IMPACTS OF SOCIOECONOMIC AND ELL STATUS ON ENGLISH LANGUAGE ARTS

by

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Abstract

The purpose of this study was to investigate the impacts of English language learners (ELL) and socioeconomic status (SES) on Matthew effect or compensatory trajectory by analyzing students' English language arts (ELA) test scores. This study applied the concept of the Matthew effect or the compensatory trajectory in the ELA proficiency tests with the latent growth modeling (LGM) method in order to examine the existence of "the rich get richer, and the poor get poorer" phenomenon in the longitudinal data. This examination allowed researchers to analyze ELA scores' growth patterns from students with different ELL and SES status by discerning the relationship between the starting point (intercept) and rate of changes (slope). In this study, data were taken from three tests for 4th-grade and 8th-grade students in the 2014/2015 academic year. The test items were constructed based on Common Core State Standards (CCSS), which provided uniform guidelines for standardized multiple-choice items. The results showed that LGM provided an adequate model-data fit for ELA scores. The LGM analysis indicated that ELL and SES had different impacts on the Matthew effect or the compensatory trajectory for different grades. Implications for ELL teaching instructions and literacy assessment were discussed.

Keywords: Matthew Effect, Compensatory Trajectory, LGM, ELL, SES, ELA, CCSS

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CHAPTER I: INTRODUCTION

Literacy Crisis

In the past decade, the literacy crisis in America's public schools has drawn significant public attention following the publication of the National Assessment of Educational Progress (NAEP) report in 2007. In the latest NAEP report (2018), average reading scores for 4th- and 8th-grade students revealed that the students were struggling to read and write at a proficient level, and the results for the average reading scores were not significantly different from the 2015 NAEP report results. Researchers, educators, and practitioners are aware of the ever-increasing literacy demands put on the students and have applied evidence-based research to implement intensive literacy improvement programs and efficient literacy instruction for students from various backgrounds.

Educational professionals and literacy researchers recognize that a majority of intensive language programs designed to improve literacy skills have primarily targeted students from kindergarten to 3rd-grade (Pufahl & Rhodes, 2011; Vacca, 1998; Walqui et al., 2000). Many of these programs focus on early literacy developments, such as phonological awareness, phonics skills, decoding skills and other developmental literacy skills. Literacy skill development focused on late elementary through high school grades did not gain wide attention in the educational field until recent years (Espin, Wallace, Lembke, Campbell, & Long, 2010). The complexity of measuring literacy skills achievement for secondary grade students to design specific language programs targeting their literacy skills development is one of primary reasons for fewer comprehensive language programs for this cohort (Rand Reading Study Group, 2002). Apparently, there is a research gap of the literacy development patterns between early childhood and

adolescence (Daneman, 1991; Williamson, Appelbaum & Epanchin, 1991). With many American students struggling to read and write proficiently, and few language programs beyond early childhood available to improve their literacy performance, the substantial literacy gap between ELLs and non-ELLs and high SES and low SES students has gained wide attention (McCoach, O'Connell, Reis, & Levitt, 2006; Van Staden, 2011).

Patterns and Trends in ELL Status and ELA Achievement Gap

Given the latest NAEP report results, it is truly discouraging how far behind ELLs have fallen compared to non-ELLs score in English language arts (ELA) assessment scores. All of the past published NAEP reports confirmed that ELLs exhibited low literacy performance and a lack of improvement over time compared to non-ELLs. On the ELA assessment tests and other content area subject tests, nationally, ELLs scored an average of 20 to 50 percent lower than non-ELLs. The majority of ELLs have not achieved proficiency levels in ELA scores and failed to meet the district or state required annual progress goals (Abedi & Dietal, 2004; Cartiera, 2006; Genesee, Lindholm-Leary, Saunders, & Christian, 2005; NAEP, 2015; Sullivan, 2011). Literacy researchers, school educators, and policymakers have suggested possible explanations for the achievement gap, such as a lack of improved classroom instruction for the ELL population (Genesee, Lindholm-Leary, Saunders, & Christian, 2005), psychometric issues of standardized achievement tests (Abedi, 2002; Yang et al, 2008) and insufficient teacher preparation for the ELL population (Good, Masewicz, & Vogel, 2010). Previous studies have identified a persistent literacy achievement gap due to these barriers, although our understanding of the trends and patterns of the achievement gap between ELLs and non-ELLs is limited and would benefit from further research.

Currently, the best source for understanding and addressing the ELL and non-ELL literacy achievement trends and patterns is the NAEP data. The assessment of long-term trends, the NAEP-LTT, is conducted every two to four years and is based on nationally representative samples (Reardon, Robinson-Cimpian, & Weathers, 2008). The latest release of the ELL and non-ELL reading achievement trends was in 2017. Since the NAEP assessment report was first established in 1998, a comparison of the average reading score results from 1998 to 2017 demonstrated an increase of 15% for 4th grade and 9% for 8th grade. However, only 9% of ELLs were performing at or above a proficient reading level compared with 40% of non-ELLs achieving proficiency. When comparing 8th-grade students between 1998 and 2017, ELLs scored 8% higher over time, and non-ELLs scored just 5% higher. Nevertheless, only 5% of the 8th-grade ELL population remained at or above a proficient reading level, while 38 % of non-ELLs were at or above a proficient reading level. The data from the latest NAEP reading achievement reports confirmed that the 4th-grade gap remained the same between ELLs and non-ELLs when comparing the 2015 and 2017 academic years, but the reading achievement gap narrowed between 8th-grade ELLs and non-ELLs (NAEP, 2018).

The NAEP data generally provide overall reading achievement trajectories between ELL and non-ELL groups and demonstrate biennial achievement gap trends and patterns; however, studies have shown that in order to discuss whether the reading achievement gaps remain, narrow, or widen entirely depends on the impact of the relevant literacy factors. Ethnicity and SES status have been reported as significant factors that impact the reading comprehension gaps between ELLs and non-ELLs. Roberts, Mohammed, and Vaughn (2010) investigated the reading achievement

trajectories across different language minority groups and identified that native Spanish-speaking ELLs had less significant growth over the same time as compared with their native Asian ELLs and non-ELL peers due to the impact of the lower SES status of the native Spanish speakers. Not only does the interaction of racial and SES status shed light on the ELL's reading development trajectories and form variations of reading achievement gaps between ELLs and non-ELLs, ethnicity status also impacts levels of reading proficiency at various learning stages. Lee and Burkam (2002) reported that during the 1970's and 1980's, language minority students demonstrated consistent achievement growth compared to their non-ELL peers, who experienced a ceiling effect. However, the non-ELL students began to exhibit improvements in test scores and almost doubled their achievement growth compared to their ELL peers from 1986 to 1999 (Lee & Burkam, 2002).

With the development of ELL's literacy growth patterns and teaching instructions, literacy researchers and school educators have begun to realize that the literacy growth patterns and trends between ELLs and non-ELLs are also dependent on their school grade levels. For example, Reardon and Galindo (2009) investigated reading achievement gaps among Hispanic, African American, and Caucasian students in elementary school. Their study revealed that reading achievement gaps between Hispanic and Caucasian students narrowed during the early stages of elementary school, then widened slightly by 5th-grade. Regarding the middle- and high-school reading achievement gaps between Hispanic and Caucasian students, Polat, Zarecky-Hodge, and Schreiber (2016) reviewed NAEP data obtained from the testing period 2003 to 2011 and observed 4th- and 8th-graders' reading achievement gaps between ELLs and non-ELLs

were either steady or slightly wider due to multiple factors including ethnicity (Polat, Zarecky-Hodge & Schreiber, 2016). Valdés and Castellón (2011) summarized that the ELL achievement gaps were normally wider at the higher grades than lower grades regardless of other contributing factors, including gender, ethnicity, SES, etc.

In brief, even though previous studies have investigated the patterns and trends of the literacy achievement gap between ELLs and non-ELLs from longitudinal data since 2010, very few studies have addressed the impact of ELL status on literacy proficiency gap changes with increasing grades. Also, a majority of the studies lack the analysis of literacy development patterns and trends for SES status. More research is needed in order to identify evident and detectable ELA achievement trends for multiple grades and confirm the impacts of ELL status and other sociocultural factors on the literacy performance gap.

Patterns and Trends in SES Status and ELA Achievement Gap

In addition to the impact of ELL status, SES is another factor frequently reported as significantly influencing ELA reading comprehension in certain circumstances. Assuming students eligible for the free or reduced-price lunch program (FRPLs) represent low-SES students, and non-FRPLs are equivalent to high-SES students, the NAEP (2018) report revealed that the reading achievement gap between FRPLs and non-FRPLs in 2017 remained the same for both 4th-grade and 8th-grade students compared to that gap in 2015. Previous studies have shown that the patterns and trends in SES status and the reading achievement gap varied across different periods, ages and language minority subgroups (Galindo, 2009; Hoff, 2013; Pickens, 2016; Reardon, Robinson, &Weathers, 2008; Reardon, 2011). These studies indicated that SES status was often

mixed with other confounding factors, such as gender, race and ELL status that also affected the literacy gap.

Due to various factors, including whether confounding factors were taken into consideration, as well as the distinctions in research focuses and designs, studies to date have yielded inconsistent findings of the literacy gap between FRPLs and non-FRPLs. For example, when the literacy achievement gap between FRPL and non-FRPL students was measured over time, regardless of the impacts of other contributing factors on literacy gaps among different groups, some researchers have found the literacy gap between FRPLs and non-FRPLs remained stable at the elementary school level and widened slowly from middle school to high school (Caro, 2009; Hertzman & Weins, 1996; Readon & Galindo, 2009; Reardon, 2011).

However, other researchers have reported finding an increased achievement gap for lower grades students (Aikens & Barbarin, 2008; Christ, Silberglitt, Yeo, and Cormier, 2010; McCoach, O'Connell, Reis, & Levitt, 2006; Shinn, Deno, & Espin, 2000). Comparing the 2017 and 2015 NAEP data, the reading proficiency gap between FRPLs and non-FRPLs widened 2% for 4th-grade students, and the achievement gap between these two targeted groups remained stable for 8th-grade students (NAEP, 2018).

Despite the impact of SES status on literacy trajectory trends and gaps varied by grade level, the majority of the studies have similar findings. Multiple studies have discussed that students with lower SES backgrounds academically underperformed their middle- or upper-class English native speakers, and the English development trajectories for FRPLs were different from non-FRPLs (Brooks-Gunn, Rouse, & McLanahan, 2007; Hoff, 2013). One of the primary reasons for the literacy gap between FRPLs and non-

FRPLs was due to the differences in literacy skills (Brooks-Gunn, Rouse, & McLanahan, 2007; Dickinson & Tabors, 2001; Morrison, Bachman, & Connor, 2005; Oller & Eilers, 2002), such as, early differences in oral language skills before school starts have contributed significant impacts on the later academic development trends followed by students with different SES status (Dickinson & Tabors, 2001; Morrison et al., 2005).

Additionally, across different studies of the impact of SES on academic outcomes, a growing body of research has agreed that SES has not only predicted the literacy skills before children entered school, but also later literacy development trajectories and patterns through high school (Brooks-Gunn, Rouse, & McLanahan, 2007; Morrison, Bachman, & Connor, 2005; Willms, 2003). Also, the majority of studies have confirmed that the relationship between SES and the literacy achievement gap varied across grade levels (Caro, 2009; Espin, Wallace, Lembke, Campbell, & Long, 2010; Pikens, 2016; Sirin, 2005). Caro's study noted the importance of understanding this research topic as "it can offer insights into how and when inequalities reproduce, and it can be altered over the life course" (Caro, 2009, p. 560). Therefore, it is critical to clarify the impact of SES on the literacy achievement gap in order to provide theoretical arguments and educational implications for improving literacy skills for students with low SES.

Common Core State Standards in ELA

Confronted with the critical finding that the average academic performance for ELL and FRPLs was far behind the performance of their high-income native English peers, Common Core State Standards (CCSS) were designed to provide some significant benefits to overcome the fundamental assessment limitations and uniform standards for assessing ELA literacy skills. Educational professionals, literacy researchers, and

governors from 48 states as well as two territories and the District of Columbia worked together and co-established instructional guidelines for the CCSS, which were officially launched in 2009 (CCSS, 2019). The CCSS were designed to provide general guidelines and standards as to what knowledge students should acquire and by when. The proposed guidelines for ELA mastery for each grade, released in 2010, were focused on teaching students how to listen, speak, read and write with critical thinking and problem-solving skills. The CCSS for ELA also defined, as a primary objective, the preparation of students with college and career readiness goals with the emphasis on equipping them with practical knowledge and literacy skills with complete literacy instruction and assessment structures (Common Core State Standards Initiative, 2010a). Currently, "The CCSS have been adopted by 46 states and the District of Columbia, as well as by the Department of Defense Education Activity, whose schools serve the children of military families stationed on bases in the United States and around the world." (Achieve, p. 3).

Literacy learning goals and teaching instructions were well defined legislatively by the CCSS; therefore, the analytical focus had emphasized on assessing students' academic performance along with the guidance of CCSS to develop literacy assessment (Hakuta, Santos, & Fang, 2013; Wixson & Lipson, 2012). Despite previous studies that have demonstrated the significant impacts of ELL and SES status separately on ELA achievement, surprisingly little research has analyzed the effect of the interaction between ELL and SES status in explaining the ELA growth patterns and trends from the elementary level to the high school level. Knowledge of the interaction between ELL and SES status will not only shed light on the characteristics of the impact of these two critical variables but also greatly help educational researchers and practitioners

understand the mixed impacts of ELL and SES status on ELA trajectory patterns and gap changes from lower grades to higher grades. There is an urgency to think the ELA performance gap might be correlated with the combination of these two contributing sociocultural factors.

