DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN STUDENTS BY GENDER AND ECONOMIC STATUS: A MULTIYEAR STATEWIDE INVESTIGATION

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by

LaTonia M. Amerson

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DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN STUDENTS BY GENDER AND ECONOMIC STATUS: A MULTIYEAR STATEWIDE INVESTIGATION

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DEDICATION

To my mother, Sophia Diane Goodspeed, I thank her for her undying support and encouragement throughout every phase of this process. I am forever grateful for her unwavering love and fervent prayers as this has been a journey filled with celebrations as well as challenges. She was the first person to tell me that I was beautiful, smart, and capable of accomplishing any and everything in my life. Many thanks and much love to my favorite girl.

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ABSTRACT

Amerson, LaTonia M., *Differences in Algebra I End-Of-Course exam Grade Level Performance of African American students by gender and economic status: A multiyear statewide investigation.* Doctor of Education (Educational Leadership), December, 2023, Sam Houston State University, Huntsville, Texas.

Purpose

The purpose of this journal-ready dissertation was to determine the extent to which African American boys and girls might differ in their performance on the Texas state-mandated Algebra I End-of-Course exam. Specifically, the degree to which differences might exist between African American boys and girls on the Approaches Grade Level, Meets Grade Level, and Masters Grade Level standards. Performance on the Algebra I End-of-Course exam was analyzed for the 2016-2017, 2017-2018, and 2018-2019 school years. African American student performance on the Algebra End-of-Course exam by gender was investigated in the first study, performance on the Algebra End-of-Course exam of African American girls as a function of their economic status was investigated in the second study, and performance on the Algebra End-of-Course exam of African American boys as a function of their economic status was investigated in the third study.

Method

A causal-comparative research design was present for all three studies. Archival data were collected through a Public Information Request form submitted to and fulfilled by the Texas Education Agency Public Education Information Management System for the 2016-2017, 2017-2018, and 2018-2019 school years.

Findings

Concerning the STAAR Algebra I End-of-Course exam, higher percentages of African American girls met the three grade level standards (i.e., Approaches Grade Level standard, Meets Grade Level standard, and Masters Grade Level standard) in all three school years than African American boys. Statistically significantly higher percentages of African American girls who were not in poverty met the three Grade Level standards in all three school years than African American girls who were economically disadvantaged. Similar results were present for African American boys in that higher percentages of African American boys who were not in poverty met the three Grade Level standards in all three school years than African American boys who were economically disadvantaged. Of concern were the high percentages of African American girls and African American boys who did not meet any Grade Level standard in the studies for all three school years. Results of these empirical investigations were commensurate with the existing literature regarding gender and economic status and their relationship to mathematics proficiency.

KEYWORDS: STAAR; Algebra I End-of-Course exam; Economically disadvantaged; Approaches Grade Level Standard; Meets Grade Level Standard; Masters Grade Level Standard

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CHAPTER I

INTRODUCTION

According to the National Assessment of Educational Progress (2019), 86% of African American students lack proficiency in Grade 8 mathematics. Mathematics is important because it builds mental discipline, encourages logical reasoning and rigor, and prepares students for other content areas such as science, social studies, and the arts. Jeongeun et al. (2015) suggested that successful completion of a Grade 8 mathematics course indicates that students will have a functional foundation of skills necessary to excel in college and careers. The proficiency data in mathematics are specifically concerning in an advancing world where mathematics and the world are integrated and cannot be separated (Curry, 2018). Although some African American students display above average academic skills, many African American students struggle in mathematics. One factor that might influence this struggle for African American students is disengagement in school. Another factor is student economic status, which can have an effect on mathematics performance and influences academic success and postsecondary options. Schools often times bridge the gap between an array of issues such as educational inequities, poverty, societal issues, technology, parental involvement, and the disparity of resources.

Algebra I, English I, and Biology are Grade 9 examinations required for graduation in Texas public schools (Texas Education Agency, 2020). As such, this testing is an example of an educational policy that directly affects students in their transition to high school. In a recent analysis of performance on the Texas state-mandated assessment in mathematics, Fraga and Slate (2020) documented the presence of statistically

significant differences between African American and Hispanic student performance on the Algebra I, English I, and Biology End of Course examinations from the 2017-2018 school year. All three performance indicators (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) were analyzed. The study was framed around Critical Race Theory that underscores the historical realities of racism and oppression with the contemporary struggles that African American male students face in schools today. Additionally, Fraga and Slate (2020) indicated that ethnic/racial inequities can be seen by the persistence of a gap in academic achievement and regression during the freshman transition. Faulkner et al. (2014) stated that one explanation of the achievement gap is that African American students are overlooked due to implicit bias. As such, rather than being neutral, teachers may have a preference for, or aversion to, a person or group of people or associate stereotypes without conscious knowledge. This unconscious, yet critical way of thinking and teaching may limit students' access to advanced mathematics courses; consequently, the future academic success of African American students.

Algebra I is one of the most important on-track indicators of students' future success. Provided in this journal-ready dissertation was an in-depth review of relevant research articles about African American student performance on the Algebra I End-of-Course exam. Specific emphasis was placed on African American student performance by gender and by economic status. Algebra I performance was measured by the State of Texas Assessments of Academic Readiness (STAAR) End-of-Course exams.

Literature Review on African American Student Performance on the Algebra I End-of-Course Exam by Gender

Education is a way of imparting knowledge and skills, promotes innovative thinking and creativity, and is a tool to achieve success. According to Long et al. (2012), students who take advanced courses in high school should experience higher performance in as indicated by grades, achievement scores, and graduation rates; college entrance, performance, and completion rates; and success in the labor market. Unlike other disciplines, literacy in mathematics is a key predictor of postsecondary success. Jeongeun et al. (2015) stated that a thoroughly developed understanding of algebra is needed to have access to advanced educational and career opportunities. Domina (2014) analyzed the selection process into advanced middle school mathematics courses and estimated the effects of advanced courses on students' mathematics. He documented advanced middle school mathematics courses improved student achievement. Evidence was provided to support the need to emphasize the importance of mathematics curricula in middle and high schools (Domina, 2014).

Proficiency in algebra is a gatekeeper to success in advanced mathematics courses, high school graduation, college admission and completion, and obtaining employment in STEM careers (Hughes et al., 2014). Researchers (e.g., Domina, 2014; Rickles, 2013) have established that taking algebra in eighth grade was associated with higher mathematics achievement when the students were prepared to take algebra earlier. According to a publication from the National Academies of Science, Engineering, and Medicine (2022), many African American students do not take advanced math in middle school. Sparks (2020), in a recent article, called out that "separate algebra is unequal

algebra" even when algebra is offered to students in higher-poverty middle schools (p. 7). In other words, algebra in higher-poverty middle schools is often not taught in the same depth as at more affluent schools.

According to the U.S. Department of Education Office for Civil Rights (2018), African American students represent 17% of students enrolled in Grade 8, but only 11% were enrolled in Algebra I. Students who cannot pass a lower-level course such as Algebra I many times cannot access to more advanced mathematics coursework which leads to a lack of postsecondary readiness. Many students have to repeat Algebra because they are not exposed to many algebraic thinking and problem-solving skills while in elementary and middle school (Sawchuk, 2018). These skills are critical to success later on in Algebra I. According to Flores (2007) and Davis (2014), African American students have fewer opportunities to take high-level mathematics courses because of their limited mathematics achievement. Flores (2007) further noted that enrollment in Grade 8 mathematics courses greatly influenced the opportunity to take advanced mathematics courses before graduating from high school. These notions are important due to the effect of the pandemic on mathematics achievement.

According to the National Center for Education Statistics (2022), a 13-point score decrease occurred among African American students compared to a 5-point decrease for White students, resulting in a widening of the White-African American score gap from 25 points in 2020 to 33 points in 2022 in mathematics. The access of African American students to advanced mathematics courses may be affected due to the decline, which is another area of concern. Hypotheses have been made regarding the factors that contribute to the achievement gap. White students take, on average, advanced academic courses at a

higher rate than Black students (Corra et al., 2011; Rodriguez & McGuire, 2019). White students also take advanced academic courses at a higher rate than Hispanic students (Sawchuk, 2018). Enrollment in advanced academic courses is one example of the gap in opportunities that students of color face (Carter & Welner, 2013; Darling-Hammond, 2018). Because White students are exposed to more rigorous curriculum than are Black and Hispanic students, they perform better on standardized examinations. These gaps in mathematics performance are present even before students reach their Algebra I course in high school.

Federal education legislation such as The Elementary and Secondary Education Act of 1965, The No Child Left Behind Act of 2001, and most recently, the Every Student Succeeds Act of 2015 have placed a clear focus on student academic achievement and accountability for all students. Consequently, educational leaders have placed a clear emphasis on reducing academic disparities between student groups enrolled in public schools (Fraga & Slate, 2020). One of the major student groups who have evident disparities are African Americans. According to the National Center for Education Statistics (2020a), the percentage of African American students enrolled in public schools across the United States in the fall of 2017 was 15%, or about 7.6 million African Americans. That percentage was in comparison to the fall of 2000 where 17% of public-school enrollment, or 8 million students were African American across the United States (National Center for Education Statistics, 2020a). Only 8% of African American students in Grade 12 performed at or above the National Assessment of Educational Progress proficiency level on the mathematics assessment. According to the National Center for Education Statistics (2020b) among racial/ethnic groups, the average

mathematics score at Grade 12 for White students was 31 points higher than the average score at Grade 12 for their African American peers in 2019. The 31-point White to African American score gap in 2019 was not substantially different from the 30-point score gap in 2015, the previous assessment year, nor from the 31-point score gap in 2005. The roots of the achievement gap trace back to the post-Civil War Era, with educational disparities exacerbated by Jim Crow Laws (Spires, 2015). The notion of separate but equal educational facilities for White students and non-White students were certainly part of the problem. Neither past Supreme Court cases (e.g., *Brown v. Board of Education of Topeka, 1954*), nor past presidential intercessions (e.g., President Eisenhower sending federal troops to Central High School in Little Rock, Arkansas in 1957) were able to mitigate the crisis that has been and continues to be manifested. Specifically, the mathematics achievement for African American students has been and remains problematic.

With respect to the state of interest for this article, Texas, the Texas Education Agency reported data from the 2017-2018 school year that 12.6%, or 680,359 PreK-12 students, were African Americans in Texas (Texas Education Agency, 2018). In the 2017-2018 school year, more than half of all students, 51.3%, were male. These enrollment numbers by gender were not reported separately by student ethnicity/race. The Texas Education Agency (2018) documented that 74.6% of African American students were economically disadvantaged, which was an increase from the previous year. These percentages of African American students pose a challenge in determining specific achievement data for African American boys and African American girls based on their gender and economic status. Information is available for the African American group

overall, but little comparative data is present for students in that particular group. African American students in Texas have not performed as well as their peers on state-mandated mathematics assessments, including the Algebra I End-of-Course exam. This course and course exam are important in that they constitute a gateway high school graduation requirement.

In 2003, Texas implemented the Texas Assessment of Knowledge and Skills as the state mandated assessment. This assessment allowed Texas to demonstrate compliance with the No Child Left Behind Act while increasing the expectations for students' academic performance. The Texas Assessment of Knowledge and Skills exams were designed to measure students' knowledge and mastery of skills across multiple core content areas (e.g., Reading, Mathematics, Science, and Social Studies). However, as evidenced by test scores in Texas, many children were not meeting the achievement standards. Alford-Stephens (2016) examined the degree to which differences were present in mathematics achievement in the Texas Assessment of Knowledge and Skills Mathematics Exit-Level exam for the 2004-2005 through the 2011-2012 school years as a function of student ethnicity/race (i.e., Asian, White, Hispanic, and African American). Asian boys had the best mathematics performance over this 8-year time period, followed by White boys, then Hispanic boys, and last African American boys. Statistically significantly lower mathematics performance was established for Hispanic and African American boys in comparison to Asian and White boys. African American boys had the poorest performance on all of the 10 mathematics objectives in each year of the 8-year time span.

The Alford-Stephens (2016) investigation is very relevant to this article because the state-mandated assessment that she analyzed is aligned to the Algebra I End-of-Course exam, as they are both state exit graduation requirements for mathematics. With respect to this study, the degree to which differences might be present in mathematics between African American boys and African American girls was investigated. As it pertains to the STAAR Algebra I End-of-Course exam, the Texas Education Agency (2019b) reported that 76% of African American students performed at the Approaches Grade Level Standard; 47% of African American students performed at the Meets Grade Level Standard; and 25% of African American students performed at the Masters Grade Level Standard. These results were in comparison to the 84% of all students who performed at the Approaches Grade Level Standard; 62% of all students who performed at the Meets Grade Level Standard; and 39% of all students who performed at the Masters Grade Level Standard. Apparent in this set of statistics are the gaps in the mathematics performance of African American students in Texas.

Though gender gaps have narrowed in recent decades, women remain underrepresented in many mathematics fields (Leaper et al., 2012). Girls tend to do as well as boys in mathematics during their adolescence. Comparative to these studies, Reilly et al. (2019) documented that boys and girls had similar mathematics performance. According to Reilly et al. (2019), gender differences in mathematics have been reported throughout the years, but no major evidence has been documented of the presence of large gaps. In fact, most of the gaps are considered trivial because they are so small. Voyer and Voyer (2014) established that girls consistently receive higher school grades for all course content areas than boys. In contrast, in meta-analyses of performance on

standardized tests, girls have not outperformed boys on standardized assessments, SAT, ACT, and AP exams.

With respect to gender and Algebra I End-of-Course exams, the Texas Education Agency (2019b) reported that 80% of boys performed at the Approaches Grade Level Standard on the Algebra I End-of-Course exam; 56% of boys performed at the Meets Grade Level Standard; and 35% of boys performed at the Masters Grade Level Standard. These results were in comparison to the 88% of girls who performed at the Approaches Grade Level Standard; 67% of girls who performed at the Meets Grade Level Standard; and 44% of girls who performed at the Masters Grade Level Standard. On all three mathematics measures, higher percentages of girls met the standards than did boys. After an extensive and intensive review of the extant literature, no published research articles could be located in which Algebra I exam data had been analyzed with respect to the performance of African American boys when compared to African American girls.

Review of the Literature on Economic Gaps in Mathematics Achievement for African American Girls

The exposure of African American girls to mathematics is critical because it affects postsecondary schooling and employment opportunities (Gholson, 2016). Consequently, the importance of mathematics cannot be overlooked or understated in the educational development of African American girls. Within the context of mathematics, African American girls are considered to have more positive self-concept and higher expectations in mathematics than White and Hispanic girls, as well as hold a substantially higher value for mathematics (Else-Quest et al., 2013). Pringle et al. (2012) determined that teachers held particularly low expectations of low-income African American girls in

upper elementary, “who were perceived as bringing limited knowledge and skills, as well as numerous social challenges to the learning environment” (p. 226). Consequently, African American girls often lack basic access to high quality, advanced mathematics, and science courses in schools located in their communities (National Women’s Law Center, 2014).

According to the National Assessment of Educational Progress (2022), only 16% of African American girls were proficient in eighth-grade mathematics. Additionally, 48% of African American girls performed below the basic level. The National Assessment of Educational Progress (2022) used categorized achievement based on a scale of basic, proficient, and advanced. Therefore, the majority of African American girls performed below basic standards for mathematics by eighth grade. African American girls were underperforming compared to White peers, which could be due to a lack of opportunities. Performance in eighth-grade algebra could predict future mathematics achievement and continuation of STEM degrees in college (Young et al., 2017). The most recent statistics published by the National Assessment of Educational Progress (2022) were that the achievement trends for girls remains unchanged when compared to other subgroups. Specific data was not available for African American girls; however, it was reported African American students had an average score that was 24 points lower than that for White students, which is a narrower performance gap than in 2000 (37 points). Additionally, students who were eligible for the free and reduced lunch had an average score that was 23 points lower than for students who were not eligible. This performance gap was similar to the African Americans students and White students gap in 2000 (24 points). When compared to boys, girls had an average score that was five

points lower than boys, this gap was wider than the gap, which was two points higher for girls than boys in 2000 (National Assessment of Educational Progress, 2022).

Young et al. (2017) argued underrepresentation in careers resulted from insufficient preparation, therefore, secondary and postsecondary education were imperative for African American girls. Once again, African American girls were underrepresented in mathematics in secondary and postsecondary education. In general, more women were attending college, but fewer African American women were earning mathematics degrees (Alexander & Hermann, 2015; Borum & Walker, 2012). A strong predictor of increased performance and persistence in mathematics was access to eighth-grade algebra (Young et al., 2017). Completion of the high level of mathematics courses in high school was a significant factor for attendance at post-secondary institutions, and early access to algebra allowed the opportunity to take classes beyond Algebra II (Chambers et al., 2016). Using high school data, which included different socio-economic levels, Chambers et. al. (2016) concluded that 50% of Black girls' standardized mathematics scores were considered low. Algebra II was a minimum requirement for most colleges, and 78% of African American girls took Algebra II or higher-level mathematics courses in high school as a prerequisite for college. These researchers discovered a strong association between high school mathematics performance and post-secondary enrollment. If African American girls were represented in secondary mathematics education, they would have had opportunities to pursue degrees and careers in mathematics.

According to the National Science Board (2016), women were underrepresented in the fields of science, technology, engineering, and mathematics (STEM). More

specifically, they reported that the underrepresentation was especially present for African American and Hispanic women. Researchers (e.g., Beasley & Fischer, 2012; Leaper et al., 2012; Saw et al., 2018) have provided evidence that students who are female, African American, Hispanic, or low socioeconomic are less likely to develop and maintain an interest in STEM fields than are their peers who are male, White, or from higher socioeconomic backgrounds. The development of an interest in the STEM fields is correlated with student achievement in mathematics (Sadler et al., 2014). The successful completion of advanced mathematics coursework is correlated to African American girls pursuing careers is the STEM field. The accessibility of advanced mathematics courses is low for African American girls which leads to low numbers of African women represented in STEM careers. For example, in 2016, African American women earned 5.4% of all bachelor's degrees in science and engineering among U.S. citizens and permanent residents (National Science Foundation, 2019). Comparatively, that same year, White and Hispanic women respectively earned 28.2% and 7.7% of bachelor's degrees in science and engineering. African American women's severe underrepresentation in STEM, particularly in engineering (National Science Foundation, 2019), often results in missed opportunities that could change the trajectories of their lives.

According to the National Center for Education Statistics (2021), although the poverty rate for children has decreased over the last two decades, approximately 11.6 million school-aged children live in poverty. In the State of Texas, poverty is well documented because of the high percentage of students who are economically disadvantaged. The poverty rate of children under 18 years of age was 19%, three

percentage points higher than the national average poverty rate (National Center for Education Statistics, 2021). During the 2018-2019 school year, 61% of Texas students were identified as economically disadvantaged (Texas Education Agency, 2019a). Over a 10-year period, the percentage of students in Texas who were identified as economically disadvantaged increased by 22.5%. Students of color are even more at risk of being economically disadvantaged. According to the Texas Education Agency (2019a), 74% of African American students and 76% of Hispanic students were living in poverty during the 2018-2019 school year. Based on the 2019 Texas Academic Performance Report data for the state, 60.6% or 3,283,812 out of 5,416,400 enrolled students met the eligibility criteria for being economically disadvantaged. From the more than 3.2 million students identified as students living in poverty, only 71% of them scored at Approaches Grade Level standard on the 2019 State of Texas Assessments of Academic Readiness (STAAR) tests, seven percentage points lower than the state passing rate. Only 39% of students in poverty scored at the Meets Grade Level standard, compared to the state average of 50% (Texas Education Agency, 2019a). These statistics are concerning because poverty has been clearly established to have strong adverse effects on academic achievement (McKenzie, 2019; Scammacca et al., 2020). The poverty status of students has been clearly established to have negative effects on reading, mathematics, and science performance (Davenport & Slate, 2019; Hentges et al., 2019; Pearman, 2019; Singh, 2015).

The negative effects of poverty on mathematics achievement increases across grade levels from Grade 3 and has a long-term influence that can last until Grade 10 (Singh, 2015). With high percentages of students living in poverty and researchers (e.g.,

Conradi et al., 2016; McGown & Slate, 2017) having documented that students in poverty perform lower than their peers at a disproportionate rate, it is important to identify achievement gaps that may exist.

According to the Texas Education Agency (2019a), more than 61% of Texas public-school students were from low-income families. In the State of Texas with high percentages of African American and Hispanic students who live in poverty, 74% and 76%, respectively (Texas Education Agency, 2019a), it is important to understand the educational inequities that may be present. To measure mathematics achievement, the STAAR Mathematics test is administered annually beginning with students in Grade 3. The state agency regularly assesses and monitors the performance of historically underperforming groups, yet little progress has been made in closing the gaps in literacy and mathematics present in most Texas schools (e.g., Alford-Stephens, 2016; Davenport & Slate, 2019; Harris, 2018; McGown, 2016) and across the nation for that matter. Students with the highest needs, such as special education students, Emergent Bilinguals, ethnic/racial minorities, and students in poverty, continue to be denied free and adequate public education in line with their peers (Ravitch, 2013).

In a recent Texas analysis, Davenport and Slate (2019) analyzed the degree to which differences were present in the performance of Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) on the Texas state-mandated mathematics assessment. Three mathematics measures were compared: Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Grade 3 students who were Not Poor (i.e., not economically disadvantaged) had the highest passing rates on all three Grade Level standards. Grade 3 students in the Moderately Poor

group (i.e., qualified for the reduced-price lunch program) had the second highest passing rates on all three Grade Level standards. Of note is Grade 3 students in the Extremely Poor group (i.e., qualified for the free lunch program) had the lowest passing rates of the three groups of students on the three Grade Level standards. As such, a clear stair-step effect (Carpenter et al. 2006) was present at each Grade Level standard. The highest passing rates were consistently present for students who were not in poverty; the next best passing rates were present for students who were eligible for the reduced-price lunch program; and the lowest passing rates were present for students who were eligible for the free lunch program.

