DIFFERENCES IN MATHEMATICS ACHIEVEMENT AS A FUNCTION OF ETHNICITY/RACE AND ECONOMIC STATUS OF TEXAS GRADE 3 STUDENTS: A MULTIYEAR, STATEWIDE INVESTIGATION

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by

Gaylon Christopher Davenport

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DEDICATION

I dedicate this dissertation to my grandparents, Martin E. Guillory Sr., Rosa Mae Guillory, and Mary Davenport. From the day I took my first breath on Earth, they were my biggest and loudest supporters in everything I did. Although two of them will be reading this from Heaven, I know the smiles on their faces are as big as the love they showed me day in and day out. They told me I would be a doctor one day and I did not disappoint them. This is for PawPaw, MeeMaw, and Big Mama.

ABSTRACT

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Purpose

The purpose of this journal-ready dissertation was to determine the degree to which ethnicity/race and economic status of Texas Grade 3 students is related to their mathematics achievement. In the first study, the degree to which ethnic/racial (i.e., Asian, White, Hispanic, Black) differences might be present in the mathematics achievement of Texas Grade 3 students was examined. In the second study, the extent to which economic status (i.e., Poor and Not Poor) is related to the mathematics achievement of Texas Grade 3 Black and Hispanic boys was addressed. In the third study, the degree to which economic (i.e., Poor and Not Poor) differences might be present in the mathematics achievement of Texas Grade 3 Black and Hispanic girls was determined. In all three studies, analyses were performed to determine if any trends are present in the reporting categories and performance levels across three school years (i.e., 2016-2017, 2017-2018, 2018-2019) by the ethnicity/race and economic status of Texas Grade 3 students on the state-mandated mathematics assessment.

Method

For these quantitative analyses, a causal-comparative research design was utilized. Texas statewide archival data from the State of Texas Assessment of Academic Readiness (STAAR) Mathematics assessment for Grade 3 students were requested and obtained from the Texas Education Agency Public Education Information Management System for the 2016-2017, 2017-2018, and 2018-2019 school years.

Findings

Regarding ethnicity/race, a clear stair-step effect was present in that Asian students had the highest mathematics test scores, followed by White students, Hispanic students, and Black students had the lowest mathematics test scores. Concerning economic status, Hispanic and Black boys who were Poor had statistically significantly lower mathematics test scores than Hispanic and Black boys who were Not Poor. With respect to girls of color, Hispanic and Black girls who were Poor had statistically significantly lower mathematics test scores than Hispanic and Black girls who were Not Poor. Results for all three school years and for all three articles were congruent with the existing research literature. Recommendations for future research and implications for policy and practice were provided.

KEYWORDS: Mathematics achievement, Ethnicity/Race, Asian, White, Hispanic, Black, STAAR Mathematics, Grade 3, Texas, Poverty, Economic status, Boys, Girls, Academic achievement, Performance level standards, Economically disadvantaged

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In addition to my parents, I would like to thank my grandparents for the wonderful job they did raising me. Specifically, my grandmother Rosa Guillory, was instrumental in me becoming the man I am today. She raised me as if I was her fourth child and not her first grandchild. Anybody who knows her, knows me because she loves talking about her Gaylon. I spend each day of my life trying to make her proud so she knows the sacrifices she made for me will always be appreciated. From t-ball games to principal visits, she was always in my corner. Without her, I would not have been able to write this dissertation. I am honored to have two angels, Martin Elmo Guillory Sr. and Mary Davenport, watching over me daily. My PawPaw showed me what it was like to be

a man throughout my childhood. He was a provider and a supporter, and I thank him for the lessons I was able to learn from him. My Big Mama was the original educator in the family. She used to tell me growing up that I should look into education and I told her teaching was not for me. However, she knew that teaching was in my blood. I am honored to now be leading a school she once worked at.

I would also like to acknowledge my brother and sister for how they inspire me daily. My brother, Dante Brown, was born with cancer and has never missed a beat in his life. His smile and laughs are infectious, and he will outdance anyone on this Earth. I thank him for showing me that no matter challenges you may face, just smile and get it done. My sister, Madeline Brown, is the true superstar of the family. Every time I set the bar, she comes right behind me and sets it higher. She is unapologetic, determined, fierce, and creative. I look forward to hearing her call me Dr. Brother for the rest of my life.

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Besides the individuals already mentioned, I must acknowledge my educational family. I took a scenic route before I decided to enter the field of education, but it was one of the best decisions of my life. To Dr. HP Hyder III, who took a chance on me in 2013 as a rookie Grade 8 math teacher at Bammel Middle School. My first year was not easy but he continued to mentor and help me become the educational leader I am today. I will always be Brave, Motivated, and Successful thanks to his leadership. A special thank you to Lameisha Watts, Secarra Walton, and Daphne Wilson for keeping me grounded and focused at all times.

