used as an indicator of reading motivation, I recommend that more items be developed in future NAEP assessment cycles to fully capture the various aspects of this construct, including intrinsic motivation, self-efficacy, valuing of reading, perceived difficulty, pro-social goals, etc. I note that the inclusion of NAEP items dedicated to motivation was a positive step, but the current, small item pool did not honor the complexity of reading motivation and unfortunately under-represents this construct. An under-representation of such a powerful construct as motivation may have restricted the inferences we can make about its role in reading achievement and reading development.

Second, reading comprehension was currently reported in the 2009 NAEP in two separate scales: informational texts and literary texts. However, literary texts were not a genre, but a broad classification used by NCES to include literary narrative, literary

nonfiction, and poetry. I recommend that the current practice of assigning texts to either literary or informational groups be enhanced by the development of more specific scales in future NAEP assessment cycles. These would include narrative texts scales, poetry scales, and literary nonfiction scales. One result of this development would be the ability to investigate reading comprehension in each of these genres. A second benefit would be the increased accuracy in describing students' reading achievements. Similarly, I recommend that scales of three cognitive targets be provided in future NAEP assessment cycles, including locate and recall, integrate and interpret, critique and evaluate. This will allow for future preciseness in describing the strengths and weaknesses of students' reading achievement.

Last but not least, I recommend more detailed information be collected on the quality of classroom reading activities and home literacy resources. More detailed sampling of these constructs will help researchers, practitioners, and policy makers better understand adolescent reading development and achievement, which hopefully will translate into effective interventions to enhance adolescent reading performance in the near future.

### **5.5. Contributions and Directions for Future Research**

In this study I investigated the associations between student characteristics, school characteristics, and eighth-graders' reading comprehension of informational and literary texts. In particular, I explored the demographic, motivational, and school factors that contributed to the White-Black achievement gap and the White-Hispanic achievement gap.

This study moved the field of reading research forward in two fronts. First, this study contributed to our understanding of the White-Black achievement gap in reading by identifying student and school characteristics that accounted for the complexity of the White-Black achievement gap. This study extended the reading research literature by documenting the gap between White and Black eighth graders in terms of home literacy resources and family income. Additionally, the present study contributed to our understanding of the White-Black achievement gap by documenting the different achievement levels of Black male and female eighth graders in informational and literary texts.

Secondly, the present study contributed to our understanding of the White-Hispanic achievement gap in reading by identifying key student characteristics associated with the White-Hispanic achievement gap. Specifically, the present study indicated that Hispanic students had significantly lower access to home literacy resources, were engaged in significantly less reading in school, and displayed significantly lower reading motivation, compared with their White peers.

While this study shed light on the White-Black achievement gap and the White-Hispanic achievement gap in reading, the NAEP data was not designed to explain the causes for some of the findings obtained in this study. For instance, this study found that Hispanic students were engaged in significantly less reading in school and displayed significantly lower reading motivation. Yet the NAEP data was not designed to explain why it was so among Hispanic students. Future research should investigate Hispanic students' motivation profiles and hopefully this will inform future interventions to help



Hispanic students enhance their reading motivation, reading engagement, and ultimately their reading achievement.

In addition, future research need to investigate why the relationship between reading motivation and reading comprehension is weaker among Black and Hispanic students, compared with White students. The current literature indicates prevalent low motivation for academic learning among adolescent learners (Guthrie et al., 2012). Yet there is limited research on the motivation profiles of disadvantaged students, such as Black and Hispanic students. More research along this line is needed to get a better understanding of the underperformance of these disadvantaged students.

Furthermore, it is not clear why the relationship between reading amount and reading comprehension is stronger among Hispanic students. Future research should investigate the mechanism underlying this differential relationships across White and Hispanic students. The educational significance of this stronger relationship between reading comprehension and school reading amount among Hispanic students offers a promise for educators. The promise is that school reading amount might be a powerful lever for literacy advancement of Hispanic students and has the potential to close the White-Hispanic achievement gap.



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Thousands of cane toads are wreaking havoc in Australia.