Similarly, Taylor and Slate (2022) documented the presence of statistically significant relationships between student poverty and low performance in mathematics. Poverty has detrimental effects on student achievement in mathematics (Davenport & Slate, 2019; Taylor & Slate, 2022). Taylor and Slate (2022) examined 2015-2016 data on the State of Texas Assessment of Academic Readiness (STAAR) Mathematics test to determine the effect of poverty for boys and girls in special education. Three STAAR Mathematics Phase-In Standards were analyzed. Economic status consisted of two categories: (a) students who qualified for the Federal Free Lunch Program (i.e., Poor students) and (b) students who did not qualify for the Federal Free Lunch Program (i.e., Not Poor students) (Taylor & Slate, 2022). For all three STAAR Mathematics Phase-In Standards, students in special education who were in the Poor group had statistically significantly lower passing rates than their peers in special education who were in the Not Poor group. For girls, an average of 16.73% fewer girls in the Poor group met the state-mandated performance level in mathematics than girls in the Not Poor group.

With respect to the effects of poverty on mathematics performance in Texas, Anderson (2016) analyzed statewide data for four school years (i.e., 2011-2012, 2012-2013, 2013-2014, 2014-2015) from the Texas state-mandated mathematics assessment. Data from Grade 5 and Grade 8 were examined to ascertain if differences were present as a function of their economic status (i.e., economically disadvantaged and not economically disadvantaged). Anderson (2016) established the presence of statistically significant differences for all school years for Grade 5 and Grade 8 students by their economic status. For all four school years, Grade 5 students who were economically disadvantaged were outperformed by Grade 5 students who were not economically disadvantaged (Anderson, 2016). The average differences in scores ranged from 5.88 to 6.69 points. Grade 8 students who were economically disadvantaged also were outperformed by Grade 8 students who were not economically disadvantaged for all four school years. For Grade 8, the average differences in scores ranged from 5.74 to 7.15 points (Anderson, 2016).

Economic status is relevant because students in poverty enter school with low academic skills compared to their peers who are not poor (Portia et al., 2019). Tran et al. (2017) documented that children from economically disadvantaged backgrounds were likely not to grow at the same pace as their peers who were not in poverty. These discrepancies translated into long-term effects on educational achievement and income in adulthood. Lee et al. (2016) explained that students who were from low-income families had a high chance of struggling in mathematics that affected their long-term well-being. Poverty has a detrimental effect on children's ability to gain skills and contribute to society (National Center for Children in Poverty, 2019). Children who experienced

economic inadequacies usually resided in neighborhoods and attended schools with limited resources required for high academic performance (Taylor & Slate, 2022). Children growing up in poverty often faced undefeatable conditions that over time, hindered academic performance (Taylor & Slate, 2022).

After an extensive and intensive review of the existing literature, no published research articles could be located in which Algebra I End-of-Course exam data from the STAAR Mathematics assessment had been analyzed determine the extent to which economic status is related African American girls' performance in mathematics. With respect to this article, Algebra I End-of-Course exam data from the STAAR Mathematics assessment was examined with respect to the degree economic status is linked to African American girls' performance in mathematics.

Review of the Literature on Economic Gaps in Mathematics Achievement for African American Boys

Federal legislation mandates such as The Elementary and Secondary Education Act of 1965, The No Child Left Behind Act of 2001, and the Every Student Succeeds Act of 2015 have placed an emphasis on student performance, school progress, and closing the achievement gaps of students, including African American students and other student groups. However, many students do not meet the achievement standards outlined in the mandates. Specifically, the mathematics achievement for students living in poverty has been and remains problematic. Given the numerous research studies about the relationship between mathematics achievement and economic stability, it is imperative that educational leaders, education agencies, and policymakers generate and implement interventions to help students overcome mathematics achievement barriers. Previous

researchers (David & Marchant, 2015; Wang et al., 2013) have stated that students from low income families are at risk for many social and academic disadvantages.

According to the National Center for Children in Poverty (2018), 41% of children in the United States were in low income families in 2018. Being a member of a low-income family is more likely for African American and Hispanic children than it is for White and Asian children. In 2018, 61% of African American children were classified as poor and 59% of Hispanic children were classified as poor (National Center for Children in Poverty 2018). This percentage is considerably higher than the percentages of Asian and White children who were classified as poor, as both of these groups had only 28% of their children living in low income families (National Center for Children in Poverty, 2018). According to the National School Boards Association (2020), nearly 33% of African American students live in poverty, compared with 10% of White students. More than one-fourth, 27%, of African American students live in households where the highest level of education attained by either parent was a bachelor's or higher degree, compared with substantially higher percentages for Asian students, 69%, and for White students, 53%. Although decreases have been documented in the dropout rates for all demographic groups, the dropout rates for Hispanic and African American students remain higher than for White students. The Hispanic dropout rate decreased from 16.6% to 7.7%, whereas the White dropout rate decreased from 5.3% to 4.1% (national Center for Education Statistics, 2021). Specific to this article, nearly 8 out of 100 African American males dropped out of school according to the most recently published data by the National Center for Education Statistics (2021).

In poorer neighborhoods where a disproportionate number of Black teenagers live, Black students tend to have a lower percentage of graduation rates than White students (Lynch, 2017). In high poverty schools, they suffer from deficient supplies, materials and opportunities to learn, deteriorating physical facilities, which diminish student engagement and performance (Hudley, 2013). Pruitt et al. (2019) conducted a longitudinal study from 2009 to 2013 to examine the effects of economic inequality on the academic achievement of African American males. The study involved 23,000 African American males in 944 different high schools who were disproportionately poor and living below the poverty line. They ran a multilinear regression to predict academic achievement based on poverty level and race. These researchers concluded that African American males living in poor neighborhoods had few resources for learning which fostered low academic achievement. Consequently, African American males in poor families had lower academic achievement than White males. Additionally, African American males who lived in impoverished neighborhood environments attended deteriorating schools which affected their academic achievement. According to their findings, no relationship was present between the race of a student and their academic achievement, indicating that race alone is not a factor but when coupled with poverty, detrimental effects on academic achievement exist (Pruitt et al., 2019).

The findings of the aforementioned researchers were supported in similar studies. Rothstein (2013) documented that in low-income neighborhoods, the residents are of low socioeconomic status, and African American students in these neighborhoods have lower graduation rates compared to their White peers. He said that schools in these low income communities have few educational specialists and resources, such as advanced placement

classes, limited extracurricular opportunities, and dilapidated physical environments. Walsh and Theodorakakis (2017) discovered that income inequality has caused a growth in educational inequality. Growing poverty rates have led to the widening of the achievement between students of color and their peers because family income has an effect on the educational opportunities that are available to children. Children and teenagers in low-income families often have less access to educational opportunities, such as, educational programs both within and outside of school, which affect their academic achievement. The findings presented in the studies are especially relevant when considering postsecondary opportunities for life and beyond for African American boys, specifically in math related fields.

According to the National Center for Education Statistics (2019), only 36% of African American male students completed a bachelor's degree within six years. African American males who graduated high school were not prepared for the rigors of college coursework. Although many college outcomes are substantially influenced by successful Algebra II completion (Gaertner et al., 2013), many high-minority schools do not offer advanced mathematics courses. Consequently, African American students are not able to garner the academic skills necessary to enter and succeed in college (Bryant, 2015). Several researchers (e.g., Morgan & Amerikaner, 2018; Scott et al., 2016; The Education Trust, 2014) have documented that many Black families with lower income levels are served by under-funded and under-performing public schools. Lower funding levels for schools with the highest percentages of African American students typically results in diminished educational opportunities (Patrick et al., 2020; The Education Trust, 2014) which include lack of access to advanced high school coursework.

According to McGee (2013), the academic achievement of African American males is a complex and multilayered issue. The failure of Algebra I mathematics at the high school level often has led to a lower curriculum track assignment for the African American male student. According to Nomi and Allensworth (2013), in the current environment, schools are responsible for preparing all students for rigorous secondary course work and a competitive work environment. Poorly performing African American male students who are assigned to a lower curriculum track will not have access to rigorous instruction or the collaborative instructional teaming activities openly visible in the college setting. Without access to college, the ability to enter lucrative career fields becomes illusive thereby disqualifying the African American male high school students from a higher education and a multitude of quality of life opportunities that would be beneficial to African American males entering adulthood.

Paschall et al. (2018) contended that the intersectionality of multiple student demographics (e.g., economic status, gender, or ethnicity/race) should be addressed when performing analyses on educational equity. The intersection of poverty and ethnicity/race are factors that should be considered when it comes to student academic needs. Though most researchers (e.g., Harris, 2018; McGown, 2016) have focused on the effects of these student demographic characteristics separately, Paschall et al. (2018) analyzed the mathematics and reading achievement of students based on interactions between poverty and ethnicity/race. Their data was indicative of substantial gaps in achievement scores by the economic status of students of color.

An investigation was conducted by Harris (2018) to examine the early indicators of Algebra I failure among African American males in an urban school during the 2016-

2017 school year. The total school enrollment consisted of 1,264 students. Of the total sampled students, 365 were assigned to the 9th grade, and 141 students were identified as Black males between the ages of 14-16 years of age. According to Harris (2018), 32 of the 141 African American male students failed the first semester of 9th grade Algebra I and received a final grade of 59% or below which equates to course failure represented by a single letter grade of F. He used pertinent data during his analysis that consisted of a review of Grade 8 math final grades, Grade 8 math performance on standardized test for those participants with data available, test scores from the high school entrance exam, observation notes, and 2015-2016 school year first semester Algebra I final grades. Harris (2018) suggested in his recommendations that future researchers include a qualitative approach whereby a conversation with urban African American males about their likes and dislikes concerning mathematics from Grade 4 through Grade 9Algebra I would be invaluable to the development of mathematical pedagogy designed to improve urban African American male mathematical outcomes.

In a nationwide study, Kuhfeld et al. (2018) examined the reading and mathematics achievement of students based on their race/ethnicity and poverty status. They established that White students in poverty outperformed both African American and Hispanic students who were in poverty in reading and mathematics. The gaps between these groups of students widened from school entry to age 15. Kuhfeld et al. (2018) also documented that White students in poverty performed similarly to African American students and Hispanic students who were not economically disadvantaged. Their findings were consistent with other researchers (e.g., Fryer & Levitt, 2006; Lee & Burkham, 2002; McDonough, 2015) that students of color enter school with academic gaps that persist or

grow as children progress through school. Also, Kuhfeld et al. (2018) contended that poverty plays a role in delineating racial/ethnic gaps but does not sufficiently explain the gaps by itself.

Texas was one of the states with the highest dropout rates for high school students. From 2013 to 2017, the state dropout rate was 7.1% (National Center for Education Statistics, 2020c). Of that percentage, African American males dropped out at a higher rate of 8.8% when compared to African American girls at 4.3% % (National Center for Education Statistics, 2021). With respect to household income, 11.1% of students from low-income homes dropped out of high school in Texas. With respect to the possible effects of poverty on mathematics performance, Davenport and Slate (2019) analyzed the degree to which differences were present in the Texas state-mandated Mathematics assessment performance of Texas Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) and by comparing three mathematics measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Grade 3 students who were Not Poor (i.e., not economically disadvantaged) had the highest percentages of students who met the Grade Level standards. Grade 3 students in the Moderately Poor group (i.e., qualified for the reduced-price lunch program) had the second highest percentages of students who met the Grade Level standards. Noteworthy, Grade 3 students in the Extremely Poor group (i.e., qualified for the free lunch program) had the lowest percentages of students who met the Grade Level standards. As such, a clear stair-step effect (Carpenter et al., 2006) was present at each Grade Level standard, with respect to economic status. The highest passing rates were consistently present for students who were not in poverty; the next

best passing rates were present for students who were eligible for the reduced-price lunch program; and the lowest passing rates were present for students who were eligible for the free lunch program.

In the aforementioned study, the focus was on students in lower grades. In a recent Texas statewide analysis, Alford-Stephens (2016) examined data on the Texas state-mandated mathematics assessment at the high school level to ascertain the extent to which differences were presented in the mathematics skills of African American boys in Texas high schools by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). In her study, statistically significant differences were established in the 10 mathematics skills tested from the 2004-2005 through the 2011-2012 school years. For the 2004-2005 through the 2006-2007 school years, African American boys who were Extremely Poor (i.e., qualified for the free lunch program) performed more poorly than African American boys who were Moderately Poor (i.e., qualified for the reduced-price lunch program) and more poorly than African American boys who were Not Poor (i.e., not economically disadvantaged) in all 10 mathematics skills (Alford-Stephens, 2016). In Alford-Stephens' (2016) study, a clear stair-step effect (Carpenter et al., 2006) was present at each Grade Level standard, with respect to economic status. The highest passing rates were consistently present for students who were not in poverty; the next best passing rates were present for students who were eligible for the reduced-price lunch program; and the lowest passing rates were present for students who were eligible for the free lunch program.

After an extensive and intensive review of the existing literature, no published research articles could be located in which Algebra I End-of-Course exam data from the

STAAR Mathematics assessment had been analyzed determine the extent to which economic status is related African American boys' performance in mathematics. With respect to this article, Algebra I End-of-Course exam data from the STAAR Mathematics assessment was analyzed to determine the extent to which economic status is related to the mathematics performance of African American boys.

Literature Review Search Procedures

For this journal-ready dissertation, the literature concerning Algebra I End-of-Course exam Grade Level Performance of African American students by gender and economic status was examined. The EBSCOHost electronic database was used to review academic peer-reviewed articles that were published between 2000-2022. The Google Scholar electronic database was also used to review academic peer-reviewed articles that were published between 2000-2022. The literature search was limited to articles in English. The following keywords were used in the search for relevant literature: *Algebra I End of Course State of Texas Assessments of Academic Readiness performance, State of Texas Assessments of Academic Readiness End-Of-Course Exams, African American, African American boys, African American girls, and economic status*.

Statement of the Problem

Embedded racial inequities produce unequal opportunities for educational success. According to Pitre (2014), issues related to racial disparities and inequitable educational practices must be shared and discussed because the academic and life trajectories of African American students can be substantially influenced by unimproved educational practices. Specific to mathematics, the concepts taught and learned in the classroom play a significant role in the development of human logic and thought. The

effect of racial inequalities on the academic performance of African American students in mathematics is of specific interest. An in-depth analysis of African American student performance on the Algebra I End-of-Course state exam was conducted to determine whether these racial inequalities also cause gender parity in mathematics achievement among African American students.

High school students in Texas are required to take and pass, a total of five high stakes standardized tests to meet their graduation requirements. According to the Texas Education Agency (2019b), Algebra I is one of the three examinations required in Grade 9. The Texas Education Agency in 2012 unveiled its current high stakes standardized test to replace the Texas Assessment of Knowledge and Skills. The State of Texas Assessment of Academic Readiness consists of a series of tests that public school students in Texas begin taking in Grade 3 and continue throughout high school. In both elementary and middle school, students are assessed in the subjects of reading, mathematics, science, social studies, and writing. While enrolled in high school, tests become more content specific, and students are required to pass the five end-of-course exams to meet their graduation requirements. Focused upon in this journal-ready dissertation, Algebra I performance was measured on the End-of-Course exams. Present was a focus on whether African American boys differ from African American girls in their academic performance at the meets or above performance standard in the State of Texas and the degree to which differences were present in overall mathematics achievement as a function of economic status for Texas African American girls and boys.

Purpose of the Study

The purpose of this journal-ready dissertation was to determine the extent to which African American boys and girls might differ in their performance on the Texas state-mandated Algebra I End-of-Course exam. Specifically, the degree to which differences might exist between African American boys and girls on the Approaches Grade Level, Meets Grade Level, and Masters Grade Level standards. Performance on the Algebra I End-of-Course exam was analyzed for the 2016-2017, 2017-2018, and 2018-2019 school years. African American student performance on the Algebra End-of-Course exam by gender was investigated in the first study, performance on the Algebra End-of-Course exam of African American girls as a function of their economic status was investigated in the second study, and performance on the Algebra End-of-Course exam of African American boys as a function of their economic status was investigated in the third study.

Significance of the Study

Young et al. (2018) established that African American girls consistently outperform African American boys in mathematics; however, these differences are small and lack statistical significance. The difficulty arises when attempting to detect these differences and how to address them instructionally. Historically, the mathematics gender gap has favored White male students. These differences are more prevalent and noticeable in advanced courses where White males are considered better at mathematics and White and Asian students are more likely to be in advanced mathematics courses in ninth grade than African American students (FitzPatrick, 2020). Based on more recent findings, researchers (e.g., Cheryan, 2012; Kane & Mertz, 2012) have indicated that

gender parity in mathematics achievement is forthcoming. Based on the conflicting results provided by gender and racial comparative studies, a close examination of the mathematics performance of African American girl and boys is instructionally and empirically important. According to Jackson and Wilson (2012), urban youth are more likely to struggle with algebra on measures of academic success, which substantially decreases the likelihood that they will have successful future careers typically linked with algebraic proficiency. Findings from this journal-ready dissertation will add to the existing research literature available on the differences in Algebra I End-of-Course exam Grade Level performance of African American boys and girls and their different success levels, which consequently, may predict long-term life trajectories for these students.

Definition of Terms

In this journal-ready dissertation, key terms for the three research investigations are provided for the reader below.

Algebra I End-of-Course Exam

The Algebra I End-of-Course exam measures students' academic performance in five Reporting Categories. Reporting Category 1 measures number and algebraic methods. Reporting Category 2 measures describing and graphing linear functions, equations, and inequalities. Reporting Category 3 measures writing and solving linear functions, equations, and inequalities. Reporting Category 4 measures quadratic functions and equations. Reporting Category 5 measures exponential functions and equations (Texas Education Agency, 2014).

Approaches Grade Level Category

In the Approaches Grade Level Category, students are likely to succeed in the next grade or course with targeted academic intervention practices to improve academic progress and performance (Texas Education Agency, 2017). Students in the Approaches Grade Level Category generally demonstrate the ability to apply assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017).

Economically Disadvantaged

The Texas Education Agency (2015) has defined economically disadvantaged as "a student who is eligible for free or reduced-priced meals under the national School Lunch and Child Nutrition Program" (para. 5). Other Economic Disadvantage includes: (a) from a family with an annual income at or below the official federal poverty line, (b) eligible for Temporary Assistance to Needy Families (TANF) or other public assistance, (c) received a Pell Grant or comparable state program of need-based financial assistance, (d) eligible for programs assisted under Title II of the Job Training Partnership Act (JTPA), or (e) eligible for benefits under the Food Stamp Act of 1977 (Texas Education Agency, 2022).

Poverty groups were defined by the following criteria: (a) Not Poor (i.e., students who did not qualify for either free or reduced-priced meals) and (b) Poor (i.e., students who qualified for reduced-priced meals or students who qualified for free meals). The 2022 poverty guidelines indicate an annual income of $13,359 for one person in a household, $18,310 for two people in a household, $23,030 for three people in a household, $27,750 for four people in a household, $32,470 for five people in a household, $37,190 for six people in a household, $41, 910 for seven people in a

household, and $46,630 for eight people in a household. For families/households with more than 8 persons, add $4,720 for each additional person (U.S. Department of Health and Human Services, 2022).

Ethnicity/Race

Ethnicity refers to two categories: ‘‘Hispanic or Latino’’ and ‘‘Not Hispanic or Latino’’ as defined by the Office of Management and Budget (1997), and the United States Census Bureau adheres to the definition standards when collecting ethnicity data. Race is defined by the United States Census Bureau as “a person’s self-identification with one or more social groups” (United States Census Bureau, 2022).

Masters Grade Level Category

In the Masters Grade Level Category, students are expected to succeed in the next grade or course with little to no academic intervention (Texas Education Agency, 2017). Students in the Masters Grade Level Category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar (Texas Education Agency, 2017).

Meets Grade Level Category

In the Meets Grade Level Category, students have a high probability of academic success in the next grade or course but may still need some type of targeted intervention (Texas Education Agency, 2017). Students in the Meets Grade Level Category generally demonstrate the ability to think critically and apply assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017).

Public Education Information Management System

The Public Education Information Management System is a centralized digital collection of data obtained and authorized as mandated by the Texas Education Code. Every year, the Texas Education Agency establishes data standards that cover a wide range of variables including personal, economic, and organizational information, student academic and demographic performance (Public Education Information Management System Data Standards, 2018).

STAAR End-of-Course Exams

Students in Texas are required to take the STAAR End-of-Course exams as part of their graduation requirements. Student academic performance in Algebra I, Biology, English I, English II, and U.S. History (Texas Education Agency, 2018a) is assessed by these exams.

State of Texas Assessment of Academic Readiness (STAAR)

The State of Texas Assessments of Academic Readiness (STAAR) assessment was introduced to Texas public-school districts in 2012. The STAAR assessment is a standardized assessment that monitors students' academic achievement on the Texas Essential Knowledge and Skill curriculum standards. Students who are in high school and who are enrolled in Algebra I, English I and II, United States History, and Biology courses are required to take the STAAR exams. (Texas Education Agency, 2018a).

Texas Education Agency

The Commissioner of Education leads the Texas Education Agency for the state of Texas. The Commissioner operates in partnership with the State Board of Education. The Texas Education Agency also collaborates with 20 Regional Education Service

Centers to lead and assist Texas ' public primary and secondary schools and districts (Texas Education Agency, 2018b, para. 1, 6, & 8). The Texas Education Agency manages 1,200 districts and billions of dollars in public schools through its mandate to provide services, leadership, and support to help fulfill the educational needs of children who reside in the State of Texas (Texas Education Agency, 2018b, para 1 & 3).