Matthew Effects and Compensatory Trajectory in ELA Assessments

Although many educational professionals recognized the existing literacy gaps among students with varying language and sociocultural backgrounds notwithstanding the limitations of the ELA assessment constructs and the questions surrounding the reliability and validity of the assessments, researchers must develop a fuller understanding of the underlying reasons why literacy gaps among students with differing backgrounds persist, as well as the essential factors causing the changes in literacy performance disparities in the long term, in order to evaluate and develop stronger assessment constructs and tests. Discerning the influence of different ELL and SES backgrounds on ELA achievement disparities may provide an understanding of the educational implications necessary to resolve some of the existing literacy assessment challenges (Kieffer, 2010).

The Matthew effect has been proposed as one of the applicable interpretations of the patterns and trends of the existing literacy gaps. This concept was first proposed by Merton (1968) in describing the impacts of material and prize rewards on scientists' contributions to the field of science. Walberg and Tsai (1983) applied the theoretical meaning of the Matthew effect in science education settings among low- and high-achieving students. Stanovich, Nathan, and Vala-Rossi (1986) attributed individual differences in reading comprehension development to the Matthew effect. Stanovich

described the phenomenon as the “rich-get-richer” and “poor-get-poorer” reading patterns, indicating that early success of mastering reading skills could lead to later reading comprehension success. To the contrary, if students failed to acquire early reading skills before they entered the third or fourth grade, the lack of early skill development could contribute to later reading deficits. In 1997, Cunningham and Stanovich demonstrated this concept with the emphasis on early reading inputs. Their study revealed that children with better reading skills gained more positive reading feedback compared to those who struggled with reading. Hempenstall (2012) further explained, "The Matthew effects are not only about the progressive decline of slow starters but also about the widening gap between slow starters and fast starters." (p.108).

Some researchers found the opposite of the Matthew effect also existed in some circumstances. Leppänen, Niemi, Aunola, and Nurmi (2004) found the reading development patterns among preschool and primary school pupils who began at achievement deficit were able to catch up to the higher proficiency students over time, a phenomenon called the “compensatory trajectory” of development, which has been advanced as an alternative hypothesis to the Matthew effect. Additionally, McCoach et al. (2006) found mixed results if primary school students’ reading performance was measured at different points in time. The Matthew effect could be detected in the summer, while a compensatory trajectory pattern emerged during the regular academic year. They argued that the existence of the Matthew effect was not due to the characteristics of schools, but instead, influenced by students’ attitudes and families. Li, Kim, and Oslund (2017) found both trajectory patterns appeared in the ELA proficiency gaps between 9th grade ELLs and non-ELLs if assessments were recorded using different

scaling methods, such as classical test theory raw scores and item response theory scale scores.

To detect the existence of the Matthew effect or the compensatory trajectory, consideration must be given to the selected participants' backgrounds, test administration time period, developmental stages, associated literacy and sociocultural factors, and testing score constructs which could all impact the trajectory growth patterns of the investigated groups. While it may not be feasible to incorporate all possible components that could explain overall growth patterns of literacy performance, examining multiple factors associated with literacy development is needed to understand persistent literacy gaps better.

Purpose of the Study and Research Questions

Braden (2002) observed that government legislation and initiatives have specifically targeted linguistically and sociocultural disadvantaged students by encouraging the states to establish the literacy accountability assessment system with the desired result of reducing the literacy achievement gaps among different groups. The differential proficiency of reading comprehension revealed by NAEP reports has addressed the necessity to identify and develop the assessment of ELA proficiency among students with different ELL and SES status. Only by understanding the relationships between ELL and SES status and ELA proficiency can a standardized test's objectivity be evaluated and corrected. This study examined ELA score growth patterns from students with different ELL and SES from multiple grades. Additionally, previous studies have revealed that the general literacy proficiency trends and gaps between low and high ability readers were significantly different between lower grades and upper

grades, with less evidence-based studies conducted for the higher grades (Catts, Bridges, Little & Tomblin, 2008; Espin, Wallace, Lembke, Campbell, & Long, 2010). By focusing on the literacy gaps at the 4th- and 8th-grade levels, the critical stages of transition from the lower grades to the higher grades were represented. In response to the extant literacy issues occurring to linguistically and economically disadvantaged students, the proposed study examined the impacts of SES and ELL status on Matthew effect and the compensatory trajectory by analyzing students' ELA test scores. The following questions were addressed in this project:

1. What is the ELA performance mean difference between ELLs and non-ELLs in 4th-grade?
2. What is the ELA performance mean difference between FRPLs and non-FRPLs in 4th-grade?
3. What is the ELA performance mean difference between ELLs and non-ELLs in 8th-grade?
4. What is the ELA performance mean difference between FRPLs and non-FRPLs in 8th-grade?
5. What are the ELA growth shapes and trajectories of ELLs and non-ELLs as well as FRPLs and non-FRPLs in 4th-grade?
6. What are the ELA growth shapes and trajectories of ELLs and non-ELLs as well as FRPLs and non-FRPLs in 8th-grade?
7. What are the differences between 4th-grade and 8th-grade on the relationship between initial status and growth trajectories with varying ELL and SES status?

CHAPTER II: LITERATURE REVIEW

This chapter provided a more comprehensive review of the studies related to the historical development of benchmark tests under CCSS, ELA performance trajectories for different grades; the impact of associated sociocultural factors on ELA development, the Matthew effects and the compensatory trajectory in ELA assessments and latent growth curve modeling (LGM) for identifying ELA trajectory patterns and trends. SES and ELL status were the primary contributing factors used as the core elements for discussing ELA performance development patterns and existing literacy achievement gaps among different groups. All selected literature reviewed in this chapter covered elementary school to secondary grades; however, previous studies mainly targeted primary school students when assessing literacy development growth patterns. In order to understand developmental characteristics of ELA and the relationship between ELL, SES, and ELA, it is necessary to research multiple grades in order to demonstrate the expected contrasts of literacy development among these groups (e.g., ELL vs. Non-ELL).

ELA Benchmark Tests and CCSS

In 1965, the *Elementary and Secondary Education Act* (ESEA) was officially enacted in order to establish equal educational opportunities for all students. In addition to providing funding for elementary and secondary education, the ESEA has been updated over time and provisions have been added to ensure equal access to education and access to opportunities to raise academic performance (Thomas & Brady, 2005). Along with the enactment of ESEA, legislation of *No Child Left Behind* (NCLB) in 2001 further defined the intended goals of identifying existing academic gaps between student subgroups ("Achievement Gap", 2004) and establishing the standardized testing and

accountability system (Bloomfield & Cooper, 2003). ELA benchmarks were established in line with the NCLB Act and required schools to assume responsibility for the assessment of their students at least once between grades 3, 5, 6, 9, 10, and 12. It allowed state-level educational agencies to conduct statewide testing programs for all populations. Additionally, the established benchmark tests should measure students' academic progress tri-annually (i.e., fall, winter, and spring) and provided teachers with reflective results to be used to adjust their teaching instructions and practices (Graney, Missall, Martinez, & Bergstrom, 2009).

Olson (2005) observed that one of the distinctive features of effective benchmark assessments was to focus on testing the most important state- or district- based content standards rather than attempting to assess all skills at one time. This effective and straightforward testing solution provided immediate academic performance results for students and generated accountable and accurate data that could be used for predicting future academic success.

Additionally, some benchmark assessments incorporated psychometric validations in designing the test items and implemented multiple assessments each academic year in order to generate rich and valid information of students' learning processes and outcomes (Bergan, Bergan & Burnham, 2009). Major advantages of benchmark tests over year-end tests can be summarized as: (a) providing communications between teachers' expectation and students' learning outcomes, (b) giving feedback for teaching curriculum and instruction, (c) evaluating and monitoring program effectiveness and learning results, and (d) predicting future academic performance (Bergan, Bergan, & Burnham, 2009). Taken together, benchmark assessments provide data on learning

outcomes that may be used as placement indicators for intervention programs, with the content utilized for evaluation "anchored" to the desired standards. These assessment anchors ensure that interventions and teaching instructions are consistent with predetermined standards for the district or state (Brindley, 1998; Linn, 1993; Linan-Thompson, Vaughn, Hickman-Davis, & Kouzekanani, 2003).

Because assessment results from benchmark tests are often used in tracking individual academic growth and changes over time (Betts, Reschley, Pickart, Heistad, Sheran, & Marston, 2008; Bergan, Bergan, & Burnham, 2009), the goal of CCSS is consistent with benchmark tests and both could be applied to support teachers with legitimate information to address students' learning processes and outcomes as well as adjust teaching instructions. Students' outcomes can also be taken into consideration as a part of a teacher evaluation program. The testing requirements of the CCSS ELA benchmark cover the following three aspects, language, reading for information and reading literature. The tests are typically administered in October, December, and March of each academic year.

The CCSS ELA curriculum requires that literacy instructors recognize the specific ELA standards for each grade level, as well as crucial shifts transitioning from primary grades to secondary grades. Curriculum adjustments for different ages are essential to promoting students' literacy progress and could help to address the causes of literacy skill disparities among students with various ELL and SES backgrounds. Currently, the CCSS ELA curriculum defines the foundational components of literacy skills for earlier elementary levels, focusing on phonemic awareness, phonics, fluency, letter, and word knowledge, etc. For upper-grade levels, the curriculum focuses on vocabulary

acquisition, reading comprehension and writing (Common Core State Standards Initiative, 2010a). These specific curriculum descriptions reflect the transition from word decoding and word knowledge to vocabulary acquisition and reading comprehension, which correspond with Chall's views that students need to be taught from "learning to read" to "reading to learn" (Chall, 1983).

ELA Performance for Students with Different ELL and SES Status

The CCSS ELA benchmark tests are best known for assessing students' learning outcomes multiple times and are guided by the specific grade-and district-level language standards as compared to traditional single, snapshot assessment methods used outside of the CCSS ELA guidelines (Common Core State Standards Initiative, 2010a). However, the learning outcomes generated by benchmark tests may not be the best representation of achievement by linguistically and economically disadvantaged students, because their learning patterns may be different from their peers (Abedi, 2004; Torgesen & Miller, 2009). Therefore, investigating the literacy development trends and patterns among students with varying backgrounds must be considered a priority in order to continuously improve the CCSS ELA benchmark assessments.

Chiou-Ian (2002) believed that ELLs unfamiliar with American testing methods had difficulty comprehending test questions. In some cultures, questions were directly addressed, whereas, there was a thorough introduction prior to the questions in other cultures. Findings from previous studies have suggested that the literacy gap between ELLs and non-ELLs was significantly impacted by the linguistic complexion of ELA assessment (Abedi, Hofstetter, & Lord, 2004). This statement was further demonstrated by Chiappe and Wade-Woolley (2002), who investigated the learning process between

131 ELLs and 727 non-ELLs. Their study indicated that ELLs performed more poorly on phonological and linguistic processing tasks than their English native speakers, whereas, the literacy development trajectories followed a similar pattern for both groups.

In the 1990s, the reading achievement trajectories for the Hispanic population were reported by NAEP. The reading achievement gap between Caucasian and Hispanic students seemed unchanged for 9-year-olds but appeared to widen from 13 to 17-year-old ages (Hemphill & Vanneman, 2011). No clear descriptions for the patterns and trends of reading proficiency gap between Hispanic and Caucasian students were revealed since 2010 as more mixed findings were addressed in the literature review (Hemphill & Vannemn, 2011; Rampey, Dion, & Donahue, 2009).

The past NAEP reports and multiple studies have discussed that students with lower SES backgrounds underperformed their middle- or upper-class native English speakers in reading comprehension, and the literacy development trajectories for FRPLs were different from non-FRPLs due to the impacts of family literacy backgrounds (Farkas & Beron, 2004; Ramey &Ramey, 2004), early literacy skill acquisition (Duncan & Magnuson, 2013), and other sociocultural factors, etc. (Honea, 2007). The results in previous studies have demonstrated some similarities and differences in the general patterns and trends. The following sections provide separate descriptions for the impacts of ELL and SES status on literacy achievement growth and gaps in the literature.

The Impact of ELL Status on ELA Performance Trajectories and Gaps.

ELLs represent a rapidly growing group of culturally and linguistically diverse students in the United States and exhibit more uneven profiles of literacy skills than non-ELLs do. Evidence indicated that about 4.8 million ELLs registered in American public schools in

the fall of 2015, an increase of 1,000,000 compared to the fall of 2000 (National Center for Education Statistics, 2017). The latest NAEP data indicated that the average ELA test scores for 4th-grade and 8th-grade ELLs were significantly lower than those of non-ELLs, and the literacy achievement gap between these two designated groups has not dramatically changed at any point compared to previous academic years (NAEP, 2018).

Polat, Zarecky-Hodge, and Schreiber (2016) addressed that the literacy gap and trends between ELLs and non-ELLs have not been thoroughly investigated between 2003 and 2001 because the results were impacted by other variables, such as grade level, gender, SES and ethnicity. Valdés and Castellón's (2011) study also demonstrated the literacy gap between ELLs and non-ELLs was growing wider as the grades increased. The ever-growing ELL population and long-standing literacy achievement gap indicated an urgent need to investigate the patterns and trends of literacy achievement gaps between ELLs and non-ELLs in order to establish more effective literacy intervention programs. Regarding the literature review of ELA performance trajectories and gaps for ELLs and non-ELLs, the following discussion was divided into two sections based on the grade levels (primary grades versus secondary grades) due to different literacy growth patterns and gaps that were exhibited at the primary and secondary levels.