## ALIEN INVASION

In the 1930s, beetles with a sweet tooth gulped down a lot of sugarcane in Australia. Angry sugarcane farmers needed to do something quickly. Farmers in Hawaii gave them a tip: Cane toads like to munch on the beetles. Desperate Australian farmers imported a boxful of the fist-sized toads from Hawaii and let them loose.

Bad idea. Instead of chowing down on the beetles, cane toads gobbled anything they could swallow—pet food, garbage, honeybees, termites, snails, and mice.

The toads multiplied, spreading across the northern coast of Australia. Today toads are such a problem that a member of the Australian government recently suggested that citizens use golf clubs to whack the warty amphibians!

Australia isn't the only country dealing with unwelcome animal guests. In the United States, hundreds of invasive species pose a threat to the environment.

### The Aliens Are Coming

An invasive species is nonnative, or alien, to the ecosystem. An ecosystem is a group of plants, animals, and other living

organisms that live together in the same area. Although invasive species don't damage their own ecosystem, they can cause massive destruction when they invade another area.

For example, fingernail-sized zebra mussels hitchhiked from Russia to the Great Lakes in the water tanks of ships. When those ships landed in the United States, the zebra mussels began gobbling up food and oxygen, leaving nothing for other underwater creatures to eat.

They also irritated humans. Each year, a female zebra mussel can produce 30,000 to 1 million eggs. When those eggs hatch, the mussels clog pipes that provide drinking water to houses and schools.

A beetle called the emerald ash borer arrived in the United States from China in wood packing material carried aboard cargo ships or airplanes.

The adult emerald ash borer nibbles on the leaves of the ash tree. The larvae of the beetle, however, cause far more damage by chomping through the inner bark of ash trees. The insects destroy the tunnels that

allow water and nutrients to travel from the roots to the leaves. Emerald ash borers have killed 8 million to 10 million trees in Michigan, Ohio, and Indiana.

Another invasive species that is wreaking havoc is the snakehead fish.

Snakeheads arrived in the United States from Asia as exotic pets. When pet owners grew tired of the snakeheads, they threw the fish into nearby lakes and streams.

The snakehead fish now live in several states and can move over land from one body of water to another body. They dine greedily and can clear a pond of all its fish. The snakehead was recently spotted in a lake in Queens, N.Y., a part of New York City.

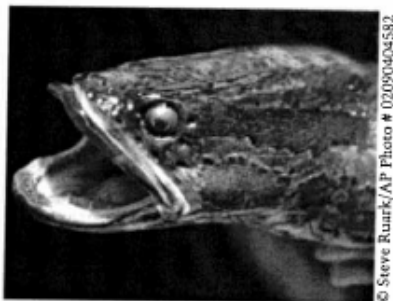
"The world has changed so much in the last 100 years," Jodie A. Ellis, a scientist at Purdue University, told *Senior Edition*.

"We are now able to share so many things with other countries, which is mostly a good thing. But there are costs, and one of those costs is the constant threat of invasive species."

#### Why Should We Care?

In addition to destroying an ecosystem, the devastation caused by invasive species can be costly. In the United States, the damage caused by the pesky critters is roughly \$137 billion per year.

"Our natural ecosystems are the primary sources of our food and drinking water," Lisa Gould, a senior scientist at the Rhode



**The snakehead fish kills native fish in many waterways in the United States.**

© Steve Rumrck/AP Photo # 02090404582

Island Natural History Survey, told *Senior Edition*. "Ecosystems help keep our air clean. They give us medicines and materials for our industries. Without them, we could not exist for long."

#### Battling the Cane Toad

Back in Australia, the government has devoted \$1 million to combating that country's pesky toad problem. Scientists are researching what kinds of poisons can kill the creature.

Wildlife officials are also setting up traps to catch the toads, which are now hitchhiking across Australia in the backs of cars and trucks.

"We cannot tolerate a situation where cane toads are getting a free ride across the continent," says one Australian official.

VC173972

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## HOME ON THE RANGE

Forget about traveling to Africa to go on a safari. If some scientists have their way, people might be able to spot lions and elephants roaming the Great Plains of North America. The Great Plains lie in the center of North America, extending from the Mississippi River to the Rocky Mountains and from Canada to Texas.