Delimitations

The first delimitation of this journal-ready dissertation was that only three school years of End-of-Course exam data (i.e., 2016-2017, 2017-2018, 2018-2019) was analyzed, which limits the extent to which results might be generalizable. The second delimitation was a sole focus on only one of the five End-of-Course exams offered in Texas (i.e., Algebra). The third and final delimitation was that data was analyzed on only African American students in Texas and not on other ethnic/racial groups of students (e.g., Hispanic, White) identified in the Public Education Information Management System.

Limitations

For this journal-ready dissertation, a limitation present was that only quantitative data was utilized to measure African American students' academic performance. Additionally, archival data was used for this causal-comparative study; therefore, no conclusive determination of cause and effect relationships could be made. In 2020, the spring STAAR tests were canceled due to the pandemic, and in the 2021 school year, the Commissioner of Education gave families the option to send their child to school to test if families had no health or safety concerns. This allowance from the Commissioner

resulted in reduced participation compared to typical years; therefore, data was not obtained for the pandemic years.

Assumptions

For this journal-ready dissertation, the major assumption is that school campus and district personnel accurately reported the Algebra I End-of-Course exam data, African American indicator, and gender to the Texas Education Agency Public Education Information Management System. Any inaccurate information could have negative effects on results.

Procedures

This journal-ready dissertation was submitted to the dissertation committee for review and approval. Following approval from the dissertation committee, an application was submitted to the Sam Houston State University Institutional Review Board. Once approval was received from the Institutional Review Board, the Algebra I End-of-Course exam performance data was analyzed. Specifically, Texas statewide data on African American boys and girls for the 2016-2017, 2017-2018, and 2018-2019 school years were examined.

Organization of the Study

This journal-ready dissertation consists of three research studies. In the first article, the degree to which differences were present in the Algebra I End-of-Course exam performance between Texas African American boys and girls for the 2016-2017, 2017-2018, and 2018-2019 school years was addressed. In the second article, the extent to which differences existed in the Algebra I End-of-Course exam performance of African American girls as a function of their economic status for the same three school

years was examined. In the last article, the extent to which differences existed in the Algebra I End-of-Course exam performance of African American boys as a function of their economic status for the same three school years was examined.

The journal-ready dissertation entails five chapters. Chapter I includes the background of the study, the statement of the problem, the purpose of the study, the significance of the study, definitions of terms, delimitations, limitations, and assumptions of the three research studies. In Chapter II, research questions about Algebra I End-of-Course Exam performance for African American boys and girls across three school years were addressed. In the second article, the Texas state-mandated Algebra I End-of-Course Exam performance of African American girls were examined for three school years. In the third article, the Algebra I End-of-Course Exam performance of African American boys were analyzed for three school years. The results of all three studies were discussed in Chapter V.

CHAPTER II

DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN STUDENTS BY GENDER: A MULTIYEAR, STATEWIDE INVESTIGATION

This dissertation follows the style and format of *Research in the Schools (RITS)*.

Abstract

The extent to which differences were present between African American boys and girls in their performance on the Texas state-mandated Algebra I End-of-Course exam was examined for the 2016-2017, 2017-2018, and 2018-2019 school years. Inferential statistical analyses of Texas statewide data revealed that statistically significantly higher percentages of African American girls met the three Grade Level standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) than African American boys in all three school years. Results add to the existing research literature, with respect to gender differences in Algebra I. Implications and recommendations for future research were discussed.

KEYWORDS: STAAR End-of-Course Exams; Algebra I End-of-Course exam; Approaches Grade Level Standard; Meets Grade Level Standard; Masters Grade Level Standard

DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN STUDENTS BY GENDER: A MULTIYEAR, STATEWIDE INVESTIGATION

Education is a way of imparting knowledge and skills, promotes innovative thinking and creativity, and is a tool to achieve success. According to Long et al. (2012), students who take advanced courses in high school should experience higher performance in as indicated by grades, achievement scores, and graduation rates; college entrance, performance, and completion rates; and success in the labor market. Unlike other disciplines, literacy in mathematics is a key predictor of postsecondary success. Jeongeun et al. (2015) stated that a thoroughly developed understanding of algebra is needed to have access to advanced educational and career opportunities. Domina (2014) analyzed the selection process into advanced middle school mathematics courses and estimated the effects of advanced courses on students' mathematics. He documented advanced middle school mathematics courses improved student achievement. Evidence was provided to support the need to emphasize the importance of mathematics curricula in middle and high schools (Domina, 2014).

Proficiency in algebra is a gatekeeper to success in advanced mathematics courses, high school graduation, college admission and completion, and obtaining employment in STEM careers (Hughes et al., 2014). Researchers (e.g., Domina, 2014; Rickles, 2013) have established that taking algebra in eighth grade was associated with higher mathematics achievement when the students were prepared to take algebra earlier. According to a publication from the National Academies of Science, Engineering, and Medicine (2022), many African American students do not take advanced math in middle

school. Sparks (2020) in a recent article called out that “separate algebra is unequal algebra” even when algebra is offered to students in higher-poverty middle schools (p.7). In other words, algebra in higher-poverty middle schools is often not taught in the same depth as at more affluent schools.

According to the U.S. Department of Education Office for Civil Rights (2018), African American students represent 17% of students enrolled in Grade 8, but only 11% were enrolled in Algebra I. Students who cannot pass a lower-level course such as Algebra I many times cannot access to more advanced mathematics coursework which leads to a lack of postsecondary readiness. Many students have to repeat Algebra because they are not exposed to many algebraic thinking and problem-solving skills while in elementary and middle school (Sawchuk, 2018). These skills are critical to success later on in Algebra I. According to Flores (2007) and Davis (2014), African American students have fewer opportunities to take high-level mathematics courses because of their limited mathematics achievement. Flores (2007) further noted that enrollment in Grade 8 mathematics courses greatly influenced the opportunity to take advanced mathematics courses before graduating from high school. These notions are important due to the effect of the pandemic on mathematics achievement.

According to the National Center for Education Statistics (2022), a 13-point score decrease occurred among African American students compared to a 5-point decrease for White students, resulting in a widening of the White-African American score gap from 25 points in 2020 to 33 points in 2022 in mathematics. The access of African American students to advanced mathematics courses may be affected due to the decline, which is another area of concern. Hypotheses have been made regarding the factors that contribute

to the achievement gap. White students take, on average, advanced academic courses at a higher rate than Black students (Corra et al., 2011; Rodriguez & McGuire, 2019). White students also take advanced academic courses at a higher rate than Hispanic students (Sawchuk, 2018). Enrollment in advanced academic courses is one example of the gap in opportunities that students of color face (Carter & Welner, 2013; Darling-Hammond, 2018). Because White students are exposed to more rigorous curriculum than are Black and Hispanic students, they perform better on standardized examinations. These gaps in mathematics performance are present even before students reach their Algebra I course in high school.

Federal education legislation such as The Elementary and Secondary Education Act of 1965, The No Child Left Behind Act of 2001, and most recently, the Every Student Succeeds Act of 2015 have placed a clear focus on student academic achievement and accountability for all students. Consequently, educational leaders have placed a clear emphasis on reducing academic disparities between student groups enrolled in public schools (Fraga & Slate, 2020). One of the major student groups who have evident disparities are African Americans. According to the National Center for Education Statistics (2020a), the percentage of African American students enrolled in public schools across the United States in the fall of 2017 was 15%, or about 7.6 million African Americans. That percentage was in comparison to the fall of 2000 where 17% of public-school enrollment, or 8 million students were African American across the United States (National Center for Education Statistics, 2020a). Only 8% of African American students in Grade 12 performed at or above the National Assessment of Educational Progress proficiency level on the mathematics assessment. According to the National

Center for Education Statistics (2020b) among racial/ethnic groups, the average mathematics score at Grade 12 for White students was 31 points higher than the average score at Grade 12 for their African American peers in 2019. The 31-point White to African American score gap in 2019 was not substantially different from the 30-point score gap in 2015, the previous assessment year, nor from the 31-point score gap in 2005. The roots of the achievement gap trace back to the post-Civil War Era, with educational disparities exacerbated by Jim Crow Laws (Spires, 2015). The notion of separate but equal educational facilities for White students and non-White students were certainly part of the problem. Neither past Supreme Court cases (e.g., *Brown v. Board of Education of Topeka, 1954*), nor past presidential intercessions (e.g., President Eisenhower sending federal troops to Central High School in Little Rock, Arkansas in 1957) were able to mitigate the crisis that has been and continues to be manifested. Specifically, the mathematics achievement for African American students has been and remains problematic.

With respect to the state of interest for this article, Texas, the Texas Education Agency reported data from the 2017-2018 school year that 12.6%, or 680,359 PreK-12 students, were African Americans in Texas (Texas Education Agency, 2018). In the 2017-2018 school year, more than half of all students, 51.3%, were male. These enrollment numbers by gender were not reported separately by student ethnicity/race. The Texas Education Agency (2018) documented that 74.6% of African American students were economically disadvantaged, which was an increase from the previous year. These percentages of African American students pose a challenge in determining specific achievement data for African American boys and African American girls based on their

gender and economic status. Information is available for the African American group overall, but little comparative data is present for students in that particular group. African American students in Texas have not performed as well as their peers on state-mandated mathematics assessments, including the Algebra I End-of-Course exam. This course and course exam are important in that they constitute a gateway high school graduation requirement.

In 2003, Texas implemented the Texas Assessment of Knowledge and Skills as the state mandated assessment. This assessment allowed Texas to demonstrate compliance with the No Child Left Behind Act while increasing the expectations for students' academic performance. The Texas Assessment of Knowledge and Skills exams were designed to measure students' knowledge and mastery of skills across multiple core content areas (e.g., Reading, Mathematics, Science, and Social Studies). However, as evidenced by test scores in Texas, many children were not meeting the achievement standards. Alford-Stephens (2016) examined the degree to which differences were present in mathematics achievement in the Texas Assessment of Knowledge and Skills Mathematics Exit-Level exam for the 2004-2005 through the 2011-2012 school years as a function of student ethnicity/race (i.e., Asian, White, Hispanic, and African American). Asian boys had the best mathematics performance over this 8-year time period, followed by White boys, then Hispanic boys, and last African American boys. Statistically significantly lower mathematics performance was established for Hispanic and African American boys in comparison to Asian and White boys. African American boys had the poorest performance on all of the 10 mathematics objectives in each year of the 8-year time span.

The Alford-Stephens (2016) investigation is very relevant to this article because the state-mandated assessment that she analyzed is aligned to the Algebra I End-of-Course exam, as they are both state exit graduation requirements for mathematics. With respect to this study, the degree to which differences might be present in mathematics between African American boys and African American girls was investigated. As it pertains to the STAAR Algebra I End-of-Course exam, the Texas Education Agency (2019b) reported that 76% of African American students performed at the Approaches Grade Level Standard; 47% of African American students performed at the Meets Grade Level Standard; and 25% of African American students performed at the Masters Grade Level Standard. These results were in comparison to the 84% of all students who performed at the Approaches Grade Level Standard; 62% of all students who performed at the Meets Grade Level Standard; and 39% of all students who performed at the Masters Grade Level Standard. Apparent in this set of statistics are the gaps in the mathematics performance of African American students in Texas.

Though gender gaps have narrowed in recent decades, women remain underrepresented in many mathematics fields (Leaper et al., 2012). Girls tend to do as well as boys in mathematics during their adolescence. Comparative to these studies, Reilly et al. (2019) documented that boys and girls had similar mathematics performance. According to Reilly et al. (2019), gender differences in mathematics have been reported throughout the years, but no major evidence has been documented of the presence of large gaps. In fact, most of the gaps are considered trivial because they are so small. Voyer and Voyer (2014) established that girls consistently receive higher school grades for all course content areas than boys. In contrast, in meta-analyses of performance on

standardized tests, girls have not outperformed boys on standardized assessments, SAT, ACT, and AP exams.

With respect to gender and Algebra I End-of-Course exams, the Texas Education Agency (2019b) reported that 80% of boys performed at the Approaches Grade Level Standard on the Algebra I End-of-Course exam; 56% of boys performed at the Meets Grade Level Standard; and 35% of boys performed at the Masters Grade Level Standard. These results were in comparison to the 88% of girls who performed at the Approaches Grade Level Standard; 67% of girls who performed at the Meets Grade Level Standard; and 44% of girls who performed at the Masters Grade Level Standard. On all three mathematics measures, higher percentages of girls met the standards than did boys. After an extensive and intensive review of the extant literature, no published research articles could be located in which Algebra I exam data had been analyzed with respect to the performance of African American boys when compared to African American girls.

Statement of the Problem

Although information related to mathematics achievement and participation are accessible, limited data associated with the simultaneous intersections of race and gender as it pertains to mathematics achievement are available. Basic mathematics achievement data for African American girls is often unavailable by standard reporting procedures or the data on race and gender are usually released or separately analyzed in mathematics (Gholson, 2016). According to Thompson and Lewis (2005), limited attention has been placed on the success of African American boys in mathematics although an overwhelming amount of literature exists related to their academic achievement, schooling experiences, and life conditions. Although student mastery of Algebra I

concepts is considered a predictor of career and college readiness, students enrolled in Grade 8 algebra in predominantly minority schools will receive less algebra and other advanced mathematics content than their peers in low minority schools (Morton & Riegle-Crumb, 2020). Without sufficient access to mathematics data for African American girls and boys, decisions about educational practices, instructional strategies, and interventions to improve student outcomes will not be well-informed.

Purpose of the Study

The purpose of this study was to determine the degree to which differences were present in overall mathematics achievement by gender for Texas African American students. Specifically addressed was performance in mathematics at the Approaches Grade Level, Meets Grade Level, and Masters Grade level standards to ascertain whether gender gaps were present. Three years of the State of Texas Assessments of Academic Readiness (STAAR) Algebra I End-of-Course assessment data was analyzed to determine the degree to which differences existed inl mathematics achievement between African American girls and boys. Furthermore, after analyzing three years of school statewide data, the extent to which trends were present in overall mathematics achievement was determined.

Significance of the Study

As of the time of this study, few researchers have examined the degree to which differences were present between African American boys and African American girls on the Texas state-mandated Algebra I End-of-Course exam. Additionally, little published literature could be located in which Texas exam data has been analyzed with respect to the performance of African American boys and girls on the Algebra I End-of-Course

assessment in Texas. Much of the literature about the achievement gap of African American students in the State of Texas is focused on comparative data with other ethnic/racial groups of students in mathematics. Researchers can use findings from this multiyear analysis to add to the existing literature.

Research Questions

The following overarching research question was addressed in this study: What is the difference between African American girls' and boys' performance on the Algebra I End-of-Course exam? Specific sub-questions under this overarching research question was: (a) What is the difference in the Algebra I End-of-Course Approaches Grade Level performance between African American girls and boys?; (b) What is the difference in the Algebra I End-of-Course Meets Grade Level performance between African American girls and boys?; (c) What is the difference in the Algebra I End-of-Course Masters Grade Level performance between African American girls and boys?; and (d) To what extent were trends present in the three Grade Level standards across the three school years of data? The first three research questions were addressed separately for the 2016-2017, 2017-2018, and 2018-2019 school years, whereas the fourth research question involved all three school years so that trends could be identified.

Method

Research Design

For this multi-year investigation, a causal-comparative research design was present (Johnson & Christensen, 2020). Archival data, which are sometimes referred to as secondary data, was analyzed. Participants in this study were African American girls and African American boys who had taken the Algebra I End-of-Course exam. The

dependent variables of student mathematics performance have previously occurred. In this study, archival data was acquired from the Texas Education Agency Public Education Information Management System and was analyzed to determine the degree to which differences were present in mathematics performance for Texas African American students. The dependent variables in this study were student performance levels on the STAAR Algebra I End-of-Course exam (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) for the 2016-2017 through the 2018-2019 school years for African American girls and boys. In 2020, the spring STAAR tests were canceled due to the pandemic, and in the 2021 school year, the Commissioner of Education gave families the option to send their child to school to test if families had no health or safety concerns. This allowance from the Commissioner resulted in reduced participation compared to typical years; therefore, data was not obtained for the pandemic years.

Participants and Instrumentation

Participants in this study were African American girls and African American boys who have taken the Algebra I End-of-Course exam. Three measures of mathematics were present on this exam: Approaches Grade Level, Meets, Grade Level, and Masters Grade Level. The achievement data for this study were obtained through a Public Information Request to the Texas Education Agency's Public Education Information Management System. Data was then imported into the Statistical Package for Social Sciences software program for analysis.

The Texas Education Agency (2017) suggested that performance in the Approaches Grade Level category indicates that students are likely to succeed in the next grade or course with targeted academic intervention. Students in this category generally

demonstrate the ability to apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). If students perform in the Meets Grade Level category, this performance indicates they have a high likelihood of success in the next grade or course but may still need some short-term, targeted academic intervention. Students in this category generally demonstrate the ability to think critically and apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). Student performance in the Masters Grade Level category indicates that students are expected to succeed in the next grade or course with little or no academic intervention. Students in this category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar (Texas Education Agency, 2017).

Results

To ascertain whether differences were present in STAAR Algebra I End-of-Course exam performance (i.e., Did Not Meet, Met) at the Approaches Grade Level, Meets Grade Level, and Masters Grade Level standards between African American boys and African American girls for the 2016-2017, 2017-2018, and 2018-2019 school years, Pearson chi-square analyses were conducted. This statistical procedure was viewed as the optimal statistical procedure to use because frequency data was present for STAAR Algebra I End-of-Course Grade Level standards and for gender. As such, chi-squares are the statistical procedure of choice when variables are categorical (Slate & Rojas-LeBouef, 2011). In addition, with the sample size, the available sample size per cell was more than five. Therefore, the assumptions for using Pearson chi-square procedures were met.

Approaches Grade Level Analyses Across All Three School Years

For the first research question on the Algebra I End-of-Course Approaches Grade Level standard for the 2016-2017 school year, the result was statistically significant, $\chi^2(1) = 1075.42$, $p < .001$. The effect size for this finding, Cramer's V, was small, .15 (Cohen, 1988). As revealed in Table 2.1, a statistically significantly higher percentage of African American girls, more than 15 percentage points, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American boys.

Insert Table 2.1 about here

With respect to the 2017-2018 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(1) = 1247.15$, $p < .001$, Cramer's V of .17, small effect size (Cohen, 1988). As delineated in Table 2.1, a statistically significantly higher percentage of African American girls, more than 16 percentage points higher, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American boys. Concerning the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(1) = 1374.83$, $p < .001$, small effect size, Cramer's V = .18 (Cohen, 1988). A statistically significantly higher percentage of African American girls, more than 17 percentage points higher, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American boys. Descriptive statistics for this analysis are contained in Table 2.1.

Meets Grade Level Analyses Across All Three School Years

Regarding the 2016-2017 school year for the STAAR Algebra I End-of-Course Meets Grade Level standard, a statistically significant result was yielded, $\chi^2(1) = 821.97$, $p < .001$, small effect size, Cramer's V = .13 (Cohen, 1988). A statistically significantly higher percentage of African American girls, more than 12 percentage points higher, met the STAAR Algebra I End-of-Course Meets Grade Level standard than did African American boys. Table 2.2 contains the descriptive statistics for this analysis.

Insert Table 2.2 about here

With respect to the 2017-2018 school year, the result was statistically significant, $\chi^2(1) = 1033.59$, $p < .001$, small effect size, Cramer's V = .15 (Cohen, 1988). As revealed in Table 2.2, a statistically significantly higher percentage of African American girls, more than 14 percentage points higher, met the STAAR Algebra I End-of-Course Meets Grade Level standard than did African American boys. Concerning the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(1) = 1343.98$, $p < .001$, small effect size, Cramer's V = .18 (Cohen, 1988). A statistically significantly higher percentage of African American girls, more than 17 percentage points higher, met the STAAR Algebra I End-of-Course exam Meets Grade Level standard than did African American boys. Descriptive statistics for this analysis are contained in Table 2.2.

Masters Grade Level Analyses Across All Three School Years

For the third research question on the STAAR Algebra I End-of-Course exam Masters Grade Level standard, the result was statistically significant, $\chi^2(1) = 410.47$, $p < .001$. The effect size for this finding, Cramer's V, was below small, .09 (Cohen, 1988). As presented in Table 2.3, a statistically significantly higher percentage of African American girls, 5 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American boys during the 2016-2017 school year.

Insert Table 2.3 about here

Concerning the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(1) = 587.57$, $p < .001$, small effect size, Cramer's V of .12 (Cohen, 1988). As revealed in Table 2.3, a statistically significantly higher percentage of African American girls, more than 7 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American boys. With respect to the 2018-2019 school year, a statistically significant difference was revealed, χ^2 (1) = 965.12, $p < .001$, small effect size, Cramer's V = .15 (Cohen, 1988). A statistically significantly higher percentage of African American girls, more than 11 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American boys. Delineated in Table 2.3 are the descriptive statistics for this analysis.

Algebra I End-of-Course Exam Performance Across All Three School Years

Concerning the Approaches Grade Level standard, African American girls outperformed African American boys in all three school years. The percentages of African American girls and African American boys who met the Approaches Grade Level standard consistently increased each school year. Regarding African American girls, 66.9% met the Approaches Grade Level standard in 2016-2017, 72% met the approaches Grade Level standard in 2017-2018, and 75.3% met the Approaches Grade Level standard in 2018-2019. In reference to African American boys, 51.8% met the Approaches Grade Level standard in 2016-2017, 55.6% met the Approaches Grade Level standard in 2017-2018, and 57.9% met the Approaches Grade Level standard in 2018-2019. The percentages of African American boys and African American girls who did not meet this Grade Level standard are depicted in Figure 2.1.