ELA Performance Trajectories and Gaps in Primary Grades. The latest biennial release of NAEP data revealed ELA performance trajectory differentials and gaps. A longitudinal study conducted by Kieffer (2011) researched the literacy achievement trajectories of ELLs and their peers from elementary school to middle school by applying the piecewise growth modeling method. As for the primary grades, Kieffer's study discovered that language minority students who entered kindergarten with fluent English

proficiency tended to catch up with their native English peers at 1st-grade. However, language minority students with initial limited English proficiency who were substantially below the national average level did not achieve average level until middle school, although the literacy gap closed somewhat when controlling for SES. This study indicated that the ELA development trends for ELLs were associated with their initial literacy level and SES status, which demonstrated the internal variations of literacy gaps for ELLs and non-ELLs (Kieffer, 2011).

Some studies that applied the NAEP longitudinal data from 2003 to 2011 reported significant differences in literacy achievement for 4th-grade ELLs and non-ELLs (Polat, Zarecky-Hodg, & Schreiber, 2016). Their studies revealed either a steady or slightly widening achievement gap with the impact of other confounding variables, such as gender, ethnicity groups, and grade levels. Similarly, Sanderson and Harrington (2005) found that the reading performance gap was continuously growing when comparing Caucasian students to Hispanic students among 4th-grade students. Additionally, their study indicated that the reading gap was attributed to improved performance of the Caucasian students rather than the declining performance of the Hispanic students.

To investigate the literacy gap of ELLs and non-ELLs in the primary grades, other studies focused on emergent literacy skills development. For instance, Lesaux, Rupp, and Siegel (2007) investigated reading skill growth for students with diverse linguistic backgrounds. In this study, they selected 689 native English speakers and 135 ELLs representing 33 foreign languages. All students were assessed for word reading, phonological processing, spelling, syntactic awareness, and working memory skills from kindergarten through 4th-grade, with an additional reading assessment for 4th-graders

only. The results suggested that the mean differences of reading development for ELLs and their peers were negligible for the 4th-grade even though the initial assessment in kindergarten appeared to reflect significant differences between the two groups. Additionally, this study detected that the word reading trajectories for both groups were non-linear, which indicated that the word reading gap between these two groups was variable. Instead of directly addressing the patterns and trends of the literacy achievement gap in the primary grades, Restrepo and Towle-Harmon (2008) placed a great emphasis on how the early emergent literacy skills development could close the gap between ELLs and non-ELLs, such as print knowledge, phonological awareness, oral language etc. They believed that ELL children who entered kindergarten often fell behind their native peers with insufficient literacy skills to learn to read, and the early emergent literacy skill development with adequate literacy instructions played an important role in closing the literacy gap between ELLs and non-ELLs at early stage.

ELA Performance Trajectories and Gaps in Secondary Grades. Compared to the ELA skill development for primary school ELLs, the literature has indicated great challenges for improving literacy skills of middle and high school ELLs. Jiménez-Castellanos and García (2017) stated that ELLs from secondary schools faced significant adversity in graduating from high schools, such as suffering from a high rate of poverty, frequently changing school districts, attending unsafe schools and underfunding ELL intervention programs. Those challenges not only contributed to an achievement gap between ELLs and non-ELLs, but also widened literacy gap was detected as students progressed from lower grades to higher grades (Kim & García, 2014).

For example, Jiménez-Castellanos, and García (2017) performed an analysis of state standardized tests from Delaware, and their testing results indicated that the academic achievement gap in reading between ELLs and non-ELLs was wider in the secondary schools than in the primary schools. This finding was consistent with the research of Polat, Zarecky-Hodge and Schreiber (2016), whose study applied NAEP data and found that the reading growth patterns for non-ELLs in 8th-grade appeared to be steady or positively growing while the reading trajectory for ELLs tended to go downward for this grade level (Polat, Zarecky-Hodge & Schreiber, 2016).

In addition to addressing the general trends and gap in ELA proficiency between secondary school ELLs and non-ELLs, the literature revealed that the majority of studies placed great emphases on assessing the internal variations of ELL's literacy development trends and patterns and the interaction effect of ELL status and other contributing factors on the ELA proficiency for secondary school students. Kieffer's study (2011) investigated the reading achievement trajectories between ELLs and non-ELLs from elementary school to middle school. He found that the English reading proficiency for ELLs by the end of middle school was associated with their initial reading proficiency when they entered kindergarten. Those ELLs who entered kindergarten with a higher English proficiency level caught up with their peers and sustained proficiency at the national average English level by grade 8. On the contrary, those ELLs who possessed minimum reading proficiency level when they entered kindergarten continuously maintained a below average English proficiency level through the end of middle school. Kieffer's findings were consistent with previous research findings, conducted by Cunning and Stanovich (1997), Hart and Risley (1995), Storch and Whitehurst (2002),

Scarborough, Neuman and Dickinson (2009), who believed that early literacy skills could impact later reading comprehension development.

In addition to the impact of ELL's initial reading level on the literacy development trajectories, school-wide bilingual language programs were considered as significant influences on ELL's ELA development trajectories in middle school and high school. Thomas and Collier (2002) reviewed numerous language programs relevant to ELL academic achievement from 1996 to 2001. Their findings indicated that students who enrolled in school bilingual programs achieved the same literacy level as those who enrolled in only English by middle school grades. Furthermore, during high school years, those registered bilingual program students outperformed their peers who just schooled in English (Thomas & Collier, 2002).

For the ELA Performance trajectories and gaps for ELL and Non-ELL for secondary grades, Kieffer (2010) addressed the interaction effect of ELL and SES status on reading growth patterns and found that SES could explain ELL reading difficulties to some extent. This study investigated the effect of SES upon the late-emerging reading difficulties of ELLs and non-ELLs. His research findings indicated that the reading performance for ELLs with low SES slightly caught up with their native English peers with high SES status in middle school.

To conclude, the literacy gap between ELLs and non-ELLs in upper-grade levels displayed a significant change and an unequal pattern compared to lower-grade levels. Unfortunately, the general literacy proficiency trends and gaps between ELLs and non-ELLs have been scarcely investigated at the upper-grade levels (August, Escamilla, & Shanahan, 2009; Espin, Wallace, Lembke, Campbell, & Long, 2010). In addition,

Kieffer's (2010) study suggested the need to investigate the extent to which SES explained the disproportionate literacy development patterns among ELLs from low SES families. Investigation of SES and ELL status on ELA performance trajectories and gaps may shed further light on these open questions.

The Impact of SES Status on ELA Performance Trajectories and Gaps. In addition to the significant influence of ELL on students' average academic performance, SES impacts academic growth trends and patterns. NAEP data defined SES status based on students' eligibility for national school reduced-price lunch program (NAEP, 2018). Literacy researchers have confirmed that children born to parents who have rich educational or financial backgrounds have demonstrated higher literacy efficiency than children born to parents of limited education or high-poverty (Farkas & Beron, 2004; Ramey &Ramey, 2004). Given the differences in literacy proficiency among the various SES levels, the Duncan and Magnuson (2013) study indicated that SES had a significant impact on early childhood literacy development prior to kindergarten. Compelling differences have been shown in literacy skill acquisition between FRPL and non-FRPL students up to at least age 13 (Lee & Burkham, 2002). Reardon (2013) suggested that the literacy gap for children born in the 1990s was approximately 30-60% wider than those born in the 1970s, and the actual literacy gap between FRPL and non-FRPL students has increased for the past three decades. Additionally, approximately 75% of students in high-poverty defined public schools were eligible for FRPL, and 50 % to 75% of students in mid-high poverty schools were eligible for FRPL, which indicated that FRPL students' literacy development and the literacy gap between FRPLs and non-FRPLs is worthy of the public's attention (National Center for Educational Statistics, 2017). These findings

demonstrated the need to investigate the origins and features of the literacy gap in order to establish a comprehensive understanding of the impacts of SES status on literacy development.

ELA Performance Trajectories in Primary Grades. Previous research has shown that early emergent literacy skills such as print knowledge, letter name knowledge, letter-sound knowledge, alphabetic knowledge, phonological awareness, and phonics knowledge are predictive of later literacy skills, including decoding, word knowledge, vocabulary and reading comprehension (Lonigan & Shanahan, 2009). Among the early literacy skills, SES has been shown to have a significant impact on both phonological awareness and vocabulary knowledge (Hoff, 2003; Rowe & Goldin-Meadow, 2009). Several researchers have done relevant studies by investigating the relationship between SES and early literacy skills development. In 2006, Chatteriji's study examined the reading achievement gap of first graders by comparing students of different ethnicities, genders and SES, and discovered significant correlations between early reading achievements and students' SES status (Chatteriji, 2006). A similar result was found in other studies. Durham, Farkas, Hammer, Tomblin, and Catts (2007) confirmed that of the various measures of elementary school academic performance, oral language ability at kindergarten entry was the most affected by SES.

Taken together, the literature supported the conclusion that SES was associated with early childhood literacy development. However, far fewer studies have examined literacy growth over specific time periods by comparing FRPLs and non-FRPLs over an extended period (Strang & Piasta, 2016). One exception is a study conducted by Rowe, Raudenbush and Goldin-Meadow in 2012. Their study found the relationship between

early vocabulary growth and later literacy skills development was stronger for students with FRPL, as compared to that of non-FRPLs (Rowe, Raudenbush, & Goldin-Meadow, 2012). The differences in literacy growth between FRPLs and non-FRPLs varied when different sub-skills were measured. Crow, Conner and, Petscher (2009) investigated oral fluency skill development between first-grade FRPL and non-FRPL students. Their study indicated that FRPLs comparatively read fewer words per minute and improved slightly less than their peers with non-FRPLs.

To conclude, literacy skills for emerging readers are indeed associated with SES. Research has shown that children entering school with economic disadvantages presented weaker literacy skills than privileged students (Hart & Risley, 1995). Compared to previous studies regarding the ELA performance development and gaps of FRPL and non-FRPL students in the primary grades, few studies have thoroughly examined the influence of SES on literacy achievement for secondary students (Espin, Wallace, Lembke, Campbell & Long, 2010; Graney, Missall, Martinez & Bergstorm, 2009). Two critical perspectives can be learned from previous studies: first, early literacy difficulties can cause long-lasting challenges to later academic achievement, and second, the level of impact of SES on literacy skill development might be different when comparing students from primary grades to those from secondary grades.

ELA Performance Trajectories and Gaps in Secondary Grades. There continues to be a lack of research on the literacy growth patterns and gaps for FRPL and non-FRPL students for secondary grades. For adolescent students, the literature was comparatively equivocal as the evidence was disputable due to the limited methodological research designs (Caro, 2009). Researchers that examined the impact of SES on ELA growth

patterns and trends among upper grades tended to evaluate the interaction effect of SES and other sociocultural factors on English performance growth, and a few studies applied longitudinal data to investigate the influence of SES on reading comprehension.

In 1998, Heck investigated the differences in academic learning outcomes between regular school settings and alternative school settings for 6th-grade students and found students' academic achievement was significantly associated with SES (Heck, 1998). Honea (2007) conducted a study of the influence of students' diligence, diligence support, self-efficacy, family SES and other sociocultural factors on academic performance growth. Participants of this study consisted of 315 high school students, 215 parents, and 46 teachers from a school in a rural area of the southern United States. The results revealed that there was a statistically significant relationship between family SES and academic performance. Similar results also can be found from Hamid (2011), who investigated the impact of SES on secondary school students' English achievement in a rural sub-district of Bangladesh. Students with higher parental education and family income had higher test scores compared to those with lesser family educational backgrounds and low income.

Two studies we found have investigated the longitudinal influence of SES on reading progress. Caro's (2009) study also showed that SES contributed to a widening achievement gap as students progressed through the grades. Pikens's (2016) study investigated the racial and SES differences in adolescent reading development with 225 participants from 8th-, 9th- and 10th-grade. She found that SES had a significant impact on students' initial reading level but not the adolescent reading growth, which revealed that students with different SES status experienced similar reading development growth in

adolescence. The studies as mentioned earlier suggested various findings in terms of the impact of SES on secondary students' literacy achievement growth. Nevertheless, research is lacking in the use of longitudinal data to investigate how SES impacts the achievement gap for secondary students.

Detections of ELA Trajectory Shapes

The Matthew effect and compensatory trajectory, discussed in chapter one, are useful for investigating individual differences over a specific period of time. Similarly, the notion of the Matthew effect or the compensatory trajectory can be applied to the investigation of literacy growth patterns and trends in the existing literacy gaps. In order to discern the literacy gaps between ELLs and non-ELLs as well as FRPL and non-FRPL students, longitudinal data may contain valuable information that enables literacy educators and researchers to recognize the Matthew effect or compensatory trajectory among targeted investigated groups. Latent growth modeling (LGM) provides a sophisticated statistical tool for analyzing longitudinal data to reveal the relationship between the initial status (intercept) and rate of changes (slope) in student test scores. As Preacher (2008) has explained:

> LGM permits straightforward examination of intraindividual (within-person) change over time as well as interindividual (between-person) variability in intraindividual change. LGM is appealing not only because of its ability to model change but also because it allows an investigation into the antecedents and consequents of change (p. 2).

Previous studies utilizing LGM analyses to investigate ELA performance have focused primarily on analyzing the impacts of some associated literacy factors, such as English reading motivation (Retelsdorf & Moller, 2011), English reading skills (Mancilla-Martinez & Lesauz, 2010), test-taking strategies (Wu & Stone, 2016), and background knowledge (Quinn, Wagner, Richard, Yaacov, & Lopez, 2015). The impacts of family literacy environment (Anders, Weinert, Ebert, Kuger, Lehrl, & Maurice, 2012; Hong & Ho, 2005; Meng, 2015; Storch & Whitehurst, 2001) and linguistic backgrounds of students (Condelli, Wrigley & Yoon, 2008; Hammer, Lawrence & Miccio, 2008; Swanson, Sáez, & Gerber, 2006) have also been investigated separately. However, few studies have examined the literacy proficiency gap between linguistically and economically disadvantaged students and their native English peers from high-income families with the application of LGM. Therefore, applying LGM may provide a unique perspective to explore the attribution for literacy performance gaps between ELLs and non-ELLs as well as FRPLs and non-FRPLs.