A team of scientists recently proposed the bold plan to save endangered animals from extinction in Africa. Many animal habitats there are disappearing. A habitat is the place where a plant or an animal lives.



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### Just "Plain" Smart

Supporters of the plan say that relocating the animals to the Great Plains would help restore the region's biodiversity (the variety of different organisms found within a geographic region) closer to what it was before humans came along.

Most modern African animals never lived on the Great Plains. However, some other large animals, such as camels, saber-toothed cats, and mastodons, lived there thousands of years ago.

A mastodon was a furry, elephant-like creature with long tusks. Mastodons and other animals lived on the Great Plains until the last ice age ended, about

10,000 years ago. An ice age is a period of time when sheets of ice covered Earth.

Supporters of the project also say that relocating large animals to vast parks in the Great Plains could save hundreds of species in Africa and Asia that now face extinction. They say the animals could be introduced gradually on private land. Eventually, fenced animal reserves could be opened to tourists.

### Bad Idea

Those against the plan argue that releasing different species into new environments can cause destruction. Cane toads, for example, brought to

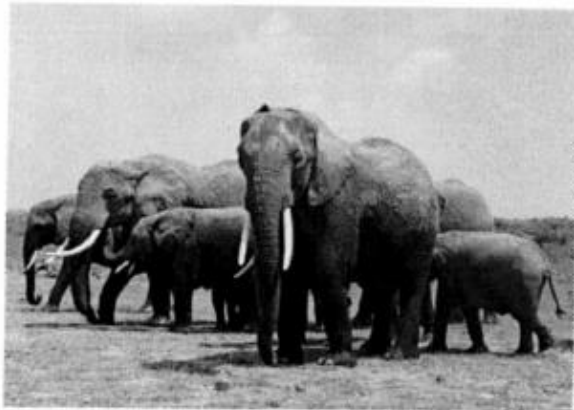
Section X

Australia from Hawaii to control beetles in sugarcane fields, ate everything in sight. Cattle and sheep ranchers are also concerned that the wild animals might devour their herds.

Critics of the plan say that there are

already a lot of endangered animals that need protection in North America. Scientist Donald Grayson says, "Why introduce . . . camels and lions when there are North American species that could benefit from the same kind of effort?"

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**Some people say the addition of elephants, lions, and other big game animals would make the Great Plains even greater.**



1. What is the central purpose of "Alien Invasion"?
  1. To point out that invasive species come from many different countries
  2. To argue that invasive species are a serious problem that must be solved
  3. To describe the damage that invasive species cause in Australia
  4. To suggest that invasive species can be stopped only with the government's help
2. "Alien Invasion" relies primarily on what form of evidence as support for its argument?
  1. Quotations of famous scientists
  2. Multiple definitions of invasive species
  3. A series of examples of invasive species
  4. Descriptions of different methods of control
3. According to "Alien Invasion," Australian farmers imported cane toads into Australia in order to
  1. help save their native beetle populations
  2. eat the sugarcane that was taking over their other crops
  3. stop an alien species of beetle imported from Hawaii
  4. eat beetles that were destroying sugarcane crops
4. Using what you read in "Alien Invasion," explain why people should be concerned about invasive species.

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5. What is the central purpose of "Home on the Range"?
  1. To inform people about two opposing views
  2. To convince people to take a particular point of view
  3. To describe recent scientific discoveries
  4. To challenge a common belief
6. Describe a similarity and a difference between the way the two articles approach the subject of invasive species. Support your answer with references to both of the articles.