Insert Figure 2.1 about here

With respect to the Meets Grade Level standard, African American girls consistently outperformed African American boys in all three school years. Similar to the Approaches Grade Level standard, higher percentages of African American girls met this standard than African American boys in each school year. Despite the increase in performance each year, more than three-fourths of African American boys and almost two-thirds of African American girls did not meet the Meets Grade Level standard in the 2016-2017 school year; about three-fourths of African American boys and more than one-half of African American girls did not meet the Meets Grade Level standard in the

2017-2018 school year; and more than two-thirds of African American boys and slightly more than one-half of African American girls did not meet the Meets Grade Level standard in the 2018-2019 school year. Portrayed in Figure 2.2 are the percentages of African American boys and African American girls who did not meet this Grade Level standard.

Insert Figure 2.2 about here

In regard to the Masters Grade Level standard, African American girls outperformed African American boys in all three school years. In comparison to the other two Grade Level standards, lower percentages of African American boys and African American girls met the Masters Grade Level standard. In all three school years, 2016-2017, 2017-2018, and 2018-2019, more than 75% of African American boys and African American girls did not meet this standard. Depicted in Figure 2.3 are the percentages of African American boys and girls who did not met this Grade Level standard.

Insert Figure 2.3 about here

Discussion

In this Texas, statewide investigation, Algebra I End-of-Course exam performance was investigated by African American student gender. Three Grade Level standards were addressed: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Statistically significant differences were revealed between African

American boys and girls for all three Grade Level standards in all three school years. African American girls outperformed African American boys in all instances. The performance gaps between African American girls and African American boys increased each year.

An issue of concern based on the results was that 48.2% of African American boys and 33.1% of African American girls did not meet any Grade Level standard in the 2016-2017 school year. In regard to the 2017-2018 school year, 44.4% of African American boys and 28% of African American girls did not meet any Grade Level standard. For the last school year of data analyzed, 42.1% of African American boys and 24.7% of African American girls did not meet any Grade Level standard. Although the performance of African American girls and boys consistently improved, academic disparities between African American students and their peers are still prevalent.

Connections to Existing Literature

As evident in this multiyear statewide investigation, African American girls performed statistically significantly higher than African American boys in the three school years of data that were analyzed. These findings are consistent with Voyer and Voyer (2014) who established that girls consistently receive higher school grades for all course content areas than boys. Although Reilly et al. (2019) suggested that clear statistically significant differences between boys and girls have not been established, results contained in this study are congruent with Texas Education Agency (2019) data which showed that on all three mathematics measures, higher percentages of girls met the standards than did boys. Moreover, Paschall et al. (2018) contended that the intersectionality of multiple student demographics (e.g., economic status, gender, or

ethnicity/race) should be addressed when performing analyses on educational equity. Findings from this investigation add to the existing research literature that African American girls outperform African American boys, results that are consistent with the extant research literature.

Implications for Policy and Practice

Several implications for policy and for practice are present based on the findings of this multi-year investigation. Policymakers are encouraged to continue funding and advocating for African American students in the State of Texas as achievement gap numbers continue to consistently increase. Additionally, funds and resources should be allocated to communities who serve high populations of African American students, specifically African American students in poverty. These funds should be used to provide families with the necessary academic support to help students when they enter school.

Regarding instructional practices, teacher preparation programs must include curricula to help aspiring teachers understand the complexities of educating students from different economic backgrounds and advocate the use of culturally responsive teaching methods in mathematics. At the school level, district leadership should mandate professional development to help teachers stay abreast of best practices. Also, educators are encouraged to continue implementing new interventions geared toward African American students in the form of tutorials and general intervention groups. Lastly, a concerted effort should be made toward general awareness of the consistent gaps between African American and their peers.

Recommendations for Future Research

Based on the results of this investigation, several recommendations for future studies can be made. First, only data on African American boys and girls in the State of Texas were the focus of this investigation. As such, researchers are encouraged to extend this study to other states to determine whether these results discussed herein are generalizable to other states. Second, because only Algebra I End-of-Course test data was examined in this investigation, researchers are encouraged to analyze data in Biology, English I, English II, and U.S. History which students in Texas are required to take to fulfill graduation requirements. Third, African American boy and girls were the only student group whose data was analyzed. Hence, researchers should consider analyzing performance for other student groups such as students identified as being at-risk, students enrolled in special education, and students in poverty. Lastly, researchers should examine the extent to which results in this investigation would be generalizable based on demographic characteristics such as ethnicity/race (e.g., Hispanic, Asian, and White).

Conclusion

In this article, the extent to which differences were present between African American boys and girls in their performance on the Texas state-mandated Algebra I End-of-Course exam was addressed. Specifically examined was the extent to which African American boys and girls differed in their performance on three Grade Level performance measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level during the 2016-2017, 2017-2018, and 2018-2019 school years. Statistically significant differences were documented in the Algebra I End-of-Course exam performance of African American boys and girls. Statistically significantly higher

percentages of African American girls met the three Grade Level standards in all three school years than did African American boys. Of concern were the high percentages of African American girls and African American boys who did not meet any Grade Level standard.

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Table 2.1

Frequencies and Percentages of STAAR Algebra I End-of-Course Approaches Grade Level Performance Standard by African American Gender for All Three School Years

School Year and Gender	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Boys	(*n* = 12,339) 48.2%	(*n* = 13,262) 51.8%
Girls	(*n* = 6,798) 33.1%	(*n* = 13,760) 66.9%
2017-2018		
Boys	(*n* = 10,869) 44.4%	(*n* = 13,634) 55.6%
Girls	(*n* = 5,528) 28%	(*n* = 14,188) 72%
2018-2019		
Boys	(*n* = 9,609) 42.1%	(*n* = 13,218) 57.9%
Girls	(*n* = 4,560) 24.7%	(*n* = 13,919) 75.3%

Table 2.2

Frequencies and Percentages of STAAR Algebra I End-of-Course Meets Grade Level Performance Standard by African American Gender for All Three School Year

School Year and Gender	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Boys	(*n* = 19,939) 77.9%	(*n* = 5,662) 22.1%
Girls	(*n* = 13,548) 65.9%	(*n* = 7,010) 34.1%
2017-2018		
Boys	(*n* = 18,446) 75.3%	(*n* = 6,057) 24.7%
Girls	(*n* = 12,036) 61.0%	(*n* = 7,680) 39%
2018-2019		
Boys	(*n* = 15,932) 69.8%	(*n* = 6,895) 30.2%
Girls	(*n* = 9,642) 52.2%	(*n* = 8,837) 47.8%

Table 2.3

Frequencies and Percentages of STAAR Algebra I End-of-Course Masters Grade Level Performance Standard by African American Gender for All Three School Years

School Year and Gender	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Boys	(*n* = 23,840) 93.1%	(*n* = 1,761) 6.9%
Girls	(*n* = 18,009) 87.6%	(*n* = 2,549) 12.4%
2017-2018		
Boys	(*n* = 22,192) 90.6%	(*n* = 2,311) 9.4%
Girls	(*n* = 16,324) 82.8%	(*n* = 3,392) 17.2%
2018-2019		
Boys	(*n* = 19,891) 87.1%	(*n* = 2,936) 12.9%
Girls	(*n* = 13,912) 75.3%	(*n* = 4,567) 24.7%

Figure 2.1

Percentages of African American Students by Gender Who Did Not Meet the STAAR Algebra I End-of-Course Approaches Grade Level Performance Standard for All Three School Years

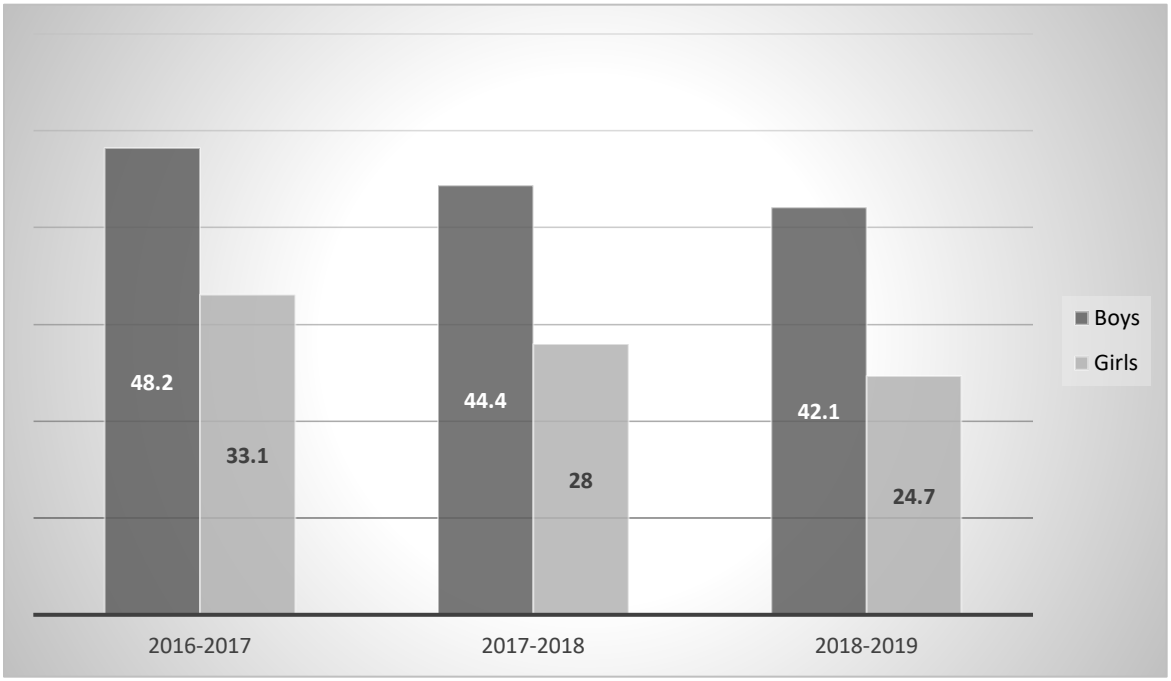


Figure 2.2

Percentages of African American Students by Gender Who Did Not Meet the STAAR Algebra I End-of-Course Meets Grade Level Performance Standard for All Three School Years

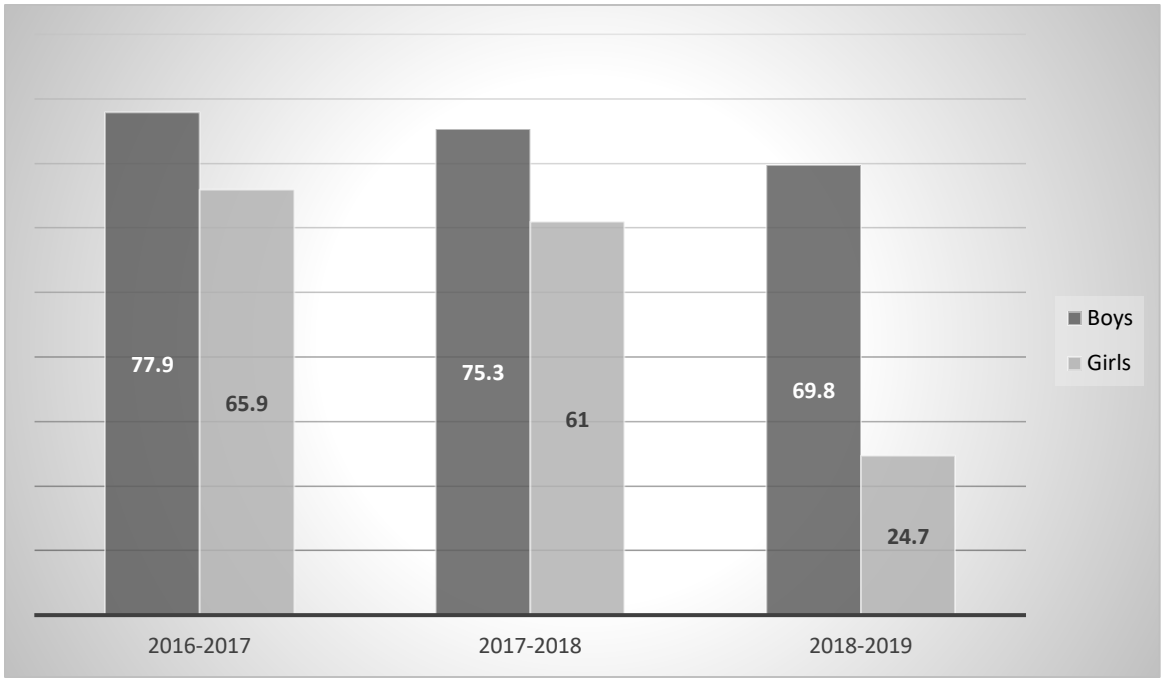
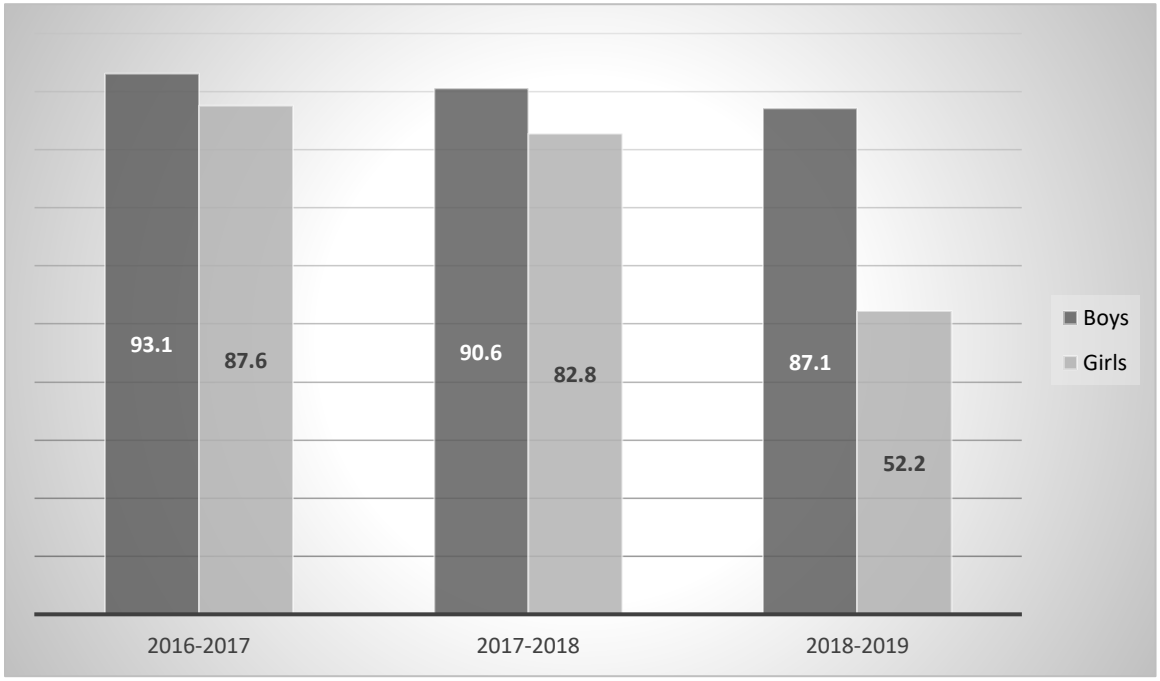


Figure 2.3

Percentages of African American Students by Gender Who Did Not Meet the STAAR Algebra I End-of-Course Masters Grade Level Performance Standard for All Three School Years



CHAPTER III

DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN GIRLS AS A FUNCTION OF ECONOMIC STATUS: A MULTIYEAR, STATEWIDE INVESTIGATION

This dissertation follows the style and format of *Research in the Schools (RITS)*.

Abstract

The extent to which differences were present for African American girls as a function of their economic status in their performance on the Texas state-mandated Algebra I End-of-Course exam was examined. Specifically addressed was the extent to which African American girls differed in their performance on three Grade Level performance standards: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Inferential statistical analyses of Texas statewide data revealed that statistically significantly lower percentages of African American girls who were economically disadvantaged met the three Grade Level standards than African American girls who were not in poverty. Implications and recommendations for future research were discussed.

KEYWORDS: STAAR End-of-Course Exam; Algebra I End-of-Course exam; Economically disadvantaged; Approaches Grade Level Standard; Meets Grade Level Standard; Masters Grade Level Standard

DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN GIRLS AS A FUNCTION OF ECONOMIC STATUS: A MULTIYEAR, STATEWIDE INVESTIGATION

The exposure of African American girls to mathematics is critical because it affects postsecondary schooling and employment opportunities (Gholson, 2016). Consequently, the importance of mathematics cannot be overlooked or understated in the educational development of African American girls. Within the context of mathematics, African American girls are considered to have more positive self-concept and higher expectations in mathematics than White and Hispanic girls, as well as hold a substantially higher value for mathematics (Else-Quest et al., 2013). Pringle et al. (2012) determined that teachers held particularly low expectations of low-income African American girls in upper elementary, "who were perceived as bringing limited knowledge and skills, as well as numerous social challenges to the learning environment" (p. 226). Consequently, African American girls often lack basic access to high quality, advanced mathematics, and science courses in schools located in their communities (National Women's Law Center, 2014).

According to the National Assessment of Educational Progress (2022) only 16% of African American girls were proficient in eighth-grade mathematics. Additionally, 48% of African American girls performed below the basic level. The National Assessment of Educational Progress (2022) used categorized achievement based on a scale of basic, proficient, and advanced. Therefore, the majority of African American girls performed below basic standards for mathematics by eighth grade. African American girls were underperforming compared to White peers, which could be due to a

lack of opportunities. Performance in eighth-grade algebra could predict future mathematics achievement and continuation of STEM degrees in college (Young et al., 2017). The most recent statistics published by the National Assessment of Educational Progress (2022) were that the achievement trends for girls remains unchanged when compared to other subgroups. Specific data was not available for African American girls; however, it was reported African American students had an average score that was 24 points lower than that for White students, which is a narrower performance gap than in 2000 (37 points). Additionally, students who were eligible for the free and reduced lunch had an average score that was 23 points lower than for students who were not eligible. This performance gap was similar to the African Americans students and White students gap in 2000 (24 points). When compared to boys, girls had an average score that was five points lower than boys, this gap was wider than the gap, which was two points higher for girls than boys in 2000 (National Assessment of Educational Progress, 2022).

Young et al. (2017) argued underrepresentation in careers resulted from insufficient preparation, therefore, secondary and postsecondary education were imperative for African American girls. Once again, African American girls were underrepresented in mathematics in secondary and postsecondary education. In general, more women were attending college, but fewer African American women were earning mathematics degrees (Alexander & Hermann, 2015; Borum & Walker, 2012). A strong predictor of increased performance and persistence in mathematics was access to eighth-grade algebra (Young et al., 2017). Completion of the high level of mathematics courses in high school was a significant factor for attendance at postsecondary institutions, and early access to algebra allowed the opportunity to take classes beyond Algebra II

(Chambers et al., 2016). Using high school data, which included different socio-economic levels, Chambers et. al. (2016) concluded that 50% of Black girls' standardized mathematics scores were considered low. Algebra II was a minimum requirement for most colleges, and 78% of African American girls took Algebra II or higher-level mathematics courses in high school as a prerequisite for college. The researchers discovered a strong association between high school mathematics performance and post-secondary enrollment. If African American girls were represented in secondary mathematics education, they would have had opportunities to pursue degrees and careers in mathematics.

According to the National Science Board (2016), women were underrepresented in the fields of science, technology, engineering, and mathematics (STEM). More specifically, they reported that the underrepresentation was especially present for African American and Hispanic women. Researchers (e.g., Beasley & Fischer, 2012; Leaper et al., 2012; Saw et al., 2018) have provided evidence that students who are female, African American, Hispanic, or low socioeconomic are less likely to develop and maintain an interest in STEM fields than are their peers who are male, White, or from higher socioeconomic backgrounds. The development of an interest in the STEM fields is correlated with student achievement in mathematics (Sadler et al., 2014). The successful completion of advanced mathematics coursework is correlated to African American girls pursuing careers is the STEM field. The accessibility of advanced mathematics courses is low for African American girls which leads to low numbers of African women represented in STEM careers. For example, in 2016, African American women earned 5.4% of all bachelor's degrees in science and engineering among U.S. citizens and

permanent residents (National Science Foundation, 2019). Comparatively, that same year, White and Hispanic women respectively earned 28.2% and 7.7% of bachelor's degrees in science and engineering. African American women's severe underrepresentation in STEM, particularly in engineering (National Science Foundation, 2019), often results in missed opportunities that could change the trajectories of their lives.

According to the National Center for Education Statistics (2021), although the poverty rate for children has decreased over the last two decades, approximately 11.6 million school-aged children live in poverty. In the State of Texas, poverty is well documented because of the high percentage of students who are economically disadvantaged. The poverty rate of children under 18 years of age was 19%, three percentage points higher than the national average poverty rate (National Center for Education Statistics, 2021). During the 2018-2019 school year, 61% of Texas students were identified as economically disadvantaged (Texas Education Agency, 2019a). Over a 10-year period, the percentage of students in Texas who were identified as economically disadvantaged increased by 22.5%. Students of color are even more at risk of being economically disadvantaged. According to the Texas Education Agency (2019a), 74% of African American students and 76% of Hispanic students were living in poverty during the 2018-2019 school year. Based on the 2019 Texas Academic Performance Report data for the state, 60.6% or 3,283,812 out of 5,416,400 enrolled students met the eligibility criteria for being economically disadvantaged. From the more than 3.2 million students identified as students living in poverty, only 71% of them scored at Approaches Grade Level standard on the 2019 State of Texas Assessments of Academic Readiness 3

(STAAR) tests, seven percentage points lower than the state passing rate. Only 39% of students in poverty scored at the Meets Grade Level standard, compared to the state average of 50% (Texas Education Agency, 2019a). These statistics are concerning because poverty has been clearly established to have strong adverse effects on academic achievement (McKenzie, 2019; Scammacca et al., 2020). The poverty status of students has been clearly established to have negative effects on reading, mathematics, and science performance (Davenport & Slate, 2019; Hentges et al., 2019; Pearman, 2019; Singh, 2015).