Detections of Linear Literacy Growth in ELA. The primary goal of LGM is to investigate the relationship between the starting point (intercept) and rate of change (slope) of the growth. Past research has suggested that students' literacy ability could impact the characteristics of ELA growth patterns, ELA assessing components, and applied statistical methods (Deno et al., 2001; Good, Deno, & Fuchs, 1995; Good, Masewicz & Vogel, 2010; Kim & García, 2014; Nese et al., 2013). Recently, several researchers applied LGM in examining ELA growth patterns and detected linear trends in ELA development (Aikens & Barbarin, 2008; Chong, 2009; Hammer, Lawrence & Miccio, 2008; Pickens, 2016). Aikens and Barbarin (2008) analyzed the socioeconomic

differences in reading comprehension by taking the contribution of family, neighborhood, and school contexts into consideration. Their study investigated 21,260 children's reading growth trajectories from kindergarten to 3rd-grade. Linear function modeling indicated that children's initial reading level (intercept) per month between the fall and spring semesters of kindergarten presented a linear growth slope, and the linear slope was also detected between the spring semester of first grade and spring semester of 3rd-grade.

Chong (2009) investigated the reading comprehension growth trajectories between 153 ELLs and 593 non-ELLs with the application of LGM. The results revealed the reading growth trajectories of both groups tended to be linear rather than quadratic growth patterns. ELL students indicated significantly lower initial reading scores compared to non-ELLs in 4th-grade. The slope of reading comprehension between these two groups did not indicate any differences; therefore, their study concluded that the reading gap between ELLs and non-ELLs remained constant.

Hammer, Lawrence, and Miccio (2008) examined receptive English vocabulary and English language comprehension for bilingual Spanish and English preschoolers who attended a two-year head start program. Participants were assigned to two groups. One group consisted of children who were exposed to Spanish only in the home before they entered school, the other group was composed of children who had access to both English and Spanish at home before school entry. The result indicated the children's development in both languages followed linear trajectories (Hammer, Lawerence, & Miccio, 2008). The receptive vocabulary skill development and language comprehension for children only exposed to Spanish before they entered school demonstrated significant growth differences compared to bilingual children. Pickens's (2016) study analyzed the

impact of racial and socioeconomic status on high school students' reading comprehension growth trajectories. LGM analysis of her research revealed that overall reading comprehension trajectories indicated linear growth. Both race and SES variables had significant impacts on the intercept, but not the growth of adolescence reading comprehension. Therefore, she concluded that students with various racial or SES status experienced identical growth patterns for adolescent reading.

Detections of non-Linear Literacy Growth in ELA. Non-linear literacy growth patterns were also detected when measuring students' oral reading fluency (Christ, Silberglitt, Yao & Cormier, 2010; Nese et. al., 2013) and reading comprehension (Beecher, 2001; Rescorla & Rosenthal, 2004; Shin, Davison, Long, Chan & Heistad, 2013). Christ et al. (2010) investigated oral reading fluency based on curriculum-based measurements with the examination of 4,824 students from both general education and special education programs in 2nd- to 6th-grade. A linear mixed model (LMM) was applied in their study to analyze the reading growth trajectories. They showed oral reading fluency trajectories for the students who enrolled in general education were cubic to some extent, but linear trajectories were detected for the special education population in some cases. A similarly designed study by Nese et. al. (2013), modeled the oral reading fluency trajectories for 1,448 students from 1st-grade to 8th-grade within a year. LGM analysis for their study demonstrated that the quadratic growth patterns for oral reading fluency within each grade between 1st-grade and 7th-grade, and a non-stable growth pattern among 8th-grade students.

As for the nonlinear shape of the literacy development trajectories, several studies have provided relevant empirical evidence. From the early elementary grades to higher

grades, Rescorla and Rosenthal (2004) investigated the reading growth of 328 participants using the Test of Cognitive Skills (TCS) and Comprehensive Tests for Basic Skills (CTBS) for students in 3rd- to 10th-grades. Hierarchical Linear Modeling determined there was a linear reading growth for early elementary grades and a curvilinear growth shape for later elementary grades (Rescorla & Rosenthal, 2004). Beecher (2011) further extended Rescorla and Rosenthal's study and incorporated kindergarten to 12th-grade to investigate the reading comprehension growth patterns. The annual archive data were utilized with 206 participants in order to reveal the quadratic form and curvilinear downward slopes (Beecher, 2011).

Summary

Previous studies relevant to literacy growth and trajectories typically focused on students from primary grades (Espin, Wallace, Lembke, Campbell & Long, 2010; Graney, Missall, Martinez & Bergstorm, 2009; Nese, et al., 2012). Although several studies did investigate the literacy development patterns for secondary- grade students, few empirical studies have examined the interactional impacts of ELL and SES status on literacy developmental trajectories (August, Escamilla, & Shanahan, 2009; Campbell, Espin, Lembke, Long, & Wallace, 2010; Graney, Missall, Martinez & Bergstorm, 2009). By examining the impacts of ELL and SES status on ELA development trends and patterns for 4th- and 8th-grade students using LGM, we may be able to address the following: (a) the ELA growth shape for 4th-grade ELLs and non-ELLs; (b) the ELA growth shape for 4th-grade FRPL and non-FRPL students; (c) the ELA growth shape for 8th-grade ELLs and non-ELLs; (d) the ELA growth shape for 8th-grade FRPL and non-FRPL students; (e) the relationship between initial ELA performance and growth rate

among 4th-graders; (f) the relationship between initial ELA performance and growth rate among 8th-graders; (g) the impact of ELL and SES status on ELA performance growth for 4th-grade; (h) the impact of ELL and SES status on ELA performance growth for 8th-grade. Based on the existing literature review regarding the ELA growth patterns and trends, results as mentioned above assisted researchers in making meaningful comparisons of the impacts of ELL and SES status on ELA performance trajectories between primary-grade and secondary-grade students as well as detections of the Matthew effect or the compensatory trajectory in ELA.

CHAPTER III: METHODOLOGY

Participants

Data from three benchmark assessments were obtained from a for-profit testing company in the United States. The researchers examined all three tests administered to 4th- and 8th-grade students in 18 states. Both 4th- and 8th-grade took forms A, B, and C per year and all item-level information was available. Table 1 in result section demonstrated sample size for each group and grade. Only the students who took all three forms of tests were included for further analyses, which ended up as 3,650 for 4th-grade and 1,709 for 8th-grade data. Other demographic variables, such as gender, ethnicity and race, were not reported due to many missing observations. Confidentiality for the participants was assured by anonymizing examinees' identity.

Measurement

There were respectively 30 and 34 multiple-choice items with 4 answer alternatives contained in each ELA test for 4th- and 8th-grade. The tests were administered in August, December and April (Test A, B and C, respectively) of the 2014/2015 academic year. The content areas embedded in these three tests mainly focused on writing, literature, language and information, which were in line with the uniform guidelines for 4th- and 8th-grade standardized test items based on the CCSS. Cronbach's α indices for the internal consistency reliability were .80 (Test A), .76 (Test B) and .82 (Test C) for 4th-grade tests, and .73 (Test A), .84 (Test B) and .82 (Test C) for 8th-grade tests, respectively, which indicated that all tests were reliable.

Procedure

Descriptive statistic results for all test scores for the 4th- and 8th-grade were computed, and separate independent sample t-tests and effect size calculation were performed comparing the mean score differences between ELLs and non-ELLs as well as FRPLs and non-FRPLs in tests A, B and C. In addition, trend analysis was conducted in order to discern the characteristics of the general tends for all targeted groups. Finally, LGMs were examined using the AMOS module (IBM SPSS v. 24) to investigate the relationship between initial ELA performance and growth rate among 4th- and 8th-graders. The impacts of SES and ELL status on the ELA performance for different grades were compared based on the LGM results. Finally, LGM analysis was utilized to discern the ELA achievement trends and gaps and to investigate the Matthew effect or the compensatory trajectory in ELA.

CHAPTER IV: RESULTS

Group Differences

Group differences between ELLs and non-ELLs for 4th- and 8th-grade.

Group differences between ELL and non-ELL students for 4th- and 8th-grade were examined by applying independent-sample *t*-tests. For 4th-grade, the descriptive statistics results (Table 1) and *t*-test results (Table 2) indicated the non-ELLs scored significantly higher than ELLs for test A, B and C. For 8th-grade, the descriptive statistics results and the independent-sample *t*-test analyses for tests A, B and C revealed the same pattern of results as in 4th-grade ELLs and non- ELLs. The mean of non-ELLs was significantly higher than that of ELLs for these three tests. The independent-sample *t*-test analyses overall indicated that non-ELLs out performed ELLs significantly at every occasion for both 4th- and 8th-grade.

Group differences between FRPLs and non-FRPLs for 4th- and 8th-grade.

For 4th-grade, the descriptive statistics results (Table 1) and the two-independent-sample *t*-test results (Table 2)**,** indicated FRPLs scored significantly lower than non-FRPLs for test A, B and C. Similarly, the mean of non-FRPLs was significantly higher than that of FRPLs for these three tests in 8th-grade. The two-independent-sample *t*-test analyses overall indicated that non-FRPL students out-performed FRPL students significantly at every occasion for 4th- and 8th-grade.

Effect size results between ELLs and non-ELLs for 4th- and 8th-grade. The effect size results for the mean differences between ELLs and non-ELLs in test A and C (Table 2) in 4th-grade and test C in 8th-grade were found to exceed the large effect (*d* = .80) reported by Cohen's (1988) convention. Medium effect size results were found for

test B in 4th-grade and test A and B in 8th-grade between ELLs and non-ELLs as Cohen proposed .50 as a medium effect size threshold.

Effect size results between FRPLs and non-FRPLs for 4th- and 8th-grade. The effect size results for the mean differences between FRPLs and non-FRPLs in test A, B and C (Table 2) in 4th-grade were found to exceed the medium effect (d = .50) reported by Cohen's (1988) convention. Small effect size results were found for test A, B and C in 8th-grade between FRPLs and non-FRPLs as Cohen proposed .20 as a small effect size threshold.

Table 1.

Descriptive Statistics

4th-Grade Descriptive Statistics (N = 3650)								
	ELLs (N = 599)		Non-ELLs (N = 3051)		FRPLs (N = 1636)		Non-FRPLs (N = 2014)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Test A	12.68	5.39	17.51	5.76	15.10	5.71	18.04	5.87
Test B	15.17	5.83	19.50	5.41	17.25	5.64	20.05	5.45
Test C	15.62	6.44	20.66	5.68	18.17	6.17	21.18	5.70
8th-Grade Descriptive Statistics (N = 1709)								
	ELLs (N = 224)		Non-ELLs (N = 1485)		FRPLs (N = 762)		Non-FRPLs (N = 947)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Test A	15.44	6.35	20.41	6.48	18.51	6.58	20.76	6.58
Test B	16.55	6.72	21.63	7.12	19.13	7.19	22.45	6.70
Test C	17.86	6.93	23.79	6.54	21.54	6.92	24.19	6.63

Note. *df* = Degree of Freedom. *M* = Mean. *SD* = Standard Deviation. *N* = Sample Size

Table 2.

Two-independent-sample T-test Results and Effect Size

4th-Grade Inferential Statistics							
	T-test		Effect size	*T*-test			Effect size
	ELLs vs. Non-ELLs		*ELLs vs. Non-ELLs*	*FRPLs vs. Non-FRPLs*			*FRPLs vs. Non-FRPLs*
	t	df	p	*Cohen's* d	t	df	p	*Cohen's* d
Test A	18.96	3648	<.001	.86	15.26	3648	<.001	.51
Test B	17.70	3648	<.001	.77	15.16	3648	<.001	.50
Test C	19.39	3648	<.001	.83	15.19	3648	<.001	.51
8th-Grade Inferential Statistics							
	T-test		Effect size	*T*-test			Effect size
	ELLs vs. Non-ELLs		*ELLs vs. Non-ELLs*	*FRPLs vs. Non-FRPLs*			*FRPLs vs. Non-FRPLs*
	t	df	p	*Cohen's* d	t	df	p	*Cohen's* d
Test A	10.73	1707	<.001	.77	7.01	1707	<.001	.34
Test B	10.03	1707	<.001	.73	9.62	1707	<.001	.48
Test C	12.55	1707	<.001	.88	8.02	1707	<.001	.39

Note. *df* = Degree of Freedom.

Trend Analysis

Trend analysis for 4th- grade ELLs and non-ELLs. Consistent with the mean scores for 4th-grade ELLs and non-ELLs as demonstrated in Table 1, the trend analysis indicated that ELA performance for non-ELLs were above that of ELLs. The trend analysis results (Figure 1), indicated the overall trend of 4th-grade ELLs in these three time points was dominantly linear, F (1, 598) = 221.859, $p < .01$. However, there was also a significant quadratic trend but not dominant compared to the linear trend, F (1, 598) = 46.088, $p < .01$. Similarly, the overall trend for non-ELLs presented a nearly linear pattern, F (1, 3050) = 1691.808, $p < .01$. The quadratic trend was significant but not dominant, F (1, 3050) = 45.045, $p < .01$. The statistical results confirmed that the overall mean trajectory of ELLs and non-ELLs revealed a reliable linear trend for both groups.