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7. In "Alien Invasion," on page 4, an Australian official says, "We cannot **tolerate** a situation" where cane toads are traveling across the Australian continent. This means that the official thinks that Australians cannot
1. find a solution to the problem posed by cane toads
  2. understand why cane toads are such a problem
  3. allow the cane toads to continue causing a problem
  4. permit the cane toad problem to become well known
8. On page 5, when "Home on the Range" talks about **vast** parks in the Great Plains, this refers to parks that
1. have mostly flat land
  2. have protected sections
  3. are owned by private citizens
  4. are extremely large
9. According to "Home on the Range," some scientists think that moving African animals to the Great Plains would help improve the area's
1. resistance to alien species
  2. economy
  3. biodiversity
  4. research facilities
10. Explain why "Home on the Range" discusses animals that lived on the Great Plains thousands of years ago.
- 
- 
- 
- 
11. Do you think "Alien Invasion" is an effective title for persuading readers of the article's point of view? Support your opinion with reference to the article.
- 
- 
- 
-

Appendix B. Released passage and questions from the 2009 NAEP reading assessment



**Reading**  
**Student Background Questionnaire**

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**2009**  
**Grade 8**



## DIRECTIONS

In the next two sections, you will be asked questions about yourself and your education. The choices for some questions will be written across the page as shown. Fill in the oval for the best answer.

### Example 1

	Never or hardly ever	Once or twice a month	Once or twice a week	Almost every day
1. How often do you watch movies on TV?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


You should have filled in the oval below the answer that best tells how often you watch movies on TV.

The choices for some questions will be written down the page as shown. Now read Example 2 and indicate your answer.

### Example 2

2. Which event would you prefer to attend?
<input type="radio"/> basketball game
<input type="radio"/> car show
<input type="radio"/> concert
<input type="radio"/> play

Make your answer mark clear and dark in the oval. If you make a mistake or want to change your answer, be sure to completely erase any unwanted marks.

Do not go past the  sign at the end of each section until you are told to do so.

If you finish before time is called, go back and check your work on that section only. Use your time carefully. Do as much as you can in each section.



## SECTION 4

## Section 4

In this section, please tell us about yourself and your family. The section has 13 questions. Mark your answers in your booklet.

1. Are you Hispanic or Latino? Fill in **one or more ovals**. VB331330
- Ⓐ No, I am not Hispanic or Latino.
  - Ⓑ Yes, I am Mexican, Mexican American, or Chicano.
  - Ⓒ Yes, I am Puerto Rican or Puerto Rican American.
  - Ⓓ Yes, I am Cuban or Cuban American.
  - Ⓔ Yes, I am from some other Hispanic or Latino background.

2. Which of the following best describes you? Fill in **one or more ovals**. VB331331
- Ⓐ White
  - Ⓑ Black or African American
  - Ⓒ Asian
  - Ⓓ American Indian or Alaska Native
  - Ⓔ Native Hawaiian or other Pacific Islander

Section 4

For the rest of the questions in this section, fill in only **one** oval for each question.

3. Does your family get a newspaper at least four times a week? VR331333
- Ⓐ Yes
- Ⓑ No
- Ⓒ I don't know.
4. Does your family get any magazines regularly? VR331334
- Ⓐ Yes
- Ⓑ No
- Ⓒ I don't know.
5. About how many books are there in your home? VR331335
- Ⓐ Few (0–10)
- Ⓑ Enough to fill one shelf (11–25)
- Ⓒ Enough to fill one bookcase (26–100)
- Ⓓ Enough to fill several bookcases (more than 100)
6. Is there a computer at home that you use? VR331336
- Ⓐ Yes
- Ⓑ No
7. Is there an encyclopedia in your home? It could be a set of books, or it could be on the computer. VR331337
- Ⓐ Yes
- Ⓑ No
- Ⓒ I don't know.
8. About how many pages a day do you have to read in school and for homework? TR001101
- Ⓐ 5 or fewer
- Ⓑ 6–10
- Ⓒ 11–15
- Ⓓ 16–20
- Ⓔ More than 20
9. How often do you talk about things you have studied in school with someone in your family? VR331339
- Ⓐ Never or hardly ever
- Ⓑ Once every few weeks
- Ⓒ About once a week
- Ⓓ Two or three times a week
- Ⓔ Every day