The negative effects of poverty on mathematics achievement increases across grade levels from Grade 3 and has a long-term influence that can last until Grade 10 (Singh, 2015). With high percentages of students living in poverty and researchers (e.g., Conradi et al., 2016; McGown & Slate, 2017) having documented that students in poverty perform lower than their peers at a disproportionate rate, it is important to identify achievement gaps that may exist.

According to the Texas Education Agency (2019a), more than 61% of Texas public-school students were from low-income families. In the State of Texas with high percentages of African American and Hispanic students who live in poverty, 74% and 76%, respectively (Texas Education Agency, 2019a), it is important to understand the educational inequities that may be present. To measure mathematics achievement, the STAAR Mathematics test is administered annually beginning with students in Grade 3. The state agency regularly assesses and monitors the performance of historically underperforming groups, yet little progress has been made in closing the gaps in literacy and mathematics present in most Texas schools (e.g., Alford-Stephens, 2016; Davenport

& Slate, 2019; Harris, 2018; McGown, 2016) and across the nation for that matter. Students with the highest needs, such as special education students, Emergent Bilinguals, ethnic/racial minorities, and students in poverty, continue to be denied free and adequate public education in line with their peers (Ravitch, 2013).

In a recent Texas analysis, Davenport and Slate (2019) analyzed the degree to which differences were present in the performance of Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) on the Texas state-mandated mathematics assessment. Three mathematics measures were compared: Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Grade 3 students who were Not Poor (i.e., not economically disadvantaged) had the highest passing rates on all three Grade Level standards. Grade 3 students in the Moderately Poor group (i.e., qualified for the reduced-price lunch program) had the second highest passing rates on all three Grade Level standards. Of note is Grade 3 students in the Extremely Poor group (i.e., qualified for the free lunch program) had the lowest passing rates of the three groups of students on the three Grade Level standards. As such, a clear stair-step effect (Carpenter et al. 2006) was present at each Grade Level standard. The highest passing rates were consistently present for students who were not in poverty; the next best passing rates were present for students who were eligible for the reduced-price lunch program; and the lowest passing rates were present for students who were eligible for the free lunch program.

Similarly, Taylor and Slate (2022) documented the presence of statistically significant relationships between student poverty and low performance in mathematics. Poverty has detrimental effects on student achievement in mathematics (Davenport &

Slate, 2019; Taylor & Slate, 2022). Taylor and Slate (2022) examined 2015-2016 data on the State of Texas Assessment of Academic Readiness (STAAR) Mathematics test to determine the effect of poverty for 12 boys and girls in special education. Three STAAR Mathematics Phase-In Standards were analyzed. Economic status consisted of two categories: (a) students who qualified for the Federal Free Lunch Program (i.e., Poor students) and (b) students who did not qualify for the Federal Free Lunch Program (i.e., Not Poor students) (Taylor & Slate, 2022). For all three STAAR Mathematics Phase-In Standards, students in special education who were in the Poor group had statistically significantly lower passing rates than their peers in special education who were in the Not Poor group. For girls, an average of 16.73% fewer girls in the Poor group met the state-mandated performance level in mathematics than girls in the Not Poor group.

With respect to the effects of poverty on mathematics performance in Texas, Anderson (2016) analyzed statewide data for four school years (i.e., 2011-2012, 2012-2013, 2013-2014, 2014-2015) from the Texas state-mandated mathematics assessment. Data from Grade 5 and Grade 8 were examined to ascertain if differences were present as a function of their economic status (i.e., economically disadvantaged and not economically disadvantaged). Anderson (2016) established the presence of statistically significant differences for all school years for Grade 5 and Grade 8 students by their economic status. For all four school years, Grade 5 students who were economically disadvantaged were outperformed by Grade 5 students who were not economically disadvantaged (Anderson, 2016). The average differences in scores ranged from 5.88 to 6.69 points. Grade 8 students who were economically disadvantaged also were outperformed by Grade 8 students who were not economically disadvantaged for all four

school years. For Grade 8, the average differences in scores ranged from 5.74 to 7.15 points (Anderson, 2016).

Economic status is relevant because students in poverty enter school with low academic skills compared to their peers who are not in poverty (Portia et al., 2019). Tran et al. (2017) documented that children from economically disadvantaged backgrounds were likely not to grow at the same pace as their peers who were not in poverty. These discrepancies translated into long-term effects on educational achievement and income in adulthood. Lee et al. (2016) explained that students who were from low-income families had a high chance of struggling in mathematics that affected their long-term well-being. Poverty has a detrimental effect on children's ability to gain skills and contribute to society (National Center for Children in Poverty, 2019). Children who experienced economic inadequacies usually resided in neighborhoods and attended schools with limited resources required for high academic performance (Taylor & Slate, 2022). Children growing up in poverty often faced undefeatable conditions that over time, hindered academic performance (Taylor & Slate, 2022).

After an extensive and intensive review of the existing literature, no published research articles could be located in which Algebra I End-of-Course exam data from the STAAR Mathematics assessment had been analyzed determine the extent to which economic status is related African American girls' performance in mathematics. With respect to this study, Algebra I End-of-Course exam data from the STAAR Mathematics assessment was examined with respect to the degree economic status is linked to African American girls' performance in mathematics.

Statement of the Problem

The implications of living in poverty can be detrimental for some children and families. The Educational Testing Service in collaboration with the Children's Defense Fund (2015) reported that by two years of age the gap in cognitive development between White and African American children has tripled. As such, it is imperative that educators and school policymakers acknowledge the realities of these youth. From birth, children born in impoverished conditions are at an increased disadvantage of being unable to have positive educational and economic outcomes when compared to their peers not living in poverty. Specifically related to African American girls, access to high quality, advanced mathematics, and science courses in schools located in their communities are limited (National Women's Law Center, 2014). Limited access to high quality mathematics courses is problematic because course-sequencing and knowledge acquisition in mathematics are key indicators of students' postsecondary trajectory in both education and job opportunities (Gholson, 2016).

Purpose of the Study

The purpose of this study was to determine the degree to which differences existed in overall mathematics achievement as a function of the economic status of African American girls. Data from the STAAR Algebra I End-of-Course examination were analyzed to determine the extent to which differences were present in achievement levels among African American girls who were determined to be Poor and Not Poor. Through this 3-year analysis of Texas statewide data, the degree to which trends existed in the Approaches Grade Level, Meets Grade Level, and Masters Grade Level

performance standards for African American girls in these two economic groups was determined.

Significance of the Study

Results from this multiyear study may add to the existing research literature available on the extent to which differences were present in the Algebra I End-of-Course exam Grade Level performance between African American girls based on their economic status. African American girls have different academic success levels. As of the time this study was conducted, few researchers have examined the degree to which African American girls differ in their performance on the Texas state-mandated Algebra I End-of-Course exam.

Research Questions

The following research question was addressed in this study: What is the difference in the Algebra I End-of-Course exam performance for African American girls as a function of economic status? Specific sub-questions under this overarching research question was: (a) What is the difference in the Algebra I End-of-Course Approaches Grade Level standard by the economic status of African American girls?; (b)What is the difference in the Algebra I End-of-Course Meets Grade Level standard by the economic status of African American girls?; (c) What is the difference in the Algebra I End-of-Course Masters Grade Level standard by the economic status of African American girls?; and (d) What trend is present in the Algebra I End-of-Course exam performance by the economic status of African American girls across the 2016-2017 school year through the 2018-2019 school year? The first three research questions were answered separately for

each school year (i.e., 2016-2017, 2017-2018, and 2018-2019) whereas the fourth research question involved data across all three school years.

Method

Research Design

A causal-comparative research design was employed for this study in which archival data, referred to as a secondary data, was analyzed. For this multiyear investigation, a causal-comparative research design was present (Johnson & Christensen, 2020). The independent variable of economic status was fixed, and the dependent variables of student mathematics performance have previously occurred. In this study, archival data was acquired from the Texas Education Agency Public Education Information Management System and were analyzed to determine the degree to which differences were present in mathematics performance for Texas African American girls as a function of their economic status. The independent variable of economic status consisted of economic status groups: (a) Poor and (b) Not Poor. The dependent variables in this study were student performance levels on the STAAR Algebra I End-of-Course exam (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) for the 2016-2017 through the 2018-2019 school years for African American girls. In 2020, the spring STAAR tests were canceled due to the pandemic. Data was not obtained for the pandemic year because the Commissioner of Education gave families the option to send their child to school to test if families had no health or safety concerns in the 2021 school year. This allowance from the Commissioner resulted in a decrease in student participation as compared to typical years.

Participants and Instrumentation

Participants in this study were African American girls who either met the criteria for being economically disadvantaged and African American girls who did not meet the criteria for being economically disadvantaged. The Texas Education Agency (2015) has defined economically disadvantaged as "a student who is eligible for free or reduced-priced meals under the national School Lunch and Child Nutrition Program" (para. 5). The 2022 poverty guidelines indicate an annual income of $13,359 for one person in a household, $18,310 for two people in a household, $23,030 for three people in a household, $27,750 for four people in a household, $32,470 for five people in a household, $37,190 for six people in a household, $41, 910 for seven people in a household, and $46,630 for eight people in a household. For families/households with more than 8 persons, add $4,720 for each additional person (U.S. Department of Health and Human Services, 2022).

The Texas Education Agency (2017) suggested that performance in the Approaches Grade Level category indicates that students are likely to succeed in the next grade or course with targeted academic intervention. Students in this category generally demonstrate the ability to apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). If students perform in the Meets Grade Level category, this indicates they have a high likelihood of success in the next grade or course but may still need some short-term, targeted academic intervention. Students in this category generally demonstrate the ability to think critically and apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). Student performance in the Masters Grade Level category indicates that students are expected to succeed in the next

grade or course with little or no academic intervention. Students in this category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar (Texas Education Agency, 2017). The achievement data for this study was obtained through a Public Information Request to the Texas Education Agency's Public Education Information Management System. Data was then imported into the Statistical Package for Social Sciences software program for analysis.

Results

To ascertain whether differences were present in STAAR Algebra I End-of-Course exam performance (i.e., Did Not Meet, Met) at the Approaches Grade Level, Meets Grade Level, and Masters Grade Level standards by level of poverty (i.e., economically disadvantaged [Poor] and not economically disadvantaged [Not Poor]) for African American girls for the 2016-2017, 2017-2018, and 2018-2019 school years, Pearson chi-square analyses were conducted. This statistical procedure was viewed as the optimal statistical procedure to use because frequency data was present for STAAR Algebra I End-of-Course exam performance, Grade Level standard, and for economic status. When the independent variables and dependent variables are categorical in nature, Pearson chi-squares are an appropriate inferential statistical procedure (Slate & Rojas-LeBouef, 2011). Given the statewide sample that was obtained, the available sample size per cell was more than five. Accordingly, the assumptions for using Pearson chi-square procedures were met.

Approaches Grade Level Analyses Across All Three School Years

For the first research question on the STAAR Algebra I End-of-Course exam performance at the Approaches Grade Level standard for the 2016-2017 school year, the result was statistically significant, $\chi^2(1) = 682.05$, $p < .001$. The effect size for this finding, Cramer's V, was small, .19 (Cohen, 1988). As revealed in Table 3.1, a statistically significantly higher percentage of African American girls who were Not Poor, more than 19 percentage points, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American girls who were Poor.

Insert Table 3.1 about here

With respect to the 2017-2018 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(1) = 350.57$, $p < .001$, Cramer's V, was small, .14 (Cohen, 1988). As delineated in Table 3.1, a statistically significantly higher percentage of African American girls who were Not Poor, more than 13 percentage points higher, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American girls who were Poor. Concerning the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(1) = 196.86$, $p < .001$, small effect size, Cramer's V = .11 (Cohen, 1988). A statistically significantly higher percentage of African American girls who were Not Poor, more than 10 percentage points higher, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American girls who were Poor. Descriptive statistics for this analysis are contained in Table 3.1.

Meets Grade Level Analyses Across All Three School Years

Regarding the 2016-2017 school year for the STAAR Algebra I End-of-Course Meets Grade Level standard, a statistically significant result was yielded, $\chi^2(1) = 682.05$, $p < .001$, small effect size, Cramer's V = .19 (Cohen, 1988). A statistically significantly higher percentage of African American girls who were Not Poor, more than 23 percentage points higher, met the STAAR Algebra I End-of-Course Meets Grade Level standard than did African American girls who were Poor. Table 3.2 contains the descriptive statistics for this analysis.

Insert Table 3.2 about here

With respect to the 2017-2018 school year, the result was statistically significant, $\chi^2(1) = 768.86$, $p < .001$, small effect size, Cramer's V = .21 (Cohen, 1988). A statistically significantly higher percentage of African American girls who were Not Poor, more than 22 percentage points higher, met the STAAR Algebra I End-of-Course Meets Grade Level standard than did African American girls who were Poor. Delineated in Table 3.2 are the descriptive statistics for this analysis. Concerning the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(1) = 507.63$, $p < .001$, small effect size, Cramer's V=.18 (Cohen, 1988). A statistically significantly higher percentage of African American girls who were Not Poor, more than 19 percentage points higher, met the STAAR Algebra I End-of-Course exam Meets Grade Level standard than did African American girls who were Poor. Descriptive statistics for this analysis are contained in Table 3.2.

Masters Grade Level Analyses Across All Three School Years

For the third research question on the STAAR Algebra I End-of-Course exam performance at the Masters Grade Level standard, a statistically significant result was yielded, $\chi^2(1) = 960.22$, $p = .001$, Cramer's V, small effect size, .22 (Cohen, 1988). As presented in Table 3.3, a higher percentage of African American girls who were Not Poor, less than 16 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American girls who were Poor in the 2016-2017 school year.

Insert Table 3.3 about here

Concerning the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(1) = 728.67$, $p < .001$. The effect size for this finding, Cramer's V, was small, .20 (Cohen, 1988). As revealed in Table 3.3, a statistically significantly higher percentage of African American girls who were Not Poor, more than 17 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American girls who were Poor. With respect to the 2018-2019 school year, the Pearson chi-square yielded the presence of a statistically significant difference, $\chi^2(1) = 585.06$, $p < .001$, small effect size, Cramer's V = .19 (Cohen, 1988). A statistically significantly higher percentage of African American girls who were Not Poor, more than 18 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American girls who were Poor. Delineated in Table 3.3 are the descriptive statistics for this analysis.

Algebra I End-of-Exam Course Performance Across All Three School Years

In regard to the Approaches Grade Level standard, African American girls who were Not Poor outperformed African American girls who were Poor in all three school years. The percentages of African American girls who were Not Poor and African American girls who were Poor who met the Approaches Grade Level standard consistently increased each school year. Regarding African American girls who were Not Poor, 81.3% met the Approaches Grade Level standard in the 2016-2017 school year, 83.1% met the Approaches Grade Level standard in the 2017-2018 school year, and 83.3% met the Approaches Grade Level standard in the 2018-2019 school year. In reference to African American girls who were Poor, 62.1% met the Approaches Grade Level standard in 2016-2017, 69.4% met the Approaches Grade Level standard in 2017-2018, and 72.9% met the Approaches Grade Level standard in 2018-2019. The percentages of African American girls who were Not Poor and African American girls who were Poor who did not meet this Grade Level standard are depicted in Figure 3.1.

Insert Figure 3.1 about here

With respect to the Meets Grade Level standard, African American girls who were Not Poor consistently outperformed African American girls who were Poor in all three school years. Similar to the Approaches Grade Level standard, African American girls in both poverty levels, Not Poor and Poor, increased in performance after each school year. Regarding African American girls who were Not Poor, 51% met the Meets Grade Level standard in 2016-2017, 56.3% met the Meets Grade Level standard in 2017-

2018, and 62.6% met the Meets Grade Level standard in 2018-2019. In reference to African American girls who were Poor, 27.9% met the Meets Grade Level standard in 2016-2017, 33.9% met the Meets Grade Level standard in 2017-2018, and 43% met the Meets Grade Level standard in 2018-2019. Portrayed in Figure 3.2 are the percentages African American girls who were Not Poor and African American girls who were Poor who did not meet this Grade Level standard for this analysis.

Insert Figure 3.2 about here

In regard to the Masters Grade Level standard, African American girls who were Not Poor consistently outperformed African American girls who were Poor in the 2016-2017, 2017-2018 and 2018-2019 school years. Statistically significant results were present for this Grade Level standard in all three school years. Readers should note the high percentages of African American girls who were Poor who did not meet this Grade Level standard. In reference to African American girls who were Poor, 92% did not meet the Masters Grade Level standard in 2016-2017, 87% did not meet the Masters Grade Level standard in 2017-2018, and 80% did not meet the Masters Grade Level standard in 2018-2019. Depicted in Figure 3.3 are the percentages African American girls who were Not Poor and African American girls who were Poor who did not meet this Grade Level standard for this analysis.

Insert Figure 3.3 about here

Discussion

The performance of African American girls on the Algebra I End-of-Course Grade Level performance was addressed in this multiyear investigation as a function of their economic status. Three Grade Level standards were investigated: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Based on the results of this empirical investigation, statistically significant differences were present between African American girls who were Not Poor and African American girls who were Poor for all Grade Level standards. Regarding the 2016-2017 results, more than two-thirds of African American girls who were Not Poor met the Approaches Grade Level standard compared to less than one-half of African American girls who were Poor. Regarding the 2017-2018 results, less than one-fourth of African American girls who were Poor met the Meets Grade Level Standard as opposed to more than one-third of African American girls who were Not Poor who met the standard. Regarding the 2018-2019 results, more than three-fourths of African American students who were Not Poor did not meet the Masters Grade Level standard when compared to more than ninety percentage points of African American students who were Poor who did not meet that same standard.

With respect to the Algebra I End-of-Course exam, statistically significant differences were present in all Grade Level standards for all three school years. African American girls who were Not Poor outperformed African American girls who were Poor in all of the Grade Level standards that yielded statistically significant results. Of concern in performance for all Grade Level standards is that more than one-third of African American girls who were Poor did not meet any Grade Level standard.

Connections to Existing Literature

In their study, Davenport and Slate (2019) analyzed the degree to which differences were present in the performance of Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) on the Texas state-mandated mathematics assessment where the same three mathematics measures were compared. Their findings were that Grade 3 students who were Not Poor had the highest passing rates on all three Grade Level standards while Grade 3 students in the Extremely Poor group had the lowest passing rates of the three groups of students on the three Grade Level standards. Readers should note that the aforementioned research included Grade 3 participants whereas this current investigation involved high school students. The performance trends are the same in the early grades and secondary grades. These findings further support that the poverty status of students is clearly linked to negative effects on reading, mathematics, and science performance (Davenport & Slate, 2019; Hentges et al., 2019; Pearman, 2019; Singh, 2015). Findings from this multiyear statewide investigation are also commensurate with the extant research literature that poverty has detrimental effects on student achievement in mathematics (Davenport & Slate, 2019; Taylor & Slate, 2022).

Implications for Policy and Practice

Based on the results of this multi-year investigation, several implications for policy and practice exist. In regard to policy, due to the gap in the mathematics performance between students who are Not Poor and students who are Poor across the state, policymakers should continue funding educational programs and advocating for students who are Poor as well as other at-risk student groups. Students who are economically disadvantaged should have access to tutorial programs outside of school funded by their local school district or community. Federal and local government entities should allocate extra funds to school districts for mathematics labs that include hands-on relevant, and culturally appropriate scenarios that foster real connections. Lastly, it will be beneficial for students experiencing economic disparities to receive effective Tier 1 instruction with a high-quality curriculum as well as early intervention in mathematics while developing fundamental skills.

In terms of practice, teachers and district level educators are encouraged to implement intervention strategies focused on African American students and closing of the educational gaps for those who are Poor. In addition, advocacy for advanced mathematics courses offered to Poor students should be highly encouraged for districts serving large number of African American students. With this action, schools and districts are promoting general awareness of the consistent gaps between African American students, poor students, other student groups, and their peers.

Recommendations for Future Research

Based on the results of this empirical, multiyear study, several recommendations for future investigations can be made. First, because only data on only high school students were analyzed herein, researchers are recommended to replicate this study in other grade level exams to ascertain the degree to which results delineated herein might be generalizable to students in other grade levels. Second, only data from the State of Texas were analyzed in this article. As such, researchers are encouraged to extend this study to other states to determine whether the findings described might be generalizable to African American girls in other states by their economic status. Third, because data on only the Algebra I exam was examined in this investigation, researchers are encouraged to analyze data in English, Biology, and U.S. History. Fourth, only the economic status of African American girls was examined in this article. Hence, researchers should consider analyzing performance of other student populations such as at-risk and students in special education. Lastly, researchers should examine the extent to which results in this investigation would be generalizable based on demographic characteristics such as ethnicity/race.

Conclusion

In this article, the performance of African American girls as a function of their economic status on the Texas state-mandated Algebra I End-of-Course exam was examined. Specifically addressed was the degree to which African American girls who were Not Poor and African American girls who were Poor differed in their performance on three Grade Level performance measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level in the 2016-2017, 2017-2018, and 2018-2019 school

years. Inferential statistical analyses revealed that African American girls who were Not Poor had statistically significantly better STAAR Algebra I End-of-Course exam performance than African American Girls who were Poor in all three school years. Although the percentage of African American girls who were Not Poor and African American girls who were Poor increased all three years at the Approaches, Meets, and Masters Grade Level standards, African American girls who were Not Poor outperformed African American girls who were Poor.