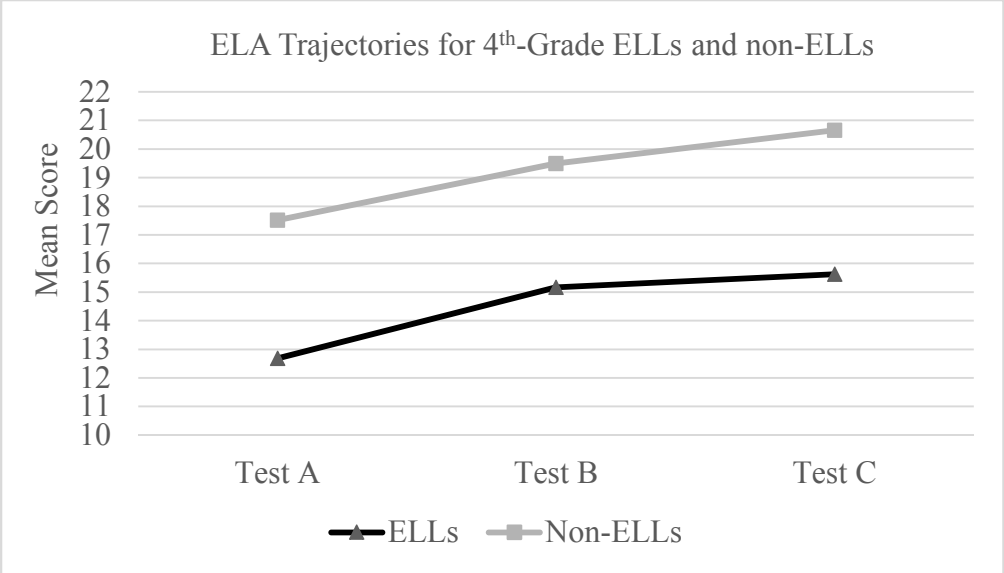

Figure 1. ELA Growth Trajectories for 4th-Grade ELLs and non-ELLs

Trend analysis for 4th-grade FRPLs and non-FRPLs. Consistent with the mean scores for 4th-grade FRPLs and non-FRPLs as demonstrated in Table 1, the trend analysis indicated that the ELA performance for non-FRPLs was above that of FRPLs. The trend analysis results were displayed in Figure 2, which indicated that the overall trend of 4th-grade FRPLs in these three time points was dominantly linear, F (1, 1635) =727.757, $p < .01$. However, there was also a significant quadratic trend but not dominant compared to the linear trend, F (1, 1635) = 48.808, $p < .01$. Similarly, the overall trend for non-FRPLs presented a nearly linear pattern, F (1, 2013) = 1188.724, $p < .01$. The quadratic trend was significant but not dominant, F (1, 2013) = 32.815, $p < .01$. The statistical results confirmed that the overall mean trajectory of FRPLs and non-FRPLs also revealed a reliable linear trend.

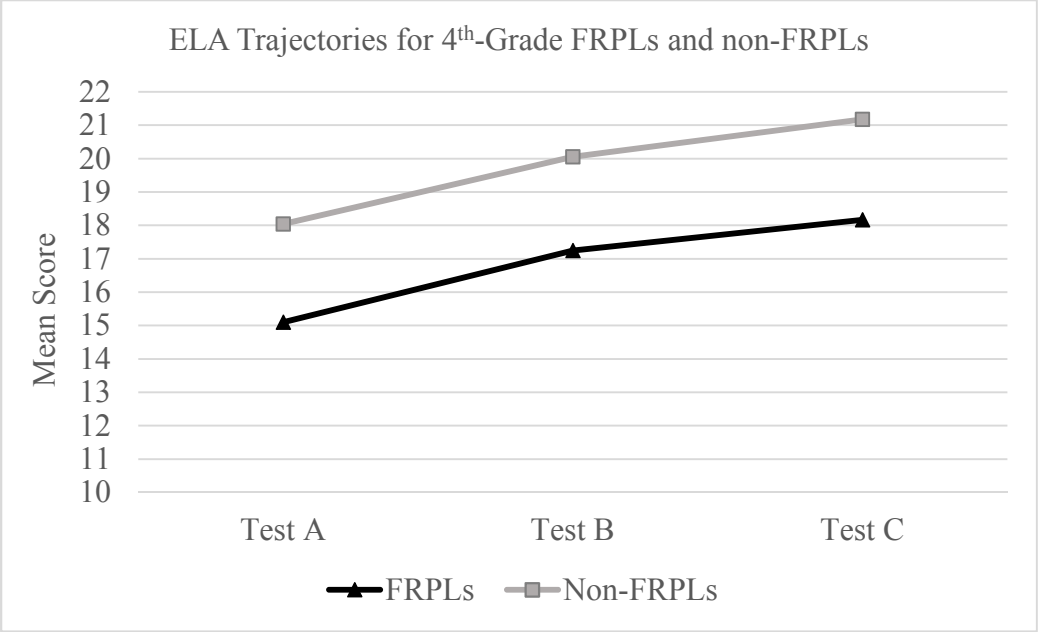

Figure 2. ELA Growth Trajectories for 4th-Grade FRPLs and non-FRPLs

Trend analysis for 8th-grade ELLs and non-ELLs. Consistent with the mean scores for 8th-grade ELLs and non-ELLs as demonstrated in Table 1, the trend analysis indicated that that ELA performance for ELLs for three testing times was below that of non-ELLs. The trend analysis results were displayed in Figure 3, which indicated that the overall trend of 8th-grade ELLs was significantly linear, F (1, 223) = 48.319, $p < .01$. The quadratic trend failed to meet the criteria of statistical significance, F (1, 223) = .111, $p = .74$. A dominant linear trend was revealed for non-ELLs in these three time points, F (1, 1484) = 805.302, $p < .01$. The quadratic trend was significant but not dominant, F (1, 1484) = 19.563, $p < .01$. The statistical results confirmed that the overall mean trajectory of ELLs and non-ELLs revealed a linear trend for both groups.

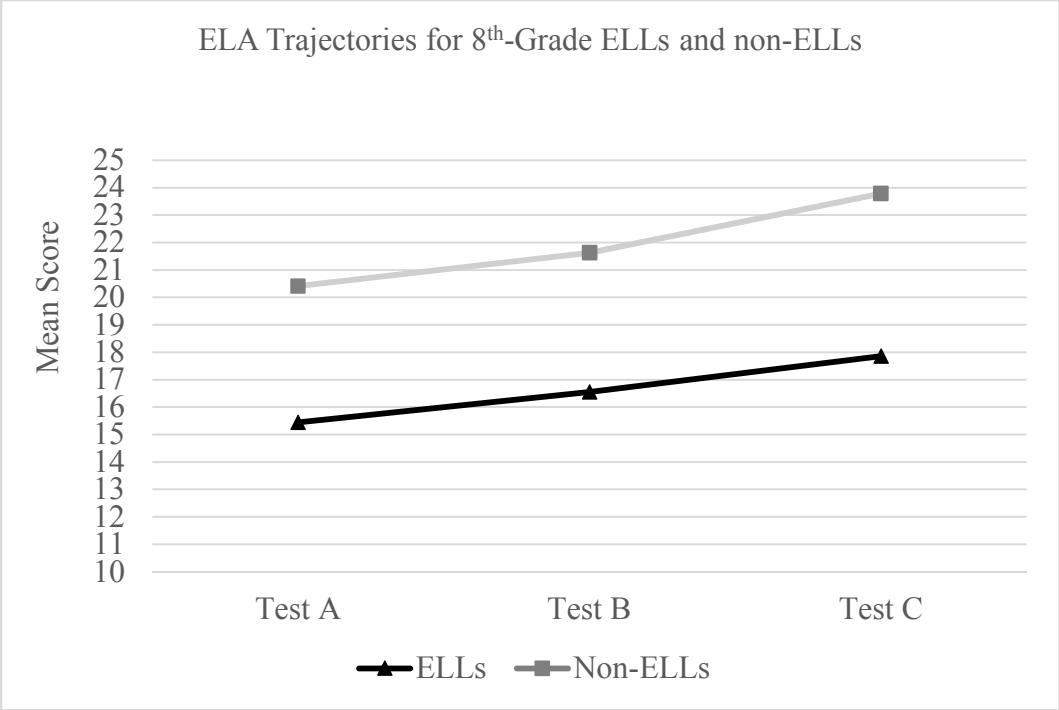

Figure 3. ELA Growth Trajectories for 8th-Grade ELLs and non-ELLs

Trend analysis for 8th-grade FRPLs and non-FRPLs. Consistent with the mean scores for 8th-grade FRPLs and non-FRPLs as demonstrated in Table 1, the trend analysis indicated that ELA performance for FRPLs was below non-FRPLs. The trend analysis results were displayed in Figure 4, which indicated that the overall trend of 8th-grade of FRPLs was dominantly linear in these three timepoints, F (1, 761) = 295.329, p < .01. The quadratic trend was significant but not dominant, F (1, 761) = 37.559, p < .01. For the non-FRPL group, there was a significant linear trend, F (1, 946) = 544.637, p < .01. The quadratic trend failed to meet the criteria of statistical significance, F (1, 946) = .047, p > .05. The statistical results confirmed that the overall mean trajectory of FRPLs and non-FRPLs revealed a linear trend for both groups.

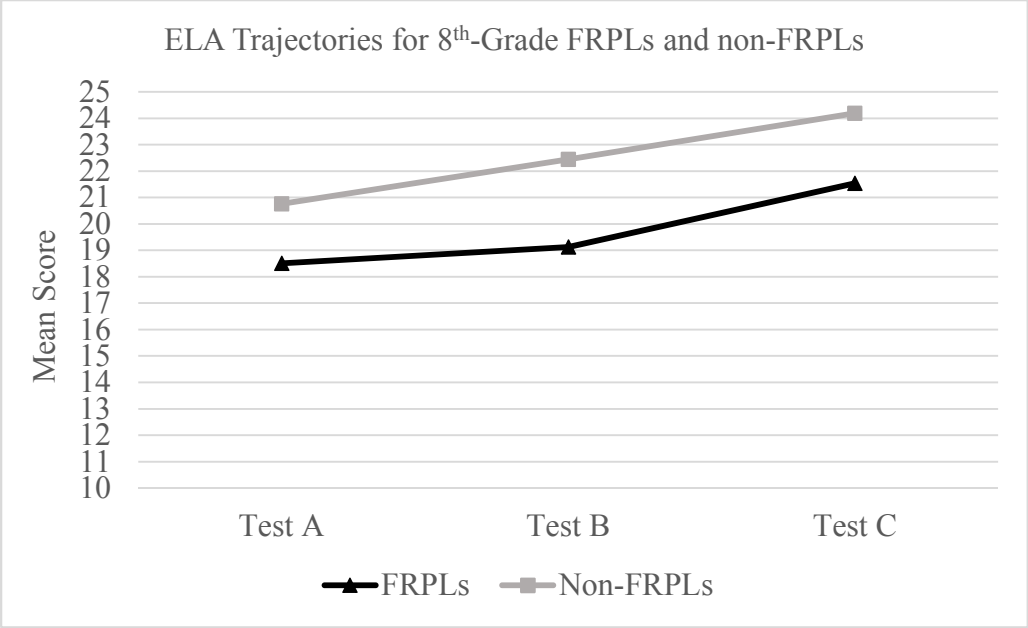

Figure 4. ELA Growth Trajectories for 8th-Grade FRPLs and non-FRPLs

LGM Fit Indices.

The χ^2-tests and χ^2/df ratios for each result (Table 3) suggested that the data fit for the model was less than ideal. However, other relative fit indices showed good model fits except some of the RMSEA indices. Because these relative fit index values exceeded the fit criterion of .95 (Bentler & Hu, 1999), we concluded that the LGM models fitted adequately for both 4th- and 8th-grade ELA test scores. These basic LGM models can be applied for conducting the LGM comparisons for 4th- and 8th-grade ELA test scores under the impacts of ELL and SES.

Table 3.

Summary of the Model-Data Fit Indices for 4th- and 8th-Grade LGM

4th-Grade ELA Test Scores								
Model	χ2	*df*	*p*	χ2 /*df*	CFI	NFI	TLI	RMSEA
ELL LGM Model	100.59	3	.00	33.53	.99	.99	.97	.09
SES LGM Model	92.18	3	.00	30.73	.99	.99	.98	.09
ELL and SES LGM Model	100.66	4	.00	25.17	.99	.99	.97	.09
8th-Grade ELA Test Scores								
Model	χ2	*df*	*p*	χ2 /*df*	CFI	NFI	TLI	RMSEA
ELL LGM Model	19.63	2	.00	9.81	.99	.99	.96	.06
SES LGM Model	35.91	2	.00	17.95	.99	.99	.97	.09
ELL and SES LGM Model	42.66	3	.00	14.22	.99	.99	.96	.07

Note. χ2 = Chi-squared Test. p = Probability. χ2 / *df* = χ2/*df* ratios. CFI = Comparative Fit Index. NFI = Normed Fit Index. TLI = Tucker Lewis Index. RMSEA = Root Mean Square Error of Approximation

LGM Comparisons for 4th-Grade

LGM comparisons for 4th-Grade ELA test scores under the impact of ELL.