10. How many days were you absent from school in the last month? VEX31447
- Ⓐ None
  - Ⓑ 1 or 2 days
  - Ⓒ 3 or 4 days
  - Ⓓ 5 to 10 days
  - Ⓔ More than 10 days
11. How far in school did your mother go? VEX30870
- Ⓐ She did not finish high school.
  - Ⓑ She graduated from high school.
  - Ⓒ She had some education after high school.
  - Ⓓ She graduated from college.
  - Ⓔ I don't know.
12. How far in school did your father go? VEX30871
- Ⓐ He did not finish high school.
  - Ⓑ He graduated from high school.
  - Ⓒ He had some education after high school.
  - Ⓓ He graduated from college.
  - Ⓔ I don't know.
13. How often do people in your home talk to each other in a language other than English? VEX31451
- Ⓐ Never
  - Ⓑ Once in a while
  - Ⓒ About half of the time
  - Ⓓ All or most of the time



## SECTION 4

## Section 4

This section has 15 questions. Mark your answers in your booklet. Fill in only **one** oval for each question.

1. Please indicate how much you **DISAGREE** or **AGREE** with the following statements about reading and writing. Fill in **one** oval on each line.

VIS345622

	Strongly disagree	Disagree	Agree	Strongly agree	
a. When I read books, I learn a lot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VIS345623
b. Reading is one of my favorite activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VIS345624

2. How often do you do each of the following? Fill in **one** oval on each line.

VIS379288

	Never or hardly ever	Once or twice a month	Once or twice a week	Almost every day	
a. Read for fun on your own time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VIS379289
b. Talk with your friends or family about something you have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VIS379290

3. Now think about reading and writing you do for school. For your **English** class this year, how often do you do each of the following? Fill in **one** oval on each line.

VIS345644

	Never or hardly ever	A few times a year	Once or twice a month	At least once a week	
a. Have a class discussion about something that the whole class has read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VIS345645
b. Work in pairs or small groups to talk about something that you have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VIS345646

Section 4

VB345648

4. For your **English** class so far this year, how many times have you done each of the following? Fill in **one** oval on each line.

	Never	Once	2 or 3 times	4 or 5 times	6 or more times	
a. Made a presentation to the class about something that you have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VB345650
b. Done a project about something that you have read (for example, written a play, created a website)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VB345651

5. How often do you use either the school library or the public library to get information for a school project or homework? VC503833
- Never or hardly ever
- Once or twice a month
- Once or twice a week
- Every day or almost every day
6. How often do you use either the school library or the public library to get information for your own use? VC503834
- Never or hardly ever
- Once or twice a month
- Once or twice a week
- Every day or almost every day
7. Do you study or do work for English/ language arts at an after-school or tutoring program? VC503875
- Yes
- No
8. In your school, do you participate in extracurricular activities such as book clubs, competitions, fairs, or exhibits for reading? VC504012
- Yes
- No
9. For school this year, how often have you been asked to write long answers to questions on tests or assignments that involved reading? VB345715
- Never
- Once or twice this year
- Once or twice a month
- At least once a week

10. In your English/language arts class this year, how often does your class do each of the following? Fill in **one** oval on each line. VC304013

	Never or hardly ever	Once or twice a month	Once or twice a week	Every day or almost every day	
a. Read aloud	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	VC304014
b. Read silently	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304015
c. Discuss new or difficult vocabulary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304016
d. Explain what we have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304017
e. Do a group activity or project about what we have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304018
f. Read books we have chosen ourselves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304019
g. Write something about what we have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304020
h. Discuss different interpretations of what we have read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VC304021

Section 4

VCS04022

11. In your English/language arts class this year, when reading a story, article, or other passage, how often does your teacher ask you to do the following? Fill in **one** oval on each line.

	Never or hardly ever	Once or twice a month	Once or twice a week	Every day or almost every day	
a. Summarize the passage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04023
b. Interpret the meaning of the passage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04024
c. Question the motives or feelings of the characters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04025
d. Identify the main themes of the passage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04026

VCS04027

12. In your English/language arts class this year, how often do you use a computer to do each of the following? Fill in **one** oval on each line.