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Table 3.1

Frequencies and Percentages of STAAR Algebra I End-of-Course Approaches Grade Level Performance Standard of African American Girls by Their Economic Status for All Three School Years

School Year and Economic Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Not Poor	(*n* = 1,073) 18.7%	(*n* = 4,670) 81.3%
Poor	(*n* = 5,165) 37.9%	(*n* = 8,471) 62.1%
2017-2018		
Not Poor	(*n* = 869) 16.9%	(*n* = 4,261) 83.1%
Poor	(*n* = 3,972) 30.6%	(*n* = 9,006) 69.4%
2018-2019		
Not Poor	(*n* = 768) 16.7%	(*n* = 3,842) 83.3%
Poor	(*n* = 3,174) 27.1%	(*n* = 8,538) 72.9%

Table 3.2

Frequencies and Percentages of STAAR Algebra I End-of-Course Meets Grade Level Performance Standard of African American Girls by Their Economic Status for All Three School Years

School Year and Economic Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Not Poor	(*n* = 2,809) 48.9%	(*n* = 2,934) 51.1%
Poor	(*n* = 9,832) 72.1%	(*n* = 3,804) 27.9%
2017-2018		
Not Poor	(*n* = 2,242) 43.7%	(*n* = 2,888) 56.3%
Poor	(*n* = 8,582) 66.1%	(*n* = 4,396) 33.9%
2018-2019		
Not poor	(*n* = 1,726) 37.4%	(*n* = 2,884) 62.6%
Poor	(*n* = 6,678) 57%	(*n* = 5,034) 43%

Table 3.3

Frequencies and Percentages of STAAR Algebra I End-of-Course Masters Grade Level Performance Standard of African American Girls by Their Economic Status for All Three School Years

School Year and Economic Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Not Poor	(*n* = 4,350) 75.7%	(*n* = 1,393) 24.3%
Poor	(*n* = 12,549) 92%	(*n* = 1,087) 8.0%
2017-2018		
Not Poor	(*n* = 3,579) 69.8%	(*n* = 1,551) 30.2%
Poor	(*n* = 11,273) 86.9%	(*n* = 1,705) 13.1%
2018-2019		
Not Poor	(*n* = 2,845) 61.7%	(*n* = 1,765) 38.3%
Poor	(*n* = 9,366) 80%	(*n* = 2,346) 20%

Figure 3.1

Percentages of African American Girls by Their Economic Status Who Did Not Meet the Algebra I End-of-Course Approaches Grade Level Performance Standard for All Three School Years

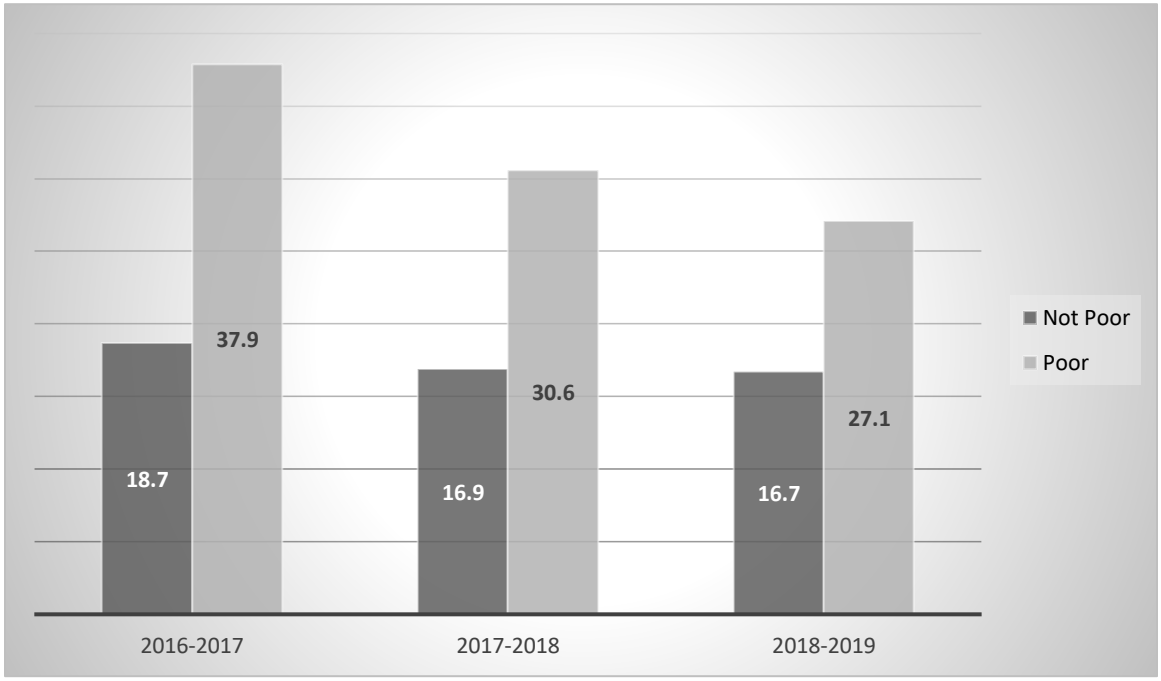


Figure 3.2

Percentages of African American Girls by Their Economic Status Who Did Not Meet the Algebra I End-of-Course Meets Grade Level Performance Standard for All Three School Years

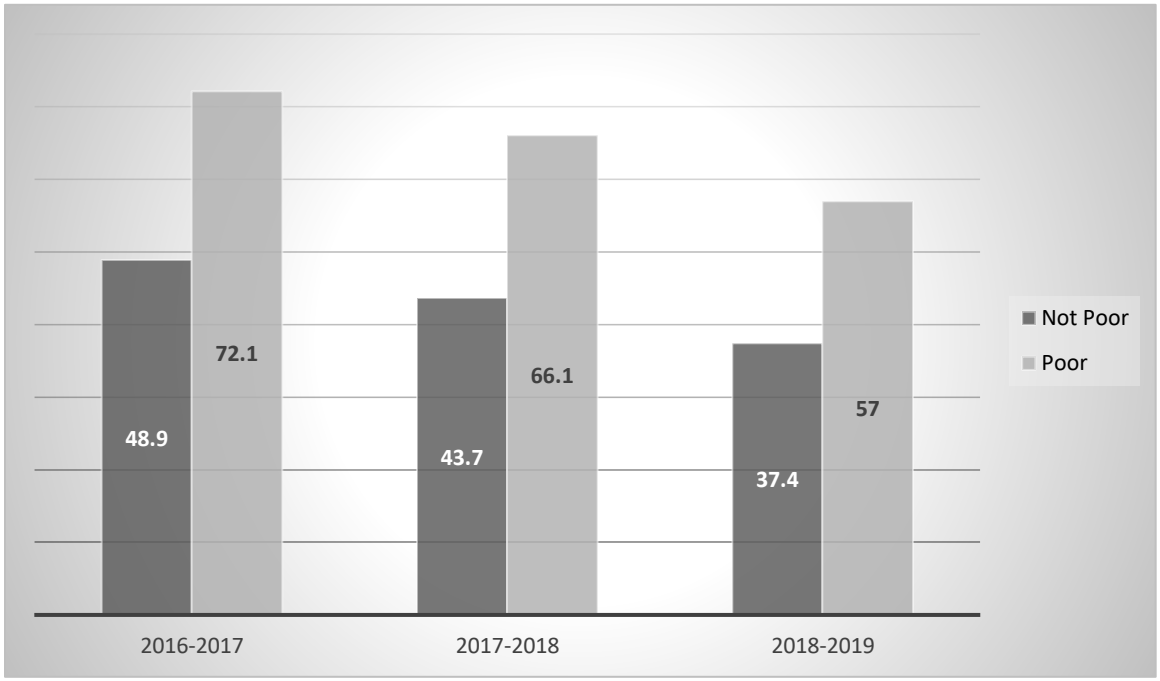
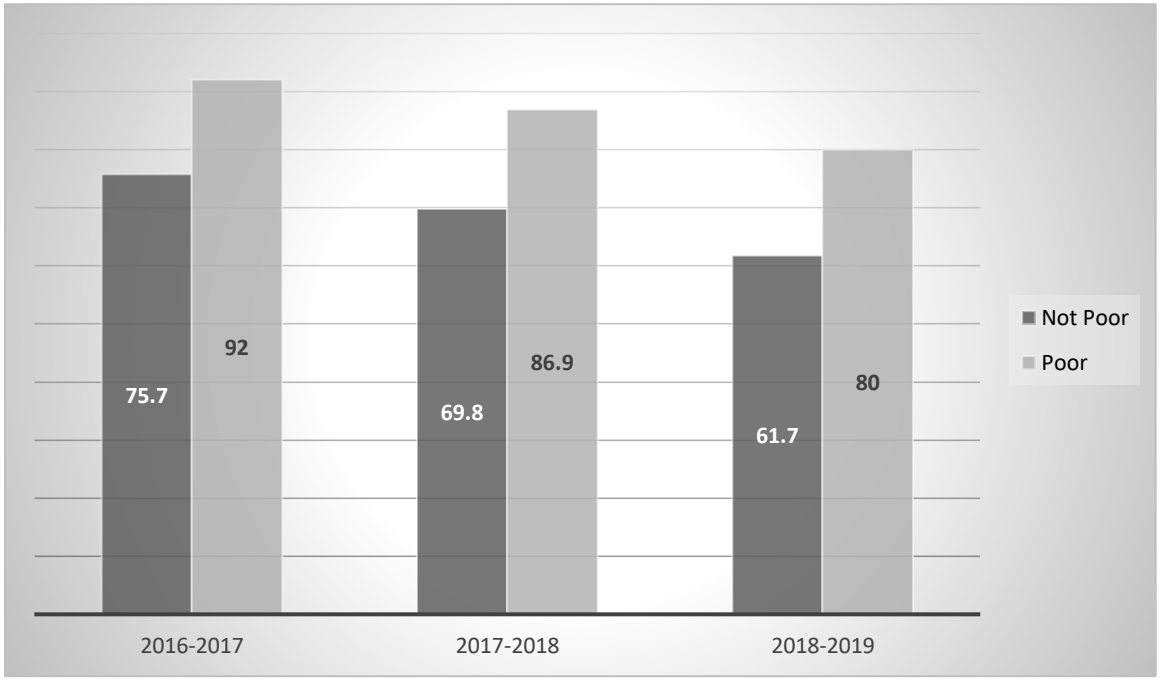


Figure 3.3

Percentages of African American Girls by Their Economic Status Who Did Not Meet the Algebra I End-of-Course Masters Grade Level Performance Standard for All Three School Years



CHAPTER IV

DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN BOYS AS A FUNCTION OF THEIR ECONOMIC STATUS: A MULTIYEAR, STATEWIDE INVESTIGATION

This dissertation follows the style and format of *Research in the Schools (RITS)*.

Abstract

The extent to which differences were present for African American boys as a function of their economic status in their performance on the Texas state-mandated Algebra I End-of-Course exam was examined. Specifically addressed was the extent to which African American boys differed in their performance on three Grade Level performance standards: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Inferential statistical analyses of Texas statewide data revealed that statistically significantly lower percentages of African American in poverty met the three Grade Level standards than African American boys who were not in poverty. Implications and recommendations for future research were discussed.

KEYWORDS: State of Texas Assessment of Academic Readiness (STAAR); Algebra I End-of-Course exam; Economically disadvantaged; Approaches Grade Level Standard; Meets Grade Level Standard; Masters Grade Level Standard

DIFFERENCES IN ALGEBRA I END-OF-COURSE EXAM GRADE LEVEL PERFORMANCE OF AFRICAN AMERICAN BOYS AS A FUNCTION OF THEIR ECONOMIC STATUS: A MULTIYEAR, STATEWIDE INVESTIGATION

Federal legislation mandates such as The Elementary and Secondary Education Act of 1965, The No Child Left Behind Act of 2001, and the Every Student Succeeds Act of 2015 have placed an emphasis on student performance, school progress, and closing the achievement gaps of students, including African American students and other student groups. However, many students do not meet the achievement standards despite these federal mandates continue to not meet achievement standards. Specifically, the mathematics achievement for students living in poverty has been and remains problematic. Given the numerous research studies about the relationship between mathematics achievement and economic stability, it is imperative that educational leaders, education agencies, and policymakers generate and implement interventions to help students overcome mathematics achievement barriers. Previous researchers (e.g., David & Marchant, 2015; Wang et al., 2013) have stated that students from low income families are at risk for many social and academic disadvantages.

According to the National Center for Children in Poverty (2018), 41% of children in the United States were in low income families in 2018. Being a member of a low-income family is more likely for African American and Hispanic children than it is for White and Asian children. In 2018, 61% of African American children were classified as poor and 59% of Hispanic children were classified as poor (National Center for Children in Poverty 2018). This percentage is considerably higher than the percentages of Asian and White children who were classified as poor, as both of these groups had only 28% of

their children living in low income families (National Center for Children in Poverty, 2018). The National School Boards Association (2020) reported that nearly 33% of African American students live in poverty, compared with 10% of White students. More than one-fourth, 27%, of African American students live in households where the highest level of education attained by either parent was a bachelor's or higher degree, compared with substantially higher percentages for Asian students, 69%, and for White students, 53%. Although decreases have been documented in the dropout rates for all demographic groups, the dropout rates for Hispanic and African American students remain higher than for White students. The Hispanic dropout rate decreased from 16.6% to 7.7%, whereas the African American dropout rate decreased from 10.3% to 5.6%, and the White dropout rate decreased from 5.3% to 4.1% (National Center for Education Statistics, 2021). Specific to this article, nearly 8 out of 100 African American males dropped out of school according to the most recently published data from the National Center for Education Statistics (2021).

In poorer neighborhoods where a disproportionate number of Black teenagers live, Black students tend to have a lower percentage of graduation rates than White students (Lynch, 2017). In high poverty schools, they suffer from deficient supplies, materials and opportunities to learn, deteriorating physical facilities, which diminish student engagement and performance (Hudley, 2013). Pruitt et al. (2019) conducted a longitudinal study from 2009 to 2013 to examine the effects of economic inequality on the academic achievement of African-American males. The study involved 23,000 African-American males in 944 different high schools who were disproportionately poor and living below the poverty line. They ran a multilinear regression to predict academic

achievement based on poverty level and race. These researchers concluded that African-American males living in poor neighborhoods had few resources for learning which fostered low academic achievement. Consequently, African- American males in poor families had lower academic achievement than White males. Additionally, African-American males who lived in impoverished neighborhood environments attended deteriorating schools which affected their academic achievement. According to their findings, no relationship was present between the race of a student and their academic achievement, indicating that race alone is not a factor but when coupled with poverty, detrimental effects on academic achievement exist (Pruitt et al., 2019).

The findings of the aforementioned researchers were supported in similar studies. Rothstein (2013) documented that in low-income neighborhoods, the residents are of low socioeconomic status, and African American students in these neighborhoods have lower graduation rates compared to their White peers. He said that schools in these low income communities have few educational specialists and resources, such as advanced placement classes, limited extracurricular opportunities, and dilapidated physical environments. Walsh and Theodorakakis (2017) discovered that income inequality has caused a growth in educational inequality. Growing poverty rates have led to the widening of the achievement between students of color and their peers because family income has an effect on the educational opportunities that are available to children. Children and teenagers in low-income families often have less access to educational opportunities, such as, educational programs both within and outside of school, which affect their academic achievement. The findings presented in the studies are especially relevant when

considering postsecondary opportunities for life and beyond for African American boys, specifically in math related fields.

According to the (National Center for Education Statistics, 2019), only 36% of African American male students completed a bachelor's degree within six years. African American males who graduated high school were not prepared for the rigors of college coursework. Although many college outcomes substantially influenced by successful Algebra II completion (Gaertner et al., 2013), many high-minority schools do not offer advanced mathematics courses. Consequently, African American students are not able to garner the academic skills necessary to enter and succeed in college (Bryant, 2015). Several researchers (e.g., Morgan & Amerikaner, 2018; Scott et al., 2016; The Education Trust, 2014) have documented that many Black families with lower income levels are served by under-funded and under-performing public schools. Lower funding levels for schools with the highest percentages of African American students typically results in diminished educational opportunities (Patrick et al., 2020; The Education Trust, 2014) which include lack of access to advanced high school coursework.

According to McGee (2013), the academic achievement of African American males is a complex and multilayered issue. The failure of Algebra I mathematics at the high school level often has led to a lower curriculum track assignment for the African American male student. According to Nomi and Allensworth (2013), in the current environment, schools are responsible for preparing all students for rigorous secondary course work and a competitive work environment. Poorly performing African American male students who are assigned to a lower curriculum track will not have access to rigorous instruction or the collaborative instructional teaming activities openly visible in

the college setting. Without access to college, the ability to enter lucrative career fields becomes illusive thereby disqualifying the African American male high school students from a higher education and a multitude of quality of life opportunities that would be beneficial to both African American males entering adulthood.

Paschall et al. (2018) contended that the intersectionality of multiple student demographics (e.g., economic status, gender, or ethnicity/race) should be addressed when performing analyses on educational equity. The intersection of poverty and ethnicity/race are factors that should be considered when it comes to student academic needs. Though most researchers (e.g., Harris, 2018; McGown, 2016) have focused on the effects of these student demographic characteristics separately, Paschall et al. (2018) analyzed the mathematics and reading achievement of students based on interactions between poverty and ethnicity/race. Their data was indicative of substantial gaps in achievement scores by the economic status of students of color.

An investigation was conducted by Harris (2018) to examine the early indicators of Algebra I failure among African American males in an urban school during the 2016-2017 school year. The total school enrollment consisted of 1,264 students. Of the total sampled students, 365 were assigned to Grade 9, and 141 students were identified as Black males between the ages of 14-16 years of age. According to the data, 32 of the 141 African American male students failed the first semester of Grade 9 Algebra I and received a final grade of 59% or below which equates to course failure represented by a single letter grade of F. He used pertinent data during his analysis that consisted of a review of Grade 8 math final grades, Grade 8 math performance on standardized test for those participants with data available, test scores from the high school entrance exam,

observation notes, and 2015-2016 school year first semester Algebra I final grades. Harris (2018) suggested in his recommendations that future researchers include a qualitative approach whereby a conversation with urban African American males about their likes and dislikes concerning mathematics from Grade 4 through Grade 9 Algebra I would be invaluable to the development of mathematical pedagogy designed to improve urban African American male mathematical outcomes.

In a nationwide study, Kuhfeld et al. (2018) examined the reading and mathematics achievement of students based on their race/ethnicity and poverty status. They established that White students in poverty outperformed both African American and Hispanic students who were in poverty in reading and mathematics. The gaps between these groups of students widened from school entry to age 15. Kuhfeld et al. (2018) also documented that White students in poverty performed similarly to African American students and Hispanic students who were not economically disadvantaged. Their findings were consistent with other researchers (e.g., Fryer & Levitt, 2006; Lee & Burkham, 2002; McDonough, 2015) that students of color enter school with academic gaps that persist or grow as children progress through school. Also, Kuhfeld et al. (2018) contended that poverty plays a role in delineating racial/ethnic gaps but does not sufficiently explain the gaps by itself.

Texas was one of the states with the highest dropout rates for high school students. From 2013 to 2017, the state dropout rate was 7.1% (National Center for Education Statistics, 2020c). Of that percentage, African American males dropped out at a higher rate of 8.8% when compared to African American girls at 4.3% % (National Center for Education Statistics, 2021). With respect to household income, 11.1% of

students from low-income homes dropped out of high school in Texas. With respect to the possible effects of poverty on mathematics performance, Davenport and Slate (2019) analyzed the degree to which differences were present in the Texas state-mandated Mathematics assessment performance of Texas Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) by comparing three mathematics measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Grade 3 students who were Not Poor (i.e., not economically disadvantaged) had the highest percentages of students who met the Grade Level standards. Grade 3 students in the Moderately Poor group (i.e., qualified for the reduced-price lunch program) had the second highest percentages of students who met the Grade Level standards. Noteworthy, Grade 3 students in the Extremely Poor group (i.e., qualified for the free lunch program) had the lowest percentages of students who met the Grade Level standards. As such, a clear stair-step effect (Carpenter et al., 2006) was present at each Grade Level standard, with respect to economic status. The highest passing rates were consistently present for students who were not in poverty; the next best passing rates were present for students who were eligible for the reduced-price lunch program; and the lowest passing rates were present for students who were eligible for the free lunch program.

In the aforementioned study, the focus was on students in lower grades. In a recent Texas statewide analysis, Alford-Stephens (2016) examined data on the Texas state-mandated mathematics assessment at the high school level to ascertain the extent to which differences were presented in the mathematics skills of African American boys in Texas high schools by their economic status (i.e., Not Poor, Moderately Poor, and

Extremely Poor). In her study, statistically significant differences were established in the 10 mathematics skills tested from the 2004-2005 through the 2011-2012 school years. For the 2004-2005 through the 2006-2007 school years, African American boys who were Extremely Poor (i.e., qualified for the free lunch program) performed more poorly than African American boys who were Moderately Poor (i.e., qualified for the reduced-price lunch program) and more poorly than African American boys who were Not Poor (i.e., not economically disadvantaged) in all 10 mathematics skills (Alford-Stephens, 2016). As in the aforementioned study, a clear stair-step effect (Carpenter et al., 2006) was present at each Grade Level standard, with respect to economic status. The highest passing rates were consistently present for students who were not in poverty; the next best passing rates were present for students who were eligible for the reduced-price lunch program; and the lowest passing rates were present for students who were eligible for the free lunch program.

After an extensive and intensive review of the existing literature, no published research articles could be located in which Algebra I End-of-Course exam data from the STAAR Mathematics assessment had been analyzed determine the extent to which economic status is related African American boys' performance in mathematics. With respect to this study, Algebra I End-of-Course exam data from the STAAR Mathematics assessment was examined with respect to the degree economic status is linked to African American boys' performance in mathematics.