Figure 5 presented the standardized model for 4th-grade ELA test scores under the impact of ELL (ELL coded as 0, non-ELL coded as 1) on the intercept and slope. The estimates of LGM for ELA scores provided the intercept and slope differences using non-ELLs as the reference group. For the standardized LGM for the ELA scores under the impact of ELL status, the path coefficient from ELL status to intercept (λ=. 34, $p < .001$) showed that the ELL status had a significant positive impact on the starting point (intercept) of the ELA test scores (i.e., ELLs performed lower than non-ELLs). The path coefficient from ELL status to the slope (λ = .14, $p = .23$) suggested that the ELL status had a non-significant positive impact on the rate of changes in 4th-grade ELA performance over time. The ELA proficiency gap between ELLs and non-ELLs remained the same based on the standardized LGM output. A significant positive correlation between the intercept

and slope (r = .37, p = .008) indicated that the initial scores and rate of growth were significantly related on the 4th-grade students' ELA achievement growth patterns. The LGM diagram results further revealed that students who started at higher levels of ELA proficiency grew faster than those who started at lower levels. Matthew effect was detected between the low- and high-performers for 4th-grade ELA test scores.

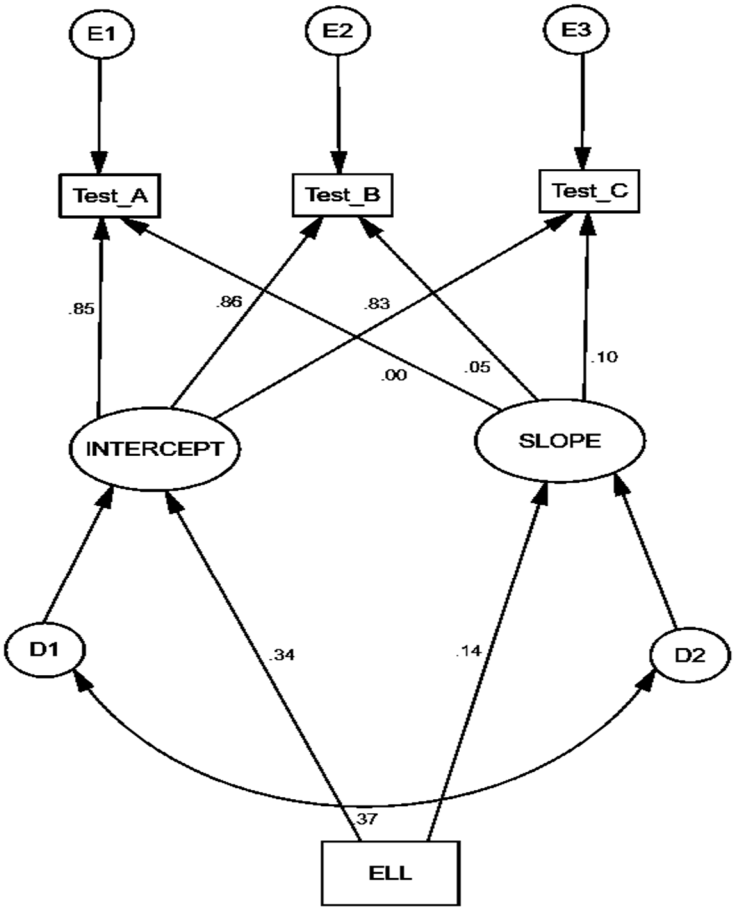

Figure 5. Standardized LGM Diagram for 4th-Grade ELA under the Impact of ELL

LGM comparisons for 4th- Grade ELA test scores under the impact of SES. Figure 6 presented the standardized model for 4th-grade ELA test scores under the impact of SES (FRPL coded as 0, non-FRPL coded as 1) on the intercept and slope. The estimates of LGM for ELA scores indicated that the SES status had a significant positive impact ($\lambda = .29$, $p < .001$) on the initial level of ELA scores. However, the path coefficient from SES status to the slope ($\lambda = .07$, $p = .573$) suggested that the SES status had no significant positive impact on the slope, which indicated that the SES status had no compelling influence on the rate of changes in 4th-grade ELA performance over time. The ELA proficiency gap between FRPLs and non-FRPLs remained the same based on the standardized LGM output. A significant positive correlation between the intercept and slope ($r = .40$, $p = .005$) indicated that the initial scores and rate of growth were significantly related to the 4th-grade students' ELA achievement growth patterns. The LGM diagram results further revealed that students who started at lower levels of ELA proficiency grew slower than those who started at higher ELA levels. Matthew effect was detected between the low- and high-performers for 4th-grade ELA test scores.

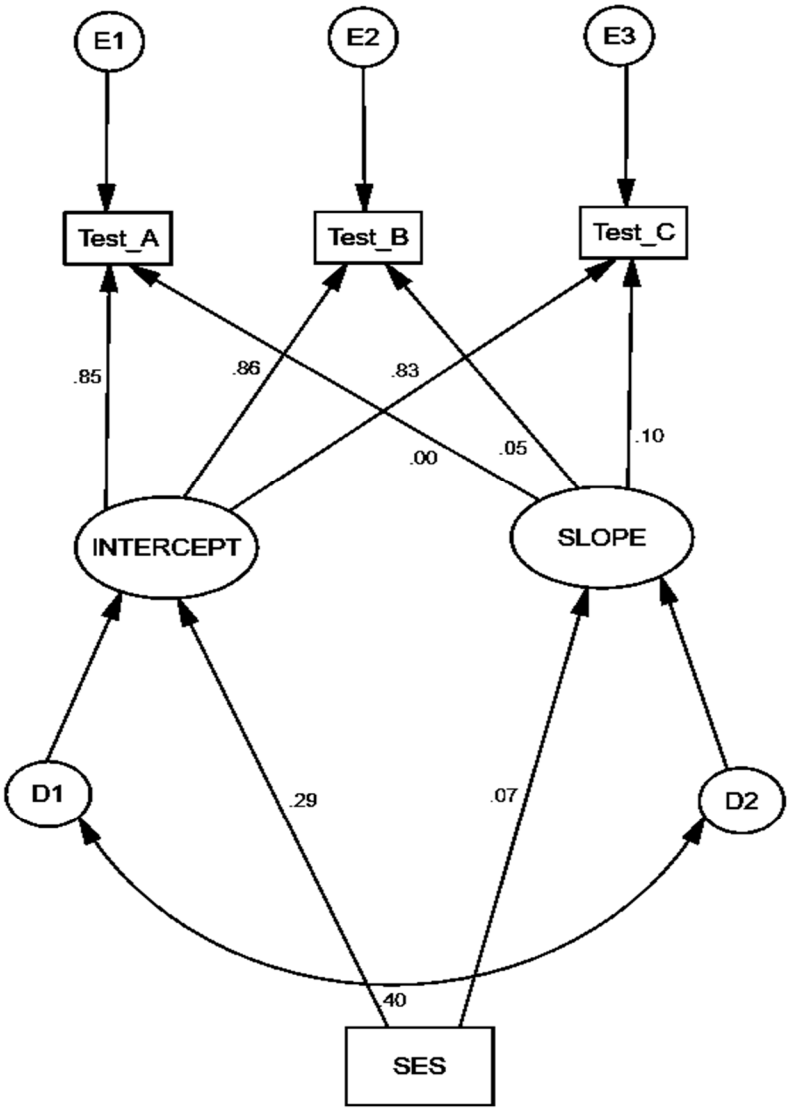

Figure 6. Standardized LGM Diagram for 4th-Grade ELA under the Impact of SES

LGM comparisons for 4th-Grade ELA test scores under the impact of ELL and SES status. Figure 7 presented the standardized model for 4th-grade ELA test scores under the impact of ELL and SES (ELL and FRPL coded as 0, non-ELL and non-FRPL coded as 1). The estimates of LGM for ELA scores indicated ELL status had a significant positive impact ($\lambda = .27$, $p < .001$) on the initial level of ELA scores, which was similar to the correspondent estimation regarding the impact of SES status on the intercept of ELA test scores ($\lambda = .19$, $p < .001$). However, the path coefficient from the ELL status to slope ($\lambda = .14$, $p = .29$) revealed that ELL status had no significant impact on the rate of changes (slope) in ELA score growth. A similar non-significant impact from SES on the rate of change of ELA score was revealed since the path coefficient from the SES status to slope was non-significant ($\lambda = .02$, $p = .89$). A significant positive correlation between the ELL and SES status ($r = .36$, $p < .001$) was also detected. This positive correlation indicated that the impact of ELL status on ELA growth significantly correlated with the impact of SES status on the literacy growth. The LGM diagram revealed a significant positive correlation between intercept and slope ($r = .38$, $p = .008$), which indicated the Matthew effect when analyzed in relation to the impacts of ELL and SES status on 8th-grade students' ELA growth patterns.

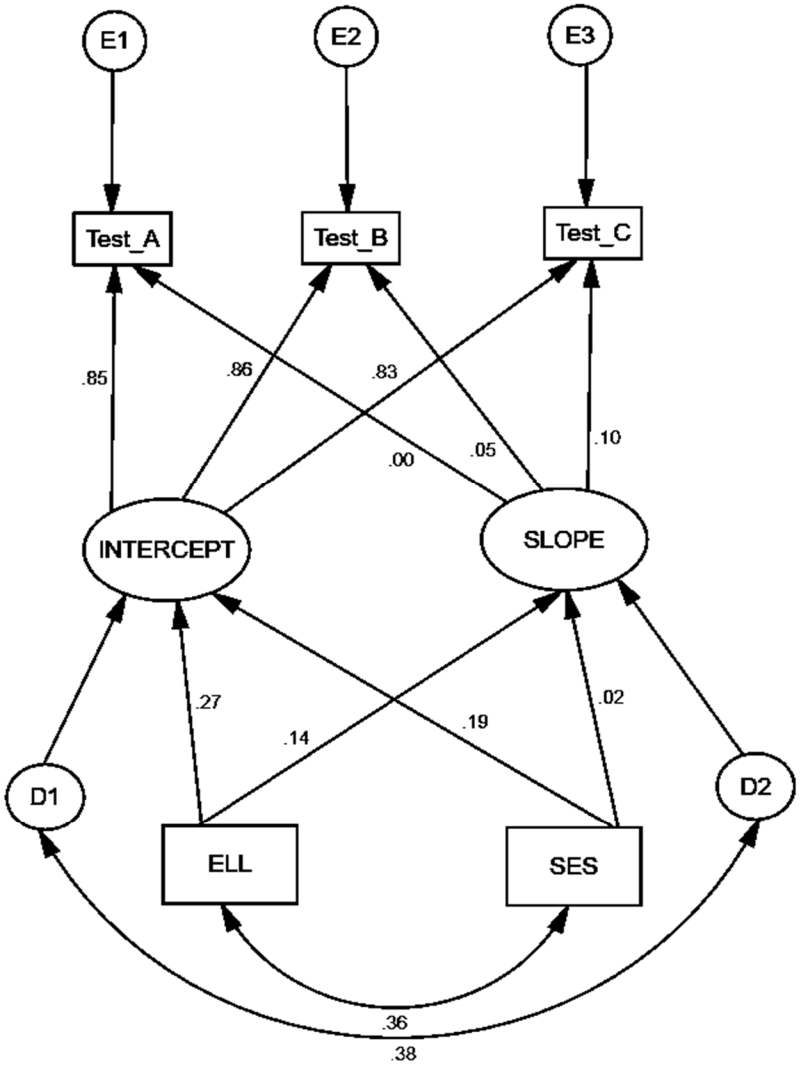

Figure 7. 4th-Grade Standardized LGM Diagram under the Impacts of ELL and SES

LGM Comparisons for 8th-Grade ELA

LGM comparisons for 8th-Grade ELA test scores under the impact of ELL. Figure 8 presented the standardized LGM diagram with the impact of ELL status on the intercept and slope (ELL coded as 0, non-ELL coded as 1). The estimates of LGM for ELA scores provided the intercept and slope differences using non-ELLs as the reference group. For the standardized LGM for the ELA scores under the impact of ELL status, the path coefficient from ELL status to intercept ($\lambda = .27$, $p < .001$) showed that the ELL status had a significant positive impact on the starting point (intercept) of the ELA test scores (i.e., ELLs performed lower than non-ELLs). The path coefficient from ELL status to the slope ($\lambda = .10$, $p = .002$) suggested that the ELL status also had significant positive impact on the slope. Matthew effect was detected between ELLs and non-ELLs for 8th-grade ELA test scores based on the standardized LGM output. The significant negative correlation between the intercept and slope ($r = -.23$, $p < .001$) indicated that the initial scores and rate of growth were significantly related. The LGM diagram results further revealed that students who started at higher levels of English proficiency grew slower than those who started at lower levels. This finding contradicted the Matthew effect on the ELA scores; that is, low-achievers grew faster than high-achievers, and a compensatory trajectory was detected when analyzed in relation to the impact of ELL status on the 8th-grade students' ELA achievement growth patterns.