	Never or hardly ever	Once or twice a month	Once or twice a week	Every day or almost every day	
a. Learn and practice vocabulary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04028
b. Practice spelling and grammar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04029
c. Write stories or reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04030
d. Produce multimedia reports/projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04031
e. Read books on the computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04032
f. Access reading-related websites (for example, websites with book reviews and lists of recommended books)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04033
g. Conduct research for reading and writing projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04034
h. Correspond with students from other schools using e-mail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VCS04035



13. How hard was this test compared to most other tests you have taken this year in school?<sup>VB095182</sup>

- Ⓐ Easier than other tests
- Ⓑ About as hard as other tests
- Ⓒ Harder than other tests
- Ⓓ Much harder than other tests

14. How hard did you try on this test compared to how hard you tried on most other tests you have taken this year in school?<sup>VC034509</sup>

- Ⓐ Not as hard as on other tests
- Ⓑ About as hard as on other tests
- Ⓒ Harder than on other tests
- Ⓓ Much harder than on other tests

15. How important was it to you to do well on this test?<sup>VB095184</sup>

- Ⓐ Not very important
- Ⓑ Somewhat important
- Ⓒ Important
- Ⓓ Very important



Appendix C. NAEP 2009 School Background Questionnaire



**Reading/Mathematics/Science  
School Background Questionnaire**

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**Grade 8  
2009**

## Part I: School Characteristics and Policies

VB17248

1. What grades are taught in your school? Fill in **all** ovals that apply.

- Pre-kindergarten
- Kindergarten
- 1st grade
- 2nd grade
- 3rd grade
- 4th grade
- 5th grade
- 6th grade
- 7th grade
- 8th grade
- 9th grade
- 10th grade
- 11th grade
- 12th grade

VB56165

2. Do all students in your school follow the same school calendar?

- Yes → *Go to Question 3.*
- No → *Skip to Question 4.*

VC346368

3. Please indicate the number of hours of instruction that eighth-grade students in your school completed as of February 1, 2009. Fill in the blocks below and then *skip to Question 5.*

,  hours of instruction as of February 1, 2009

4. For each group of students following a separate calendar, please indicate the number of hours of instruction that eighth-grade students in your school completed as of February 1, 2009. VB607887

First group:  ,  hours of instruction as of February 1, 2009 VB607888

Second group:  ,  hours of instruction as of February 1, 2009 VB607889

Third group:  ,  hours of instruction as of February 1, 2009 VB607890

5. What is the current enrollment in your school? VB337250

,

6. Approximately what percentage of eighth-graders in your school . . .  
(Please be sure your answers sum to 100%.) VC189012

a. is **new this year**?  % VC189050

b. has been attending your school for 1–2 years?  % VC189051

c. has been attending your school for 3 or more years?  % VC189053

**TOTAL**  %

7. Of the students currently enrolled in your school, what percentage has been identified as limited-English proficient?

- Ⓐ 0%
- Ⓑ 1-5%
- Ⓒ 6-10%
- Ⓓ 11-25%
- Ⓔ 26-50%
- Ⓕ 51-75%
- Ⓖ 76-90%
- Ⓗ Over 90%

8. Is your school a public **charter** school?

(A charter school is a public school that, in accordance with an enabling state statute, has been granted a charter exempting it from selected state or local rules and regulations. A charter school may be a newly created school or it may previously have been a public or private school.)

- Ⓐ Yes
- Ⓑ No

9. What other type of school is this? Fill in **one** oval on each line. VC311012

	Yes	No	
a. Regular elementary school	<input type="radio"/>	<input type="radio"/>	VC311014
b. A regular school with a magnet program	<input type="radio"/>	<input type="radio"/>	VC311015
c. A magnet school or a school with a special program emphasis, e.g., science/math school, performing arts school, talented/gifted school, foreign language immersion school, etc.	<input type="radio"/>	<input type="radio"/>	VC311016
d. Special education: a school that primarily serves students with disabilities	<input type="radio"/>	<input type="radio"/>	VC311017
e. Alternative: a school that offers a curriculum designed to provide alternative or nontraditional education, not clearly categorized as regular, special education, or vocational	<input type="radio"/>	<input type="radio"/>	VC311018
f. Private (independent)	<input type="radio"/>	<input type="radio"/>	VC311020
g. Private (religiously affiliated)	<input type="radio"/>	<input type="radio"/>	VC311021
h. Privately run public school	<input type="radio"/>	<input type="radio"/>	VC311022
i. Other	<input type="radio"/>	<input type="radio"/>	VC311024