Statement of the Problem

The U.S. graduation rates from public high schools are especially low for boys, 83%, and are even lower for African American boys, 64% (National Center for Education Statistics, 2020c). For African American boys, poverty can be the barrier that impedes academic and life-long success (Gardner & Miranda, 2001). Many African American boys living in poverty are not prepared for the expectations of the academic setting; consequently, these students lack the numeracy and literacy skills needed to be academically successful. Several researchers (e.g., Alford-Stephens & Slate, 2015; Noguera, 2012) have documented that poverty can place children at an even greater risk of being academically unsuccessful. However, all students are expected to meet the established state achievement standards despite personal struggles and financial limitations regardless of their economic status. High school students in Texas are required to take and pass, a total of five high stakes standardized tests to meet their graduation requirements. According to the Texas Education Agency (2019b), three of these tests are administered to first year high school students; one of which is the Algebra I End-of-Course exam.

Purpose of the Study

The purpose of this study was to determine the degree to which differences were present in mathematics achievement as a function of the economic status of African American boys. Data from the State of Texas Assessments of Academic Readiness (STAAR) Algebra I End-of-Course examination were analyzed to determine the extent to which differences existed in the mathematics performance of African American boys by their economic status. Through this 3-year analysis of Texas statewide data, the degree to

which trends were present in three Grade Level standards in these two economic groups was determined.

Significance of the Study

Results from this multiyear study may add to the existing research literature available on the relationship between poverty and the mathematics performance of African American boys based on their economic status. As of the time this study was conducted, few researchers have examined the degree to which African American boys differed in their performance on the Texas state-mandated Algebra I End-of-Course exam by their economic status.

Research Questions

The following overarching research question was addressed in this study: What is the difference in the Algebra I End-of-Course exam performance for African American boys as a function of economic status? Specific sub questions under this overarching research question was: (a) What is the difference in the Algebra I End-of-Course Approaches Grade Level performance by the economic status of African American boys?; (b)What is the difference in the Algebra I End-of-Course Meets Grade Level performance by the economic status of African American boys?; (c) What is the difference in the Algebra I End-of-Course Masters Grade Level performance by the economic status of African American boys?; and (d) What trend is present in the Algebra I End-of-Course exam performance by the economic status of African American boys across the 2016-2017 school year through the 2018-2019 school year? The first three research questions were answered separately by each school year, whereas the fourth research question involved data across all three school years.

Method

Research Design

For this multi-year investigation, a causal-comparative research design was present (Johnson & Christensen, 2020). The independent variable of economic status was fixed, and the dependent variables of student mathematics performance had previously occurred. In this study, archival data was acquired from the Texas Education Agency Public Education Information Management System and were analyzed to determine the degree to which differences were present in mathematics performance for Texas African American boys as a function of their economic status. Two economic status groups were present: (a) Poor and (b) Not Poor. The dependent variables in this study were student performance levels on the STAAR Algebra I End-of-Course exam (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) for the 2016-2017 through the 2018-2019 school years for African American boys. In 2020, the spring STAAR tests were canceled due to the pandemic. In 2021, the Commissioner of Education gave families the option to send their child to school to test if families had no health or safety concerns. This allowance from the Commissioner resulted in a decrease in student participation as compared to typical years. Consequently, data was not obtained for the pandemic year.

Participants and Instrumentation

Participants in this study were African American boys who meet the criteria for the economically disadvantaged subgroup and had completed the Algebra I End-of-Course exam. For this End-of-Course exam, the labels for the performance categories were Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Texas

Education Agency (2015) has defined economically disadvantaged as “a student who is eligible for free or reduced-priced meals under the national School Lunch and Child Nutrition Program” (para. 5). The achievement data for this study was obtained through a Public Information Request to the Texas Education Agency’s Public Education Information Management System. Data was then imported into the Statistical Package for Social Sciences software program for analysis.

The Texas Education Agency (2017) suggested that performance in the Approaches Grade Level category indicates that students are likely to succeed in the next grade or course with targeted academic intervention. Students in this category generally demonstrate the ability to apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). If students perform in the Meets Grade Level category, this performance indicates they have a high likelihood of success in the next grade or course but may still need some short-term, targeted academic intervention. Students in this category generally demonstrate the ability to think critically and apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). Student performance in the Masters Grade Level category indicates that students are expected to succeed in the next grade or course with little or no academic intervention. Students in this category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar (Texas Education Agency, 2017).

Results

To ascertain whether differences were present in STAAR Algebra I End-of-Course exam performance (i.e., Did Not Meet, Met) at the Approaches Grade Level,

Meets Grade Level, and Masters Grade Level standards by level of poverty (i.e., Poor and Not Poor) for African American boys for the 2016-2017, 2017-2018, and 2018-2019 school years, Pearson chi-square analyses were conducted. This statistical procedure was viewed as the optimal statistical procedure to use because frequency data was present for STAAR Algebra I End-of-Course exam performance, Grade Level standard, and for economic status. When the independent variables and dependent variables are categorical in nature, Pearson chi-squares are an appropriate inferential statistical procedure (Slate & Rojas-LeBouef, 2011). Given the statewide sample that was obtained, the available sample size per cell was more than five. Accordingly, the assumptions for using Pearson chi-square procedures were met.

Approaches Grade Level Analyses Across All Three School Years

For the first research question on the STAAR Algebra I End-of-Course exam performance at the Approaches Grade Level standard for the 2016-2017 school year, the result was statistically significant, $\chi^2(1) = 866.14$, $p < .001$. The effect size for this finding, Cramer's V, was small, .19 (Cohen, 1988). As revealed in Table 4.1, a statistically significantly higher percentage of African American boys who were Not Poor, more than 21 percentage points, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American boys who were Poor.

Insert Table 4.1 about here

With respect to the 2017-2018 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(1) = 669.52$, $p < .001$, Cramer's V,

was small, .17 (Cohen, 1988). As delineated in Table 4.1, a statistically significantly higher percentage of African American boys who were Not Poor, more than 19 percentage points higher, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American boys who were Poor. Concerning the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(1) = 534.75$, $p < .001$, small effect size, Cramer's V = .16 (Cohen, 1988). A statistically significantly higher percentage of African American boys who were Not Poor, more than 18 percentage points higher, met the STAAR Algebra I End-of-Course exam Approaches Grade Level standard than did African American boys who were Poor. Descriptive statistics for this analysis are contained in Table 4.1.

Meets Grade Level Analyses Across All Three School Years

Regarding the 2016-2017 school year for the STAAR Algebra I End-of-Course Meets Grade Level standard, a statistically significant result was yielded, $\chi^2(1) = 926.37$, $p < .001$, small effect size, Cramer's V = .20 (Cohen, 1988). A statistically significantly higher percentage of African American boys who were Not Poor, more than 18 percentage points higher, met the STAAR Algebra I End-of-Course Meets Grade Level standard than did African American boys who were Poor. Table 4.2 contains the descriptive statistics for this analysis.

Insert Table 4.2 about here

With respect to the 2017-2018 school year, the result was statistically significant, $\chi^2(1) = 996.16$, $p < .001$, small effect size, Cramer's V = .21 (Cohen, 1988). A

statistically significantly higher percentage of African American boys who were Not Poor, more than 21 percentage points higher, met the STAAR Algebra I End-of-Course Meets Grade Level standard than did African American boys who were Poor. Delineated in Table 4.2 are the descriptive statistics for this analysis. Concerning the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(1) = 734.84$, $p < .001$, small effect size, Cramer's V = .19 (Cohen, 1988). A statistically significantly higher percentage of African American boys who were Not Poor, more than 20 percentage points higher, met the STAAR Algebra I End-of-Course exam Meets Grade Level standard than did African American boys who were Poor. Descriptive statistics for this analysis are contained in Table 4.2.

Masters Grade Level Analyses Across All Three School Years

For the third research question on the STAAR Algebra I End-of-Course exam performance at the Masters Grade Level standard, a statistically significant result was yielded, $\chi^2(1) = 767.64$, $p = .001$, Cramer's V, small effect size, .18 (Cohen, 1988). As presented in Table 4.3, a higher percentage of African American boys who were Not Poor, less than 10 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American boys who were Poor in the 2016-2017 school year.

Insert Table 4.3 about here

Concerning the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(1) = 737.39$, $p < .001$. The effect size for this finding, Cramer's V, was small,

.18 (Cohen, 1988). As revealed in Table 4.3, a statistically significantly higher percentage of African American boys who were Not Poor, more than 12 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American boys who were Poor. With respect to the 2018-2019 school year, the Pearson chi-square yielded the presence of a statistically significant difference, $\chi^2(1) = 704.29$, $p < .001$, small effect size, Cramer's V = .19 (Cohen, 1988). A statistically significantly higher percentage of African American boys who were Not Poor, more than 14 percentage points higher, met the STAAR Algebra I End-of-Course exam Masters Grade Level standard than did African American boys who were Poor. Delineated in Table 4.3 are the descriptive statistics for this analysis.

Algebra I End-of-Exam Course Performance Across All Three School Years

In regard to the Approaches Grade Level standard, African American boys who were Not Poor outperformed African American boys who were Poor in all three school years. The percentages of African American boys who were Not Poor and African American boys who were Poor who met the Approaches Grade Level standard consistently increased each school year. Regarding African American boys who were Not Poor, 68.4% met the Approaches Grade Level standard in the 2016-2017 school year, 71.5% met the approaches Grade Level standard in the 2017-2018 school year, and 72.1% met the Approaches Grade Level standard in the 2018-2019 school year. In reference to African American boys who were Poor, 47% met the Approaches Grade Level standard in 2016-2017, 51.8% met the Approaches Grade Level standard in the 2017-2018 school year, and 53.9% met the Approaches Grade Level standard in the 2018-2019 school year. The percentages of African American boys who were Not Poor

and African American boys who were Poor who did not meet this Grade Level standard are depicted in Figure 4.1.

Insert Figure 4.1 about here

With respect to the Meets Grade Level standard, African American boys who were Not Poor consistently outperformed African American boys who were Poor in all three school years. Similar to the Approaches Grade Level standard, African American boys in both poverty levels, Not Poor and Poor, increased in performance after each school year. In the 2016-2017 school year, 36.3% of African American boys who were Not Poor met the Meets Grade Level standard. In the 2017-2018 school year, 41.6% of African American boys who were Not Poor met the Meets Grade Level standard. In the 2018-2019 school year, 45.8% of African American boys who were Not Poor met the Meets Grade Level standard. In the 2016-2017 school year, 20.4 % of African American boys who were Poor met the Meets Grade Level Standard. In the 2017-2018 school year, 17.7% of African American boys who were Poor met the Meets Grade Level standard. In the 2018-2019, 25.7% of African American boys who were Poor met the Meets Grade Level standard. Portrayed in Figure 4.2 are the percentages African American boys who were Not Poor and African American boys who were Poor who did not meet this Grade Level standard for this analysis.

Insert Figure 4.2 about here

In regard to the Masters Grade Level standard, African American boys who were Not Poor consistently outperformed African American boys who were Poor in the 2016-2017, 2017-2018, and 2018-2019 school years. Statistically significant results were present for this Grade Level standard in all three school years. Readers should note the high percentages of African American boys who were Poor who did not meet this Grade Level standard. In reference to African American boys who were Poor, 95.6% did not meet the Masters Grade Level standard in 2016-2017. In the 2017-2018 school year, 93.2% of African American boys who were Poor did not meet the Masters Grade Level standard. In the 2018-2019 school year, 90.5% of African American boys did not meet the Masters Grade Level standard. Depicted in Figure 4.3 are the percentages African American boys who were Not Poor and African American boys who were Poor who did not meet this Grade Level standard for this analysis.

Insert Figure 4.3 about here

Discussion

The performance of African American boys who were Not Poor and African American boys who were Poor on the Algebra I End-of-Course Grade Level performance was addressed in this multiyear investigation. The three Grade Level standards that were investigated were: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Based on the results of this empirical investigation, statistically significant differences were present between African American boys who were Not Poor and African American boys who were Poor for all Grade Level standards.

With respect to the Algebra I End-of-Course exam, statistically significant differences were present in all Grade Level standard for the 2016-2017, 2017-2018, and 2018-2019 school years. African American boys who were Not Poor outperformed African American boys who were Poor in all of the Grade Level standards that yielded statistically significant results. Of concern in performance for all Grade Level standards is that almost one-half of African American boys who were Poor did not meet any Grade Level standard.

Connections to Existing Literature

In this empirical investigation, African American boys who were Not Poor performed statistically significantly higher than African American boys who were Poor in all three of the statistical analyses that were conducted. These results are congruent with the existing research literature. In Texas state-wide study, Alford-Stephens (2016) examined data on the Texas state-mandated mathematics assessment at the high school level to ascertain the extent to which differences were presented in the mathematics skills of African American boys in Texas high schools by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). Findings were the highest passing rates were consistently present for students who were not in poverty whereby students who were Extremely Poor had the lowest passing rates. The results of this investigation also align with Walsh and Theodorakakis (2017) who determined that income inequality has caused a growth in educational inequality. They suggested that growing poverty rates have led to the widening of the achievement between students of color and their peers because family income has an effect on the educational opportunities that are available to children. Findings from this multiyear statewide investigation are also commensurate with the

extant research literature that poverty has detrimental effects on student achievement in mathematics (Davenport & Slate, 2019; Taylor & Slate, 2022).

Implications for Policy and Practice

Based on the results of this multi-year investigation, several implications for policy and practice exist. In regard to policy, due to the gap in the mathematics performance between students who are not in poverty and for students in poverty across the state, policymakers should continue funding educational programs and advocating for students who are Poor as well as other at-risk student groups.

In terms of practice, teachers and district level educators are encouraged to implement intervention strategies focused on African American students and closing of the educational gaps for those students who are Poor. In addition, advocacy for advanced mathematics courses offered to students in poverty should be highly encouraged for districts serving large number of African American students. With this action, schools and districts are promoting general awareness of the consistent gaps between African American students, poor students, other student groups, and their peers.

Recommendations for Future Research

Based on the results of this empirical, multiyear study, several recommendations for future investigations can be made. First, because only data on Grade 9 students were analyzed herein, researchers are recommended to replicate this study in other Grade Level exams to ascertain the degree to which results delineated herein might be generalizable to students in other Grade Levels. Second, only data from the State of Texas were analyzed in this article. As such, researchers are encouraged to extend this study to other states to determine whether the findings described might be generalizable

to African American boys in other states who are Not Poor and Poor. Third, because data on only the Algebra I exam was examined in this investigation, researchers are encouraged to analyze data in English, Biology, and U.S. History. Fourth, African American boys who were Not Poor and Poor were the only student demographics whose data was analyzed. Hence, researchers should consider analyzing performance of other student populations such as at-risk and students in special education. Lastly, researchers should examine the extent to which results in this investigation would be generalizable based on demographic characteristics such as ethnicity/race (i.e., Hispanic and White).

Conclusion

In this article, differences in the performance of African American boys as a function of their economic status on the Texas state-mandated End-of-Course exam in Algebra I were examined. Specifically addressed was the degree to which African American boys who were Not Poor and African American boys who were Poor differed in their performance on three Grade Level performance measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level in the 2016-2017, 2017-2018, and 2018-2019 school years. Inferential statistical analyses revealed that African American boys who were Not Poor had statistically significantly better STAAR Algebra I End-of-Course exam performance than African American boys who were Poor in all three school years.

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Table 4.1

Frequencies and Percentages of STAAR Algebra I End-of-Course Approaches Grade Level Performance Standard of African American Boys by Their Economic Status for All Three School Years

School Year and Economic Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Not Poor	(*n* = 2,011) 31.6%	(*n* = 4,361) 68.4%
Poor	(*n* = 9,417) 53%	(*n* = 8,345) 47%
2017-2018		
Not Poor	(*n* = 1,603) 28.5%	(*n* = 4,029) 71.5%
Poor	(*n* = 8,176) 48.2%	(*n* = 8,795) 51.8%
2018-2019		
Not Poor	(*n* = 1,461) 27.9%	(*n* = 3,780) 72.1%
Poor	(*n* = 7,021) 46.1%	(*n* = 8,202) 53.9%

Table 4.2

Frequencies and Percentages of STAAR Algebra I End-of-Course Meets Grade Level Performance Standard of African American Boys by Their Economic Status for All Three School Years

School Year and Economic Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Not Poor	(*n* = 4,059) 63.7%	(*n* = 2,313) 36.3%
Poor	(*n* = 14,617) 82.3%	(*n* = 3,145) 17.7%
2017-2018		
Not Poor	(*n* = 3,291) 58.4%	(*n* = 2,341) 41.6%
Poor	(*n* = 13,514) 79.6%	(*n* = 3,457) 20.4%
2018-2019		
Not poor	(*n* = 2,843) 54.2%	(*n* = 2,398) 45.8%
Poor	(*n* = 11,310) 74.3%	(*n* = 3,913) 25.7%

Table 4.3

Frequencies and Percentages of STAAR Algebra I End-of-Course Masters Grade Level Performance Standard of African American Boys by Their Economic Status for All Three School Years

School Year and Economic Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
Not Poor	(*n* = 5,425) 85.1%	(*n* = 947) 14.9%
Poor	(*n* = 16,977) 95.6%	(*n* = 785) 4.4%
2017-2018		
Not Poor	(*n* = 4,548) 80.8%	(*n* = 1,084) 19.2%
Poor	(*n* = 15,820) 93.2%	(*n* = 1,151) 6.8%
2018-2019		
Not Poor	(*n* = 3,987) 76.1%	(*n* = 1,254) 23.9%
Poor	(*n* = 13,772) 90.5%	(*n* = 1,451) 9.5%

Figure 4.1

Percentages of African American Boys by Their Economic Status Who Did Not Meet the Algebra I End-of-Course Approaches Grade Level Performance Standard for All Three School Years

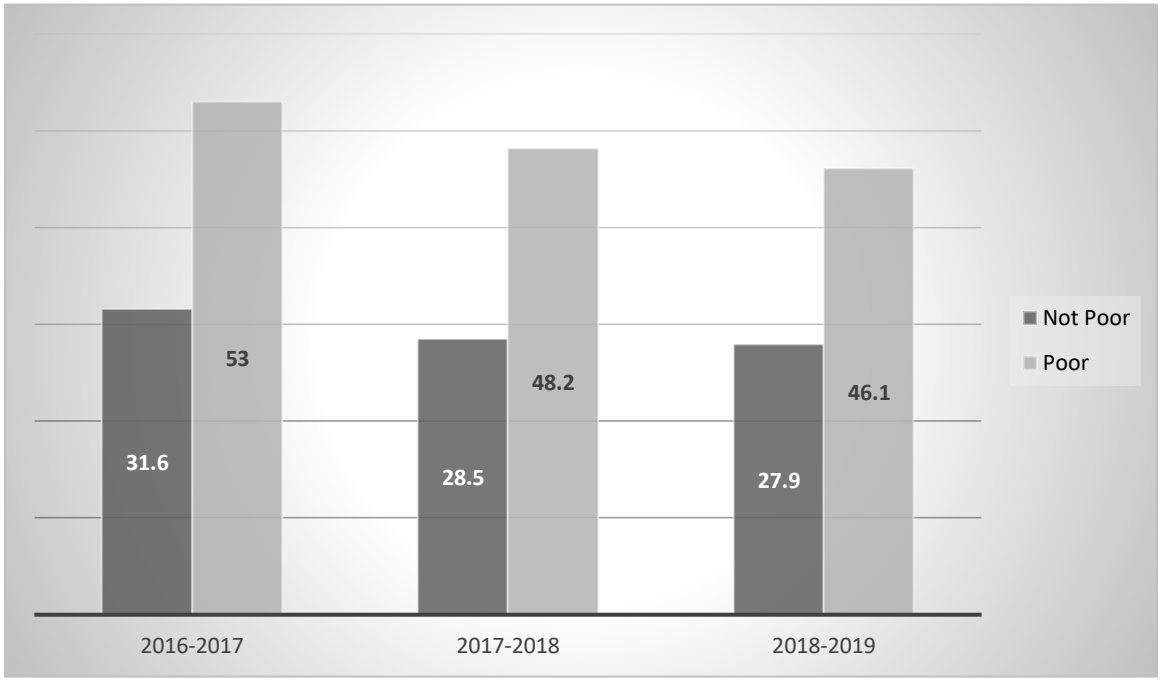


Figure 4.2

Percentages of African American Boys by Their Economic Status Who Did Not Meet the Algebra I End-of-Course Meets Grade Level Performance Standard for All Three School Years