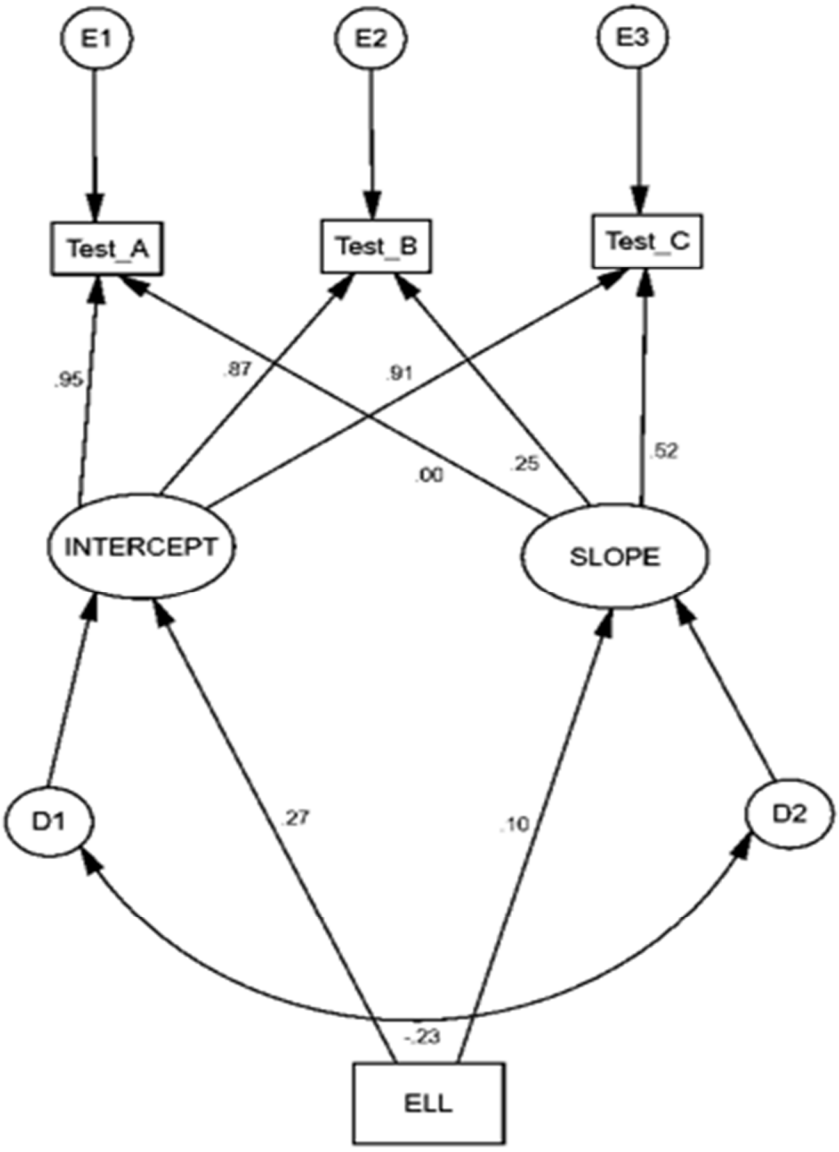

Figure 8. Standardized LGM Diagrams for 8th-Grade ELA under the Impact of ELL

LGM comparisons for 8th- Grade ELA test scores under the impact of SES status. Figure 9 presented the standardized LGM diagram with the impact of SES status on the intercept and slope (FRPL coded as 0, non-FRPL coded as 1). The estimates of LGM for ELA scores provided the intercept and slope differences using non-FRPLs as the reference group. The estimates of LGM for ELA scores revealed that the SES status had significantly positive impact ($\lambda = .20$, $p = .001$) on the initial level of ELA scores, which was similar to the corresponding estimation regarding to the impact of SES status on the slope of ELA test scores ($\lambda = .07$, $p = .049$). Matthew effect was detected between FRPLs and non-FRPLs for 8th-grade ELA test scores based on the standardized LGM output. A significant negative correlation between the intercept and slope ($r = -.17$, $p = .029$) revealed that students who started at lower levels of English proficiency grew faster than those who started at higher levels. Therefore, a compensatory trajectory was detected when analyzed in relation to the impact of SES status on the 8th-grade students' ELA achievement growth patterns.

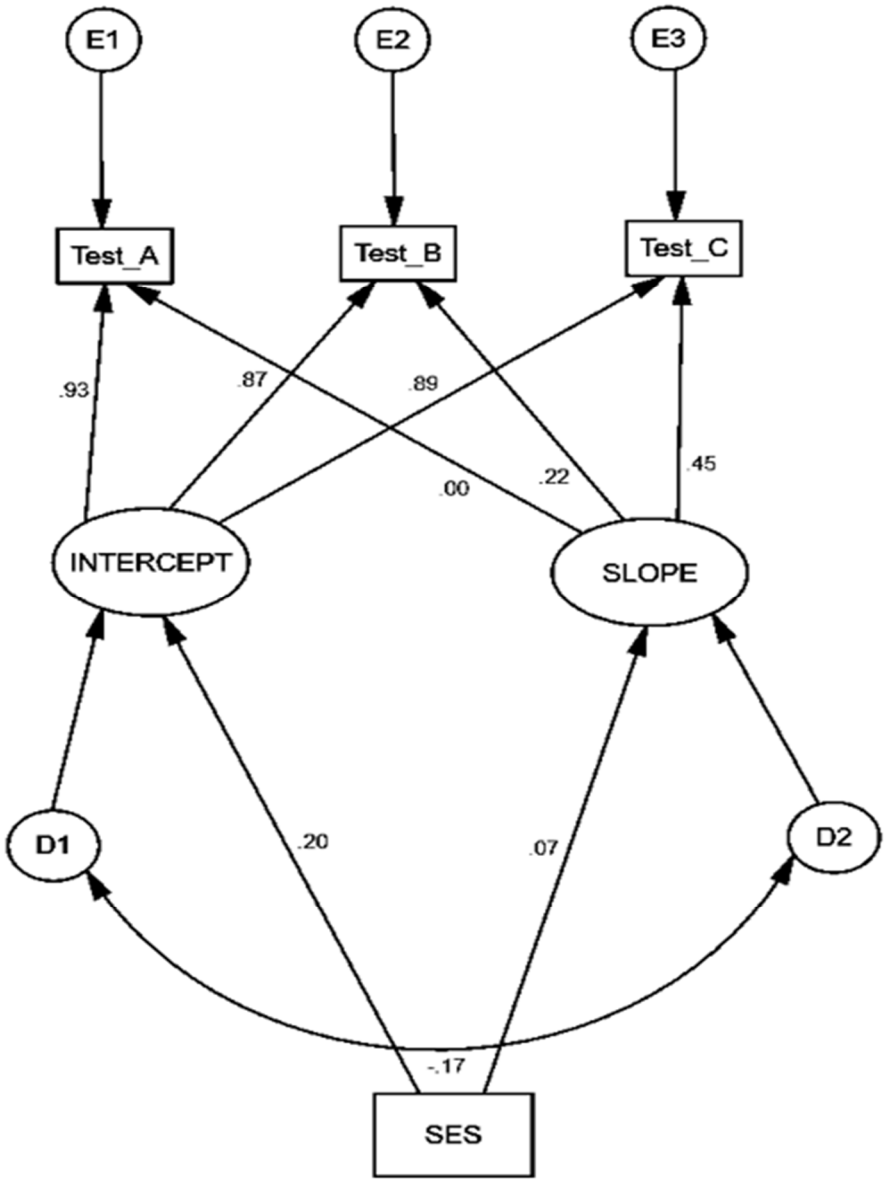

Figure 9. Standardized LGM Diagrams for 8th-Grade ELA under the Impact of SES

LGM comparisons for 8th-Grade ELA test scores under the impact of ELL and SES status. Figure 10 revealed that the standardized LGM diagram from the impacts of ELL and SES status(ELL and FRPL coded as 0, non-ELL and non-FRPL coded as 1) on the ELA scores indicated that the ELL status had a significant positive impact ($\lambda = .24$, $p < .001$) on the initial level of ELA scores, which was similar to the corresponding estimation regarding to the impact of SES status on the intercept of ELA test scores ($\lambda = .13$, $p < .001$). The path coefficient from the ELL status to slope ($\lambda = .09$, $p = .007$) revealed that ELL status had a significant positive impact on the rate of changes (slope) in ELA score growth. However, the path coefficient from the SES status to slope ($\lambda = .04$, $p = .225$) revealed that SES status had a non-significant impact on the rate of changes (slope) in ELA scores. A significant positive correlation between the ELL status and SES status ($r = .25$, $p < .001$) revealed that the impact of ELL status on ELA growth significantly correlated with the impact of SES status on the ELA growth. The LGM diagram revealed a significant negative correlation between intercept and slope ($r = -.22$, $p = .002$), which indicated a compensatory trajectory when analyzed in relation to the impacts of ELL and SES status on the 8th-grade students' ELA achievement growth patterns.

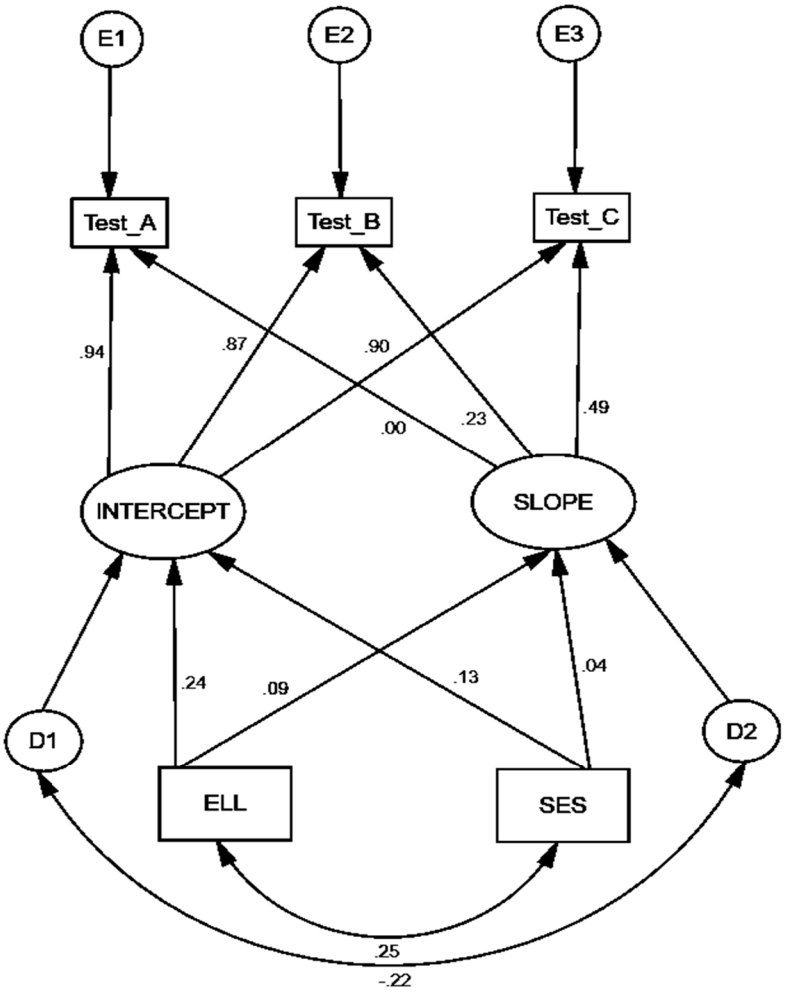

Figure 10. 8th-Grade Standardized LGM Diagrams under the Impacts of ELL and SES

CHAPTER V: DISCUSSION

Understanding the roles of SES and ELL status from a longitudinal perspective is valuable and informative. This information can also help educational professionals and literacy researchers gain insights on individual's literacy growth patterns. The primary goal of this research was to explore the impacts of ELL and SES status on the initial level and rate of change of ELA growth. Analyses of the relationship between intercept and slope of ELA performance trajectories helped to identify the existence of the Matthew effect or the compensatory trajectory and determined whether the literacy achievement gap was widening, narrowing or remaining consistent for 4th- and 8th-grade students. Another research goal was to determine the overall trend of ELA performance for each designated group. This information was applied to determine whether ELA achievement growth was steady or sporadic across the 4th- and 8th-grade groups. This chapter provides an overview of this research study and addresses educational implications. Research limitations and further studies were also discussed along with the comparison to the results of the existing body of the literature review.

Similarities in Trend Analysis for 4th- and 8th-Grade

Independent-sample *t*-test results indicated that non-ELL students outperformed ELL students for 4th- and 8th-grade at each time point. ELA proficiency of FRPLs was below their non-FRPL peers for 4th- and 8th-grades based on the results of two-independent-sample *t*-tests. This pattern is consistent with decades-long trends that demonstrate, on average, ELL students perform below their native-speaking peers, and FRPLs consistently present lower ELA proficiency compared to that of non-FRPLs.

Besides, the trend analysis results revealed a dominant linear trend for each group for 4th- and 8th-grades, and a quadratic trend coexisted but was not dominant. However, 8th-grade ELLs and non-FRPLs revealed a non-significant quadratic trend. We concluded that both sets of groups for 4th- and 8th-grade were all relatively stable across time, with no significant discernible differences being noted at the mean level. The ELA performance for 8th-grade ELL and non-FRPL groups presented the most stable status across three-time points compared to the other groups. The linear trajectories for 4th- and 8th-grade ELLs and non-ELLs, as well as FRPLs and non-FRPLs of the current study, are in line with the results of a few existing studies. Chong (2009) and Low (2013) have examined students' reading comprehension scores at later elementary grades and found linear-shaped trajectory patterns.

Differences between 4th-Grade and 8th-Grade ELA Proficiency Gaps under the Impact of ELL Status

The results also indicated that LGM overall provided marginal model-data fit information through the χ^2-tests and χ^2/df-ratio. Relative fit indices showed better fits for all LGM models we built. Regarding the ELA growth shapes and trajectories of ELLs and non-ELLs for 4th-grade, LGM results indicated that ELL status had a significant positive impact on the initial level of students' literacy proficiency, which corresponded with the reality that the ELLs had a lower literacy proficiency level than non-ELLs. A non-significant path coefficient (see Figure 5) from ELL to the slope was detected based on LGM statistical output; we may conclude that neither Matthew effect nor compensatory trajectory was detected using 4th-grade ELA test scores. Thus, it appeared as if the gaps were steady between 4th-grade ELLs and non-ELLs. This finding is

consistent with the results of the study conducted by Polat, Zarecky-Hodg, and Schreiber (2016). They reported significant differences in literacy achievement for 4th-grade ELLs and non-ELLs and revealed either a steady or slightly widening achievement gap with the impact of ELL status along with other factors.