10. About what percentage of your students is absent on an average day? (Include excused and unexcused absences in calculating this rate.) HE000917

- 0–2%
- 3–5%
- 6–10%
- More than 10%

11. About what percentage of your teachers is absent on an average day? (Include all absences in calculating this rate.)

- Ⓐ 0–2%
- Ⓑ 3–5%
- Ⓒ 6–10%
- Ⓓ More than 10%

12. About what percentage of students who are enrolled at the beginning of the school year is still enrolled at the end of the school year? (Exclude students who transfer into the school during the school year in figuring this rate.)

- Ⓐ 98–100%
- Ⓑ 95–97%
- Ⓒ 90–94%
- Ⓓ 80–89%
- Ⓔ 70–79%
- Ⓕ 60–69%
- Ⓖ 50–59%
- Ⓗ Less than 50%

13. About what percentage of this year's eighth graders was held back and is repeating eighth grade?

- Ⓐ 0%
- Ⓑ 1–2%
- Ⓒ 3–5%
- Ⓓ 6–10%
- Ⓔ More than 10%

14. Of the full-time teachers who started in your school last year, what percentage left before the end of the school year?
- Ⓐ 0%
  - Ⓑ 1-2%
  - Ⓒ 3-5%
  - Ⓓ 6-10%
  - Ⓔ 11-15%
  - Ⓕ 16-20%
  - Ⓖ More than 20%

15. Does your school participate in the National School Lunch Program?
- Ⓐ Yes → *Go to Question 16.*
  - Ⓑ No → *Skip to Question 19.*

16. How does the school operate the program?
- Ⓐ Student eligibility is determined individually, and eligible students receive free or reduced-price lunch. → *Skip to Question 18.*
  - Ⓑ All students in school receive free lunch under special provisions (e.g., Provision 2 or 3). → *Go to Question 17.*



17. If your school distributes free lunch to all students under Provision 2 or 3, what was the base year during which individual student eligibility was collected?

- This school does not distribute free lunch to all students under Provision 2 or 3—eligibility is determined annually.
- 2008
- 2007
- 2006
- 2005
- 2004
- 2003 or earlier

18. During this school year, about what percentage of students in your school was eligible to receive a free or reduced-price lunch through the National School Lunch Program?

- 0%
- 1–5%
- 6–10%
- 11–25%
- 26–34%
- 35–50%
- 51–75%
- 76–99%
- 100%

19. Does your school receive Title I funding? (Title I is a federally funded program which provides educational services, such as remedial reading or remedial math, to children who live in areas with high concentrations of low-income families.)

- A No
- B Yes, our school receives funds, which are targeted to eligible students.
- C Yes, our school receives funds, which are used for schoolwide purposes.

20. Approximately what percentage of students in your school receives the following services? Fill in **one** oval on each line. Students who receive more than one service should be counted for each service they receive. Please report the percentage of students who receive each of the following services as of the day you respond to this questionnaire.

	None	1-5%	6-10%	11-25%	26-50%	51-75%	76-90%	Over 90%	
a. Targeted Title I services	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E	<input type="radio"/> F	<input type="radio"/> G	<input type="radio"/> H	VB610145
b. Gifted and talented program	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E	<input type="radio"/> F	<input type="radio"/> G	<input type="radio"/> H	VB485286
c. Instruction provided in student's home language (non-English)	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E	<input type="radio"/> F	<input type="radio"/> G	<input type="radio"/> H	VB485287
d. English-as-a-second-language (not in a bilingual education program)	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E	<input type="radio"/> F	<input type="radio"/> G	<input type="radio"/> H	VB485288
e. Special education	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E	<input type="radio"/> F	<input type="radio"/> G	<input type="radio"/> H	VB485289

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