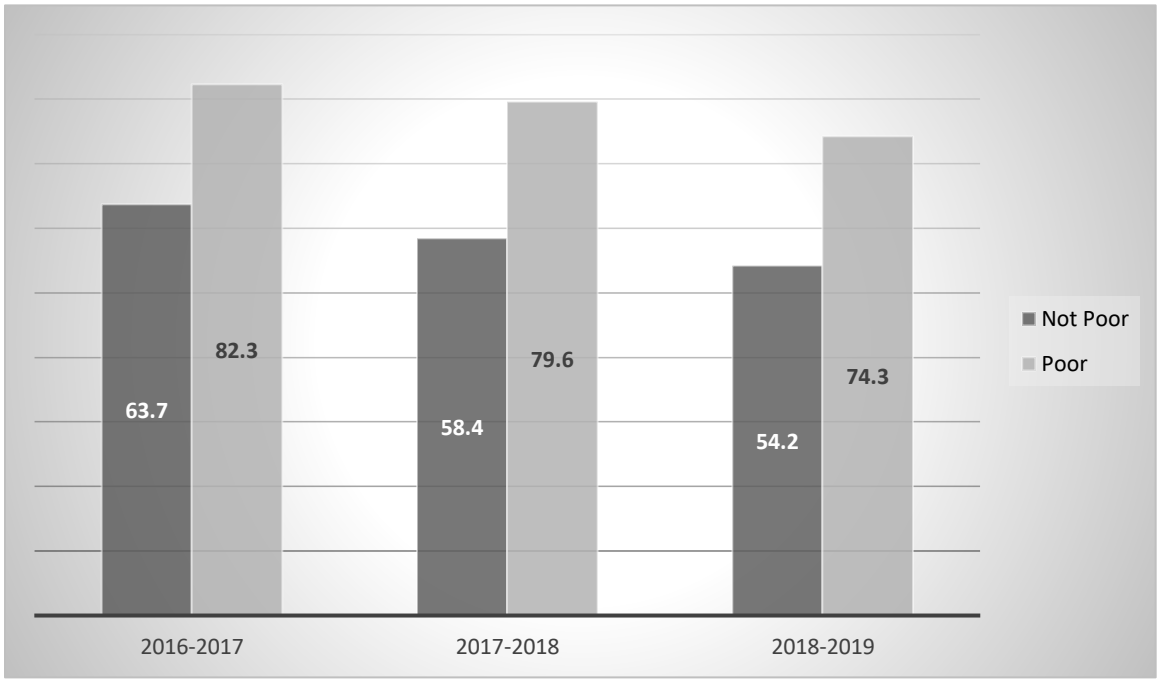
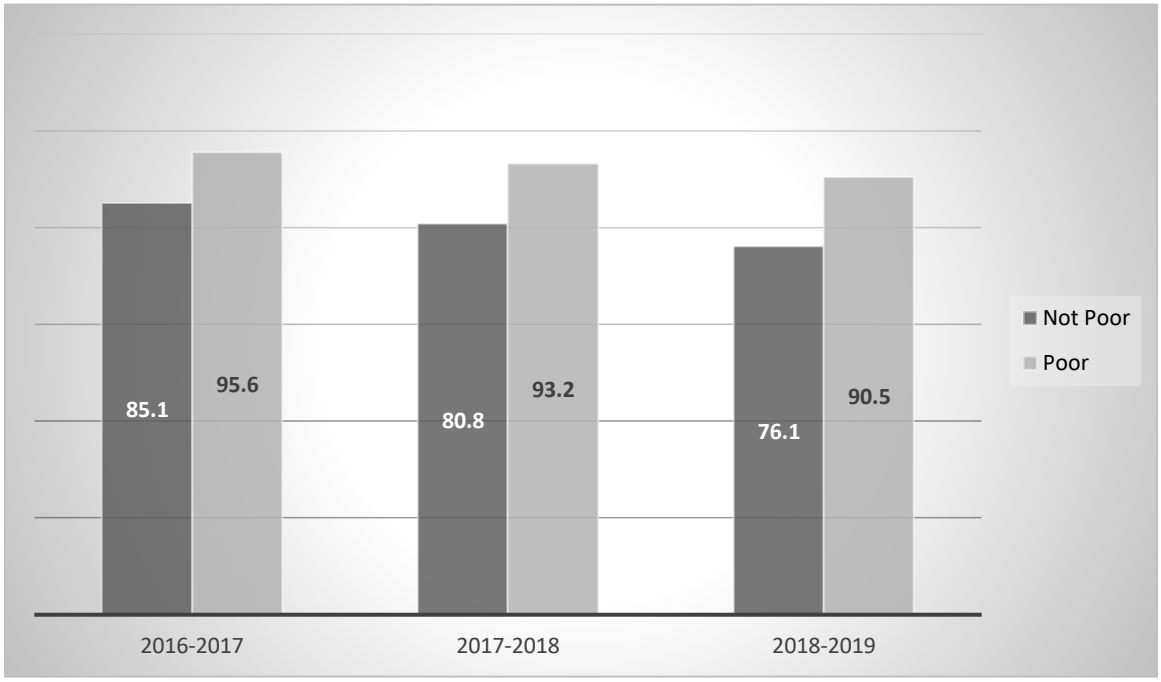


Figure 4.3

Percentages of African American Boys by Their Economic Status Who Did Not Meet the Algebra I End-of-Course Masters Grade Level Performance Standard for All Three School Years



CHAPTER V

DISCUSSION

The purpose of this journal-ready dissertation was to determine the extent to which differences were present for African American boys and girls in their performance on Algebra I Texas state-mandated End-of-Course exam. Specifically examined was the extent to which African American boys and girls differed in their performance on three Grade Level performance measures: Approaches Grade Level standard, Meets Grade Level standard, and Masters Grade Level standard during the 2016-2017, 2017-2018, and 2018-2019 school years. In the first article, the extent to which differences were present for African American boys and girls in their performance by gender on the STAAR Algebra I End-of-Course exam was examined. In the second article, the purpose was to determine whether differences were present for African American girls in their performance on the STAAR Algebra I End-of-Course exams as a function of economic status. In the third and final article, the purpose was to analyze differences in performance of African American boys as a function of their economic status on the STAAR Algebra I End-of-Course exam.

The results for all three of the investigations are discussed in this chapter. Next, implications for policy and practice and recommendations for future research will be provided. Lastly, a summary will then conclude this final chapter in this journal-ready dissertation.

Discussion of Article One Results

In the first article, Algebra I End-of-Course Grade Level performance was investigated by African American student gender. Three Grade Level standards were addressed: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Statistically significant differences were revealed between African American boys and girls for all three Grade Level standards in all three school years. Higher percentages of African American girls met these three grade standards than did African American boys in all three school years.

A concerning focus of the results is almost half of African American boys and more than one-third of African American girls did not meet any Grade Level standard during the 2016-2017 school year. In regard to the 2017-2018 school year, less than half of African American boys and more than one-fourth of African American girls did not meet any Grade Level standard. During the last school year analyzed, more than one-third of African American boys and almost one-fourth of African American girls did not meet any Grade Level standard. The results of the statistical analyses, statistical significance, effect size, and lowest performing groups for the STAAR Algebra I End-of-Course Grade Level standards by African American gender for the 2016-2017, 2017-2018, and 2018-2019 school year are summarized in Table 5.1.

Table 5.1

Summary of Results of STAAR Algebra I End-of-Course Grade Level Standards by African American Gender for All Three School Years.

School Year and Grade Level Standard	Statistically Significant	Effect Size	Lowest Performing Group
Approaches			
2016-2017	Yes	Small	Boys
2017-2018	Yes	Small	Boys
2018-2019	Yes	Small	Boys
Meets			
2016-2017	Yes	Small	Boys
2017-2018	Yes	Small	Boys
2018-2019	Yes	Small	Boys
Masters			
2016-2017	Yes	Small	Boys
2017-2018	Yes	Small	Boys
2018-2019	Yes	Small	Boys

Discussion of Article Two Results

The performance of African American girls on the Algebra I End-of-Course exam as a function of their economic status was addressed in the second article. The same three Grade Level standards that were investigated were: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Based on the results of this empirical investigation, statistically significant differences were present for all Grade Level standards.

With respect to the Algebra I End-of-Course exam, statistically significant differences were present in all Grade Level standards for all three school years. Higher percentages of African American girls who were not economically disadvantaged met the three Grade Level standards than did African American girls who were economically disadvantaged. Of concern for all three Grade Level standards was that more than one-third of African American girls in poverty did not meet any Grade Level standards. The

results of the statistical analyses for the STAAR Algebra I End-of-Course Grade Level standards by African American girls' s economic status for the 2016-2017, 2017-2018, and 2018-2019 school year are summarized in Table 5.2.

Table 5.2

Summary of Results of STAAR Algebra I End-of-Course Grade Level Standards by African American Girls' Economic Status for All Three School Years

School Year and Standard	Statistically Significant	Effect Size	Lowest Performing Group
Approaches			
2016-2017	Yes	Small	Economically Disadvantaged
2017-2018	Yes	Small	Economically Disadvantaged
2018-2019	Yes	Small	Economically Disadvantaged
Meets			
2016-2017	Yes	Small	Economically Disadvantaged
2017-2018	Yes	Small	Economically Disadvantaged
2018-2019	Yes	Small	Economically Disadvantaged
Masters			
2016-2017	Yes	Small	Economically Disadvantaged
2017-2018	Yes	Small	Economically Disadvantaged
2018-2019	Yes	Small	Economically Disadvantaged

Discussion of Article Three Results

In the third article, the STAAR Algebra I End-of-Course Grade Level performance was investigated by African American boys as a function of economic status. Three Grade Level standards were analyzed: Approaches Grade Level, Meets Grade Level, and Masters Grade Level. Statistically significant differences were revealed

between African American boys who were Not Poor and African American boys who were Poor for the Meets Grade Level standard and the Masters Grade Level standard. African American boys who were Not Poor outperformed African American boys who were Poor and in the Approaches Grade Level, Meets Grade Level standard and Masters Grade Level standard for all three school years analyzed. Performance gaps between African American boys who were Not Poor and African American boys who were Poor increased each school year.

Based on the results, more than one-half of African American boys who were Poor did not meet any Grade Level standard during the 2016-2017 school year. The percentage of African American boys who did not meet any Grade Level standard decreased during the 2017-2018 school year because less than one-half of African American boys who were Poor did not meet any Grade Level Standard. During the 2018-2019 school year, more than one-third of African American boys who were Poor did not meet any Grade Level standard. Results of the statistical analyses for the STAAR Algebra I End-of-Course Grade Level standards by African American economic status for the 2016-2017, 2017-2018, and 2018-2019 school year are delineated in Table 5.3.

Table 5.3

Summary of Results of STAAR Algebra I End-of-Course Grade Level Standards by African American Boys' Economic Status for All Three School Years

School Year and Standard	Statistically Significant	Effect Size	Lowest Performing Group
Approaches			
2016-2017	Yes	Small	Economically Disadvantaged
2017-2018	Yes	Small	Economically Disadvantaged
2018-2019	Yes	Small	Economically Disadvantaged
Meets			
2016-2017	Yes	Small	Economically Disadvantaged
2017-2018	Yes	Small	Economically Disadvantaged
2018-2019	Yes	Small	Economically Disadvantaged
Masters			
2016-2017	Yes	Small	Economically Disadvantaged
2017-2018	Yes	Small	Economically Disadvantaged
2018-2019	Yes	Small	Economically Disadvantaged

Connections with the Existing Literature

As evident in this multiyear statewide investigation, African American girls performed statistically significantly higher than African American boys in the three school years of data that were analyzed. These findings are consistent with the Voyer and Voyer (2014) who established that girls consistently receive higher school grades for all course content areas than boys. Although previous researchers have not established clear statistically significant differences between boys and girls, results contained in this study are congruent with the Texas Education Agency (2019) data which showed that on all three mathematics measures, higher percentages of girls met the standards than did boys. Moreover, Paschall et al. (2018) contended that the intersectionality of multiple student demographics (e.g., economic status, gender, or ethnicity/race) should be addressed when performing analyses on educational equity. Findings from this investigation add to the existing research literature that African American girls outperform African American boys, results that are consistent with the extant research literature.

In the second empirical investigation on the Algebra I exams, African American girls who were Not Poor performed statistically significantly higher than African American girls who were Poor in all three of the statistical analyses that were conducted. These results are congruent with the existing research literature. In their study, Davenport and Slate (2019) analyzed the degree to which differences were present in the performance of Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) on the Texas state-mandated mathematics assessment where the same three mathematics measures were compared: Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Their findings were that

Grade 3 students who were Not Poor had the highest passing rates on all three Grade Level standards while Grade 3 students in the Extremely Poor group had the lowest passing rates of the three groups of students on the three Grade Level standards. Readers should note that the aforementioned research included Grade 3 participants whereas this investigation involved high school students. The performance trends are the same in the early grades and secondary grades. These findings further support that the poverty status of students is clearly linked to negative effects on reading, mathematics, and science performance (Davenport & Slate, 2019; Hentges et al., 2019; Pearman, 2019; Singh, 2015). Findings from this multiyear statewide investigation are also commensurate with the extant research literature that poverty has detrimental effects on student achievement in mathematics (Davenport & Slate, 2019; Taylor & Slate, 2022).

As presented in the results of the third investigation about the Algebra I End-of-Course exam, African American boys who were Not Poor performed statistically significantly higher than African American boys who were Poor in all three of the statistical analyses that were conducted. These results are congruent with the existing research literature. In a Texas state-wide study, Alford-Stephens (2016) examined data on the Texas state-mandated mathematics assessment at the high school level to ascertain the extent to which differences were presented in the mathematics skills of African American boys in Texas high schools by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). Findings were the highest passing rates were consistently present for students who were not in poverty whereby students who were Extremely Poor had the lowest passing rates. The results of this investigation also align with Walsh and Theodorakakis (2017) who determined that income inequality has caused a growth in

educational inequality. They suggested that growing poverty rates have led to the widening of the achievement between students of color and their peers because family income has an effect on the educational opportunities that are available to children. Findings from this multiyear statewide investigation are also commensurate with the extant research literature that poverty has detrimental effects on student achievement in mathematics (Davenport & Slate, 2019; Taylor & Slate, 2022).

Implications for Policy and Practice

Several implications for policy and for practice are present based on the findings of this journal-ready investigation. First, policymakers are encouraged to continue funding and advocating for African American students in the state of Texas as achievement gap numbers continue to consistently increase. Additionally, funds and resources should be allocated to communities who serve high populations of African American students, specifically African American students in poverty. These funds should be used to provide families with the necessary academic support to help students when they enter school. Students who are economically disadvantaged should have access to tutorial programs outside of school funded by their local school district or community. Federal and local government entities should allocate extra funds to school districts for mathematics labs that include hands-on relevant, and culturally appropriate scenarios that foster real connections. Lastly, it will be beneficial for students experiencing economic disparities to receive effective Tier 1 instruction with a high-quality curriculum as well as early intervention in mathematics while developing fundamental skills.

In terms of practice, teachers and district level educators are encouraged to implement intervention strategies focused on African American students and closing of the educational gaps for those students who are poor. In addition, advocacy for advanced mathematics courses offered to students in poverty should be highly encouraged for districts serving large number of African American students. At the school level, district leadership should mandate professional development to keep teachers current on strategies educators are encouraged to continue implementing new interventions geared toward African American students in the form of tutorials and general intervention groups. With this action, schools and districts are promoting general awareness of the consistent gaps between African American students, poor students, other student groups, and their peers.

Recommendations for Future Research

Based on the results of the first investigation, several recommendations for future studies can be made. First, only data on African American boys and girls in the State of Texas were the focus of this investigation. As such, researchers are encouraged to extend this study to other states to determine whether these results discussed herein are generalizable to other states. Second, because only Algebra I End-of-Course test data were examined in this investigation, researchers are encouraged to analyze data in Biology, English I, English II, and U.S. History which students in Texas are required to take to fulfill graduation requirements. Third, African American boy and girls were the only student group whose data was analyzed. Hence, researchers should consider analyzing performance for other student groups such as students identified as being at-risk, students enrolled in special education, and students in poverty. Lastly, researchers

should examine the extent to which results in this investigation would be generalizable based on demographic characteristics such as ethnicity/race (i.e., Hispanic, Asian, and White).

Based on the results of the second empirical, multiyear study, several recommendations for future investigations can be made. First, because only data on only high school students were analyzed herein, researchers are recommended to replicate this study in other Grade Level exams to ascertain the degree to which results delineated herein might be generalizable to students in other Grade Levels. Second, only data from the State of Texas were analyzed in this article. As such, researchers are encouraged to extend this study to other states to determine whether the findings described might be generalizable to African American girls in other states who are Not Poor and Poor. Third, because data on only the Algebra I exam was examined in this investigation, researchers are encouraged to analyze data in English, Biology, and U.S. History. Fourth, African American girls who were Not Poor and Poor were the only student demographics whose data was analyzed. Hence, researchers should consider analyzing performance of other student populations such as at-risk and students in special education. Lastly, researchers should examine the extent to which results in this investigation would be generalizable based on demographic characteristics such as ethnicity/race (i.e., Hispanic and White).

Based on the results of the third empirical, multiyear study, several recommendations for future investigations can be made. First, because only data on Grade 9 students were analyzed herein, researchers are recommended to replicate this study in other Grade Level exams to ascertain the degree to which results delineated herein might be generalizable to students in other Grade Levels. Second, only data from

the State of Texas were analyzed in this article. As such, researchers are encouraged to extend this study to other states to determine whether the findings described might be generalizable to African American boys in other states who are Not Poor and Poor. Third, because data on only the Algebra I exam was examined in this investigation, researchers are encouraged to analyze data in English, Biology, and U.S. History. Fourth, African American boys who were Not Poor and Poor were the only student demographics whose data was analyzed. Hence, researchers should consider analyzing performance of other student populations such as at-risk and students in special education. Lastly, researchers should examine the extent to which results in this investigation would be generalizable based on demographic characteristics such as ethnicity/race (i.e., Hispanic and White).

Conclusion

The purpose of this journal-ready dissertation was to determine the extent to which differences were present for African American boys and girls in their performance on the Texas state-mandated End-of-Course exam in Algebra I. Specifically examined was the extent to which African American boys and girls differed in their performance on three Grade Level performance measures: Approaches Grade Level standard, Meets Grade Level standard, and Masters Grade Level standard during the 2016-2017, 2017-2018, and 2018-2019 school years. Statistically significant differences were documented in the Algebra I End-of-Course exam performance of African American boys and girls. Statistically significantly higher percentages of African American girls met the three Grade Level standards in all three school years than did African American boys. Of concern were the high percentages of African American girls and African American boys who did not meet any Grade Level standard.

Concerning the performance of African American girls as a function of economic status on the Algebra I End-of-Course exam and the degree to which African American girls who were Not Poor and African American girls who were Poor differed in their performance on three Grade Level performance measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level in the 2016-2017, 2017-2018, and 2018-2019 school years. Inferential statistical analyses revealed that African American girls who were Not Poor had statistically significantly better STAAR Algebra I End-of-Course exam performance than African American Girls who were Poor in all three school years.

Lastly, the performance of African American boys as a function of economic status on the Algebra I End-of-Course exam results were that African American boys who were Not Poor and African American boys who were Poor differed in their performance on three Grade Level performance measures: Approaches Grade Level, Meets Grade Level, and Masters Grade Level in the 2016-2017, 2017-2018, and 2018-2019 school years. Inferential statistical analyses revealed that African American boys who were Not Poor had statistically significantly better STAAR Algebra I End-of-Course exam performance than African American boys who were Poor in all three school years.

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APPENDIX

Sam Houston STATE UNIVERSITY
A Member of The Texas State University System

Date: May 18, 2023 11:00:27 AM CDT

TO: Latonia Amerson Cynthia Martinez-Garcia
FROM: SHSU IRB
PROJECT TITLE: Differences in Algebra 1 End-Of-Course exam Grade Level Performance of African American Students by Gender and Economic Status: A Multiyear Statewide Investigation
PROTOCOL #: IRB-2023-132
SUBMISSION TYPE: Initial
ACTION: No Human Subjects Research
DECISION DATE: May 18, 2023
OPPORTUNITY TO PROVIDE FEEDBACK: To access the survey, click **here**. It only takes 10 minutes of your time and is voluntary. The results will be used internally to make improvements to the IRB application and/or process. Your feedback will be most appreciated.

Greetings,

In accordance with applicable federal law governing the use of human subjects in research the SHSU Institutional Review Board ("IRB") has reviewed your proposed project entitled "Differences in Algebra 1 End-Of-Course exam Grade Level Performance of African American Students by Gender and Economic Status: A Multiyear Statewide Investigation" and determined that this project does not meet the definition of human subjects research as defined in Title 45 Code of Federal Regulations Part 46 et al (also known as the "Common Rule") - specifically, secondary data analysis of a publicly available dataset. Therefore, this project is not subject to further SHSU IRB oversight. Even so, please remember that you are responsible for ensuring that your study is conducted in an ethical manner and in accordance with applicable law and SHSU policies and procedures. You may initiate your project. Please contact the IRB office at irb@shsu.edu or (936)294-4875 if you need any additional information.

Sincerely,
SHSU Institutional Review Board

VITA

LaTonia M. Amerson

Degrees Earned
Doctor of Education in Educational Leadership, TBD 2023, Sam Houston State University. Dissertation: *Differences in Algebra I End-of-Course Exam Grade Level Performance of African American Students by gender and economic status: A multiyear statewide investigation.*

Master of Education, Sam Houston State University
Educational Leadership, December 2007

Bachelor of Arts, University of Texas at Austin
Sociology, December 1998

Professional Licensure and Certifications
English Language Arts/Social Studies, Grades 4-8
Principal, Grades EC-12
Superintendent, Grades, EC-12

Work or Professional Experiences
2019-current, School Assistant Superintendent
2014-2019 – Principal
2013-2014 – Curriculum Assistant Principal
2008-2013 – Administrative Assistant Principal
2004-2008 – English Teacher
2003-2004 – Substitute Teacher

College Courses Taught
Remedial English, Lone Star College, 2011-2013

Honors and Awards
Aldine ISD Secondary Principal of the Year, 2019

International Presentations
International Baccalaureate Organization (IBO), 2015 International Conference, Personal Project in Urban Schools – Ontario, Canada

Presentations at Professional Meetings
Amerson, L. M. (2022, February). *Leadership Coaching: Perceptions from Novice Principals in an Urban District.* Southwest Education Research Association (SERA), New Orleans, LA.

Professional Organizations

Texas Association of Secondary School Principals (TASSP)
Texas Association of School Administrators (TASA)
Texas Association of Black School Educators (TABSE)
Texas Council of Women School Educators (TCWSE)
Raise Your Hand Texas (RYHT)
Delta Sigma Theta, Sorority, Incorporated