For 8th-grade, ELL status significantly impacted the initial level and rate of change of ELA proficiency. Unlike 4th-grade's LGM results, a significant positive path coefficient from ELL to the slope (see Figure 8) was detected, indicating that the ELA proficiency gap between ELLs and non-ELLs for 8th-grade was widening. Non-ELLs who started at higher levels of literacy proficiency grew faster than ELLs who started at lower levels. Therefore, the Matthew effect was detected when we only analyzed the impact of ELL status on ELA performance for 8th-grade ELLs and non-ELLs. This finding of a widening literacy gap between 8th-grade ELLs and non-ELLs in the current study is consistent with the previous research of Polat, Zarecky-Hodge and Schreiber (2016), which identified a growing reading comprehension gap between ELLs and non-ELLs in 8th-grade.

The standardized LGM results revealed a widening literacy gap between ELLs and non-ELLs for 8th-grade; however, a narrowing literacy gap between low-and high-performers in 8th-grade was detected based on the significant negative correlation between intercept and slope. We notice that the growth trend of the literacy gap between ELLs and non-ELLs is inconsistent with the gap trend between 8th-grade low- and high-performers. We speculate that some other potential factors (such as sample size differences between ELL and non-ELL groups) may also impact students' literacy performance in general.

Differences between 4th-Grade and 8th-Grade ELA Proficiency Gaps under the Impact of SES Status

For both 4th- and 8th-grades, LGM analysis indicated that SES status significantly impacted the initial level of students' ELA proficiency but not the rate of growth. For 4th-grade, there was a non-significant path coefficient (see Figure 6) from SES to the slope based on the LGM output. We concluded that neither Matthew effect nor compensatory trajectory was detected between 4th-grade FRPLs and non-FRPLs, and the literacy gap between these two designated groups remained steady. This research finding is consistent with the that of the 2018 NAEP reading report regarding the stable literacy gap between 4th-grade FRPLs and non-FRPLs compared 2015 to 2017.

For 8th-grade, SES status significantly impacted the initial level and rate of change of the ELA proficiency. Unlike 4th-grade's LGM results, a significant positive path coefficient (see Figure 9) from SES to the slope was detected based on the standardized LGM statistical output. We concluded that the ELA proficiency gap between FRPLs and non-FRPLs was growing in 8th-grade. Non-FRPL students who started at higher levels of literacy proficiency increased faster than that of FRPLs. The Matthew effect was confirmed if we analyzed the impact of SES status for 8th-grade ELA performance in isolation. The classification of a widening ELA proficiency gap of the current study differs from Pickens's (2016) study that examined the reading comprehension gap for adolescences with diverse ethnicity and SES status and found SES status had no significant impact on the reading comprehension trajectory during youth. Our study result is also slightly different from that of the latest NAEP reading report regarding the steady literacy gap between 8th-grade FRPL and non-FRPL students compared 2015 to

2017. However, the results of the current study are similar to those of the other major studies which have investigated different components of ELA growth (Caro, 2009; Catts, 2008; Hemphill, Vanneman, 2011). We speculate that the literacy achievement gaps vary depending on the ELA assessment times, ELA subskills assessed and other sociocultural factors.

For the 4th-grade literacy gap, the SES to slope path coefficient indicated the literacy gap between FRPLs and non-FRPLs remained steady, but the positive correlation between intercept and slope indicated high-starters grew faster than the slow-starters. For the 8th-grade literacy gap, the SES to the slope coefficient implied the literacy performance for non-FRPLs was increasing faster than that of FRPL students, but the negative correlation between intercept and slope illustrated the literacy proficiency for high-starters grew slower than that of the slow-starters. We conclude that the literacy growth gap between FRPLs and non-FRPLs is not equivalent to that of the low- and high-starters for 4th- and 8th-grades. We speculate that some other potential factors may also impact students' literacy performance in general.

Differences between 4th-Grade and 8th-Grade ELA Proficiency Gaps under the Impact of ELL and SES Status

The current study revealed that there was a positive correlation for the ELA proficiency between ELL and SES status for both 4th- and 8th-grade students. ELL and SES status have been identified as commonly-agreed indicators of students' initial level of ELA achievements. However, we found ELL status only impacted 8th-grade ELA rate of changes based on the LGM analyses. We conclude that ELL status plays a more significant role in 8th-grade ELA achievement gap compared to that in 4th-grade. Given

the impact of SES status on the ELA performance gap, we found 8th-grade ELA rate of change was significantly impacted by SES status when the LGM analysis only included the SES factor.

LGM results highlight the fact that the literacy achievement gap is impacted by multiple factors with changing grades. There was a significant positive correlation between intercept and slope for 4th-grade, but a significant negative correlation for 8th-grade. Therefore, we concluded that the ELA proficiency gap was widening between high-achievers and low-achievers in 4th-grade, and a narrowing ELA achievement gap was detected for 8th-graders with different ELA competency. As noted, the characteristics for the literacy gaps between low- and high-achievers in 4th- and 8th-grades demonstrate uneven profiles compared to that of the ELA gaps between ELLs and non-ELLs as well as FRPLs and non-FRPLs. We suspect that other potential factors along with ELL and SES status co-impact the ELA growth gaps among the targeted groups.

Our research findings are very similar to the results of Kieffer (2010) that addressed the interaction effect of ELL and SES status on reading comprehension growth and found that the impact of ELL status on ELA growth patterns was contextualized with the effects of SES status on ELA growth, and this interaction effect also varied with changing grades. Besides, the current study confirmed that ELLs who were also possibly identified as FRPLs slightly caught up with their native English-speaking peers who had not been perhaps identified as FRPLs. This conclusion is consistent with the results of Kieffer's study that found the reading performance for ELLs with FRPL status could catch up with their native English peers with non-FRPL status in secondary grades.

Limitations of the Current Study and Recommendations for Future Studies

One of the limitations of this study is the inaccessibility to the criteria for defining ELL status, which can vary from state-to-state and from district-to-district. As the population of non-ELLs is larger than ELLs with an unknown definition of ELL status, we strongly recommend that clear and precise categorization of the ELL population be applied in future studies. Second, SES status is defined as students register at an FRPL program based on the description of the original archival dataset. In reality, some school districts allow everyone to register for the FRPL program regardless of their SES status; thus we cannot guarantee the sample we had for our research project would be the best representative of the population. In addition, other demographic variables that have been known to influence ELA performance and growth, such as gender and ethnicity, are insufficiently reported for inclusion in our analyses. As such, future researchers should include these variables in future studies to better understand the context of group differences. Lastly, the data subjects we obtained for 4^{th}- and 8^{th}-grade did not include the same participants. Thus, the samples are cross-sectional samples. The research results would be better demonstrated if the ELA scores for 4^{th}- and 8^{th}-graders are from the same sample participants as a longitudinal data set. The items appeared in the tests were constructed based on the CCSS ELA guidelines; however, we have no access to the description of each testing item. The literacy sub-skills could be identified in order to narrow or close the literacy gaps among subgroups if the future study could connect the description of individual ELA testing item with the information of specific literacy skill assessed before the literacy gap analysis among subgroups.

This study may serve as an evidence-based research tool for other researchers, educational experts, school educators and other stakeholders on how to precisely analyze and interpret ELA data and literacy development patterns for students with different ELL and SES status. Additionally, we notice that the impacts of ELL status on ELA growth contextualize with the effects of SES status and grades, and vice-versa. Therefore, we recommend that education professionals need to take multiple sociocultural factors or literacy indicators into consideration when evaluating or assessing students' ELA achievements. In addition to the contextualized impacts of ELL and SES status on ELA growth with increasing ages, several reading development theories have projected a common phenomenon that literacy growth trajectory also associates with individual developmental stages. Individual attitudes, habits and cognitive development could all impact the literacy growth in the long term (Chall, 1983; Chomsky, 1972; Russell, 1961). In conclusion, in order to investigate the Matthew effect or the compensatory trajectory among students with various sociolinguistic status, future studies may consider including the examination of ELL's first language skills, family literacy levels, ethnicity, gender, cognitive development stages and other literacy indicators, with the purpose of informing instruction for students with low ELA performance.

We acknowledge that there is no perfect research project. While we have made our best effort in the endeavor of this study with our limited knowledge and information, there is inevitably always room for improvement. We will continue improving the experiment and analysis environment for a given situation and will try to obtain the closest approximation to the unknown ultimate truth. It is only through the continued

cooperation, effort, and sharing of knowledge in the science education community that this goal may ever be achieved.

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APPENDICES

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129

IRBN007 – EXEMPTION DETERMINATION NOTICE

Tuesday, April 12, 2016

Investigator(s): Daren Li & Jwa Kim
Investigator(s') Email(s): dl3u@mtmail.mtsu.edu
Department: Literacy Studies

Study Title: "COMMON CORE STATE STANDARDS BENCHMARKASSESSMENTS: ITEM ALIGNMENT TO THE SHIFTS"
Protocol ID: **16-1254**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category *(4) Study involving existing data* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	EXEMPT from furhter IRB review***
Date of expiration	**NOT APPLICABLE**
Participant Size	Click here to enter text.
Participant Pool	Click here to enter text.
Mandatory Restrictions	Click here to enter text.
Additional Restrictions	Click here to enter text.
Comments	Click here to enter text.

Amendments	**Date**	**Post-Approval Amendments** Click here to enter text.

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:

- Addition/removal of subject population should not be implemented without IRB approval
- Change in investigators must be notified and approved
- Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval
- Be advised that the proposed change must comply within the requirements for exemption
- Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form
- Changes to funding source must be notified via email (irb_submissions@mtsu.edu)
- The exemption does not expire as long as the protocol is in good standing
- Project completion must be reported via email (irb_submissions@mtsu.edu)
- Research-related injuries to the participants and other events must be reported within 48 hours of such events to compliance@mtsu.edu

The current MTSU IRB policies allow the investigators to make the following types of changes to this protocol without the need to report to the Office of Compliance, as long as the proposed changes do not result in the cancellation of the protocols eligibility for exemption:

- Editorial and minor administrative revisions to the consent form or other study documents
- Increasing/decreasing the participant size

The investigator(s) indicated in this notification should read and abide by all applicable postapproval conditions imposed with this approval. Refer to the post-approval guidelines posted in the MTSU IRB's website. Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident.

All of the research-related records, which include signed consent forms, current & past investigator information, training certificates, survey instruments and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the sacure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board

Middle Tennessee State University

Quick Links:

Click here for a detailed list of the post-approval responsibilities.
More information on exmpt procedures can be found here.

I

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129

IRBN007 – EXEMPTION DETERMINATION NOTICE

Friday, September 21, 2018

Principal Investigator	**Daren Li** (Student)
Faculty Advisor	Jwa Kim
Co-Investigators	NONE
Investigator Email(s)	*dl3u@mtmail.mtsu.edu; jwa.kim@mtsu.edu*
Department	Literacy Studies
Protocol Title	***Common core state standards benchmark assessmentsw item alignment to the shifts***
Protocol ID	**16-1254**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category *(4) Study involving existing data* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	**EXEMPT from furhter IRB review*** **	Date	**4/12/16**
Date of Expiration	NOT APPLICABLE		
Sample Size	Not Applicable		
Participant Pool	**Academic records of school students**		
Exceptions	NONE		

Mandatory Restrictions	1. Participants must be 18 years or older 2. Informed consent must be obtained from the participants 3. Identifying information must not be collected
Restrictions	**Not approved for participant recruitment - exisiting data only**
Comments	This template is updated to the current format on 09.21.2018

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:

- Addition/removal of subject population should not be implemented without IRB approval
- Change in investigators must be notified and approved
- Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval
- Be advised that the proposed change must comply within the requirements for exemption
- Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form
- Changes to funding source must be notified via email (irb_submissions@mtsu.edu)
- The exemption does not expire as long as the protocol is in good standing
- Project completion must be reported via email (irb_submissions@mtsu.edu)
- Research-related injuries to the participants and other events must be reported within 48 hours of such events to compliance@mtsu.edu

Post-approval Protocol Amendments:

The current MTSU IRB policies allow the investigators to make the following types of changes to this protocol without the need to report to the Office of Compliance, as long as the proposed changes do not result in the cancellation of the protocols eligibility for exemption:

- Editorial and minor administrative revisions to the consent form or other study documents
- Increasing/decreasing the participant size

Only THREE procedural amendment requests will be entertained per year. This amendment restriction does not apply to minor changes such as language usage and addition/removal of research personnel.

Date	Amendment(s)	IRB Comments
09.21.2018	1. The PI is permitted to disseminate the findings using this protocol under the dissertation title "Impacts of socio-economic and ell status on Mathew effect in English Language arts." 2. Dr. Eric Oslund is permitted to join the investigating team. 3. The data set is expanded to include records from 8th grade students. .	Administrative approval

The investigator(s) indicated in this notification should read and abide by all applicable post-approval conditions imposed with this approval. Refer to the post-approval guidelines posted in the MTSU IRB's website. Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident.

All of the research-related records, which include signed consent forms, current & past investigator information, training certificates, survey instruments and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the sacure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board

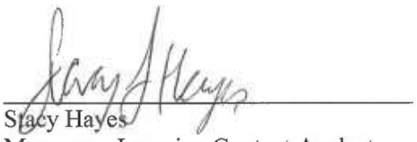
Middle Tennessee State University

Quick Links:

Click here for a detailed list of the post-approval responsibilities.
More information on exmpt procedures can be found here.

Dear MTSU IRB Committee,

This letter is to confirm that Dr. Jwa Kim and his research team have the permission to analyze data from the Discovery Education Assessment English Language Arts interim assessment data for grades K-8 Reading (Tests A, B & D) and High School English 1-3 (Test A, B & C) from the 2014-2015 school year. A random sample from the total population was selected and anonymized. No information which may lead to the identification of any subjects will be released to the researchers. The data will be used only for their research projects. If you have any questions, please feel free to contact me.



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