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Finally, to all of the Black children in the world, I acknowledge you. There will be good days and there will be bad days. There will be easy paths and there will be hard paths. I hope this dissertation and my words remind you that Black Lives Matter.

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CHAPTER I

INTRODUCTION

In 2015, the United States passed the Every Student Succeeds Act with a purpose of shifting educational authority from the federal government to states and local education agencies (Sharp, 2016). This federal law required that states test all students beginning in Grade 3 mathematics and reading. States are also required to maintain records of how different subgroups of students (e.g., racial/ethnic minorities, students in poverty, and gender) perform on these assessments (Franquiz & Ortiz, 2016). As a part of the new accountability system created by the Texas Education Agency, school districts and their campuses are rated on how well students perform within their subgroups. District and campus leaders are held accountable to ensuring historically underperforming groups (i.e., students of color, students in poverty) are receiving instruction and interventions to close the gaps between their peers.

To measure mathematics achievement, the State of Texas Assessment of Academic Readiness (STAAR) Mathematics test is administered annually beginning with students in Grade 3. The state regularly assesses and monitors the performance of historically underperforming groups, yet little progress has been made in closing the gaps present in most Texas schools, and across the nation for that matter, with regard to literacy and mathematics (e.g., Alford-Stephens, 2016; Davenport & Slate, 2019; Harris, 2018; McGown, 2016). In addition, students with the highest needs, such as special education students, English-speaking learners, ethnic/racial minorities, and students in poverty, continue to be denied free and adequate public education in line with their peers (Ravitch, 2013). In this journal-ready dissertation, the extent to which differences might be present in the mathematics performance of Grade 3 students in Texas as a function of their ethnicity/race and economic status over multiple school years were analyzed.

Review of the Literature on Ethnicity/Racial Gaps in Mathematics Achievement

In 2001, the United States Department of Education passed the No Child Left Behind Act in which states and school districts were required to report the progress they were making on closing ethnic/racial achievement gaps (U.S. Department of Education, 2005). A focus was placed on closing the White-Black and White-Hispanic achievement gaps in the content areas of reading and mathematics. In 2015, a new education policy, the Every Students Succeeds Act, was enacted with mandates of a continued focus on the narrowing of achievement gaps. Maintained in this new law was state and school district accountability to continue to work toward closing racial/ethnic achievement gaps (U.S. Department of Education, 2017). Despite policies targeted at closing these achievement gaps, many researchers (e.g., Braun et al., 2010; Growe & Montgomery, 2003; Reardon, Cimpian, & Weathers, 2015; Reardon & Galindo, 2009; Reardon, Kalogrides, & Shores, 2019; Reardon & Portillo, 2016; Rowley & Wright, 2011; Shirvani, 2009) have discussed how the achievement gap is not closing at an appropriate rate. In fact, researchers (e.g., Fryer & Levitt, 2006; Kuhfeld, Gershoff, & Paschall, 2018; Lee & Burkham, 2002; McDonough, 2015; Reardon, 2011) have documented how students of color enter school with disparities which continue to be present as children progress through school.

Also mandated in the previously mentioned federal laws was that state education leaders and school practitioners must disaggregate student assessment data to ensure all student groups are mastering the content. According to the Nation's Report Card (2019a), only 41% of Grade 4 students in the United States were at or above the proficient level on the National Assessment of Educational Progress Mathematics assessment. Within that percentage, 70% were Asian, 52% were White, 27% were Hispanic, and 20% were Black (The Nation's Report Card, 2019a). These percentages are congruent with previous researchers (e.g., Harris, 2018; Jencks & Phillips, 1998; Lee, 2002; McGown, 2016; Reardon & Galindo, 2009; Saw & Chang, 2018; Schleeter, 2017) who established that Asian students had the highest test scores, followed by White students, Hispanic students, and then Black students in mathematics. These data were indicative of a 32% gap between White and Black students and a 25% gap between White and Hispanic students. Compared to 2009, the White-Black achievement gap and the White-Hispanic achievement gap decreased three and four percentage points, respectively, over 10 years (The Nation's Report Card, 2019a). In Grade 8, one third of the students in the United States were at or above proficient on the National Assessment of Educational Progress Mathematics assessment (The Nation's Report Card, 2019b). Of those students, 64% were Asian, 44% were White, 20% were Hispanic, and 14% were Black. The White-Black and White-Hispanic achievement gaps present for Grade 8 students were almost identical to the gaps present for Grade 4 students.

With regard to the state of interest in this study, Texas, achievement gaps by ethnicity/race in reading have been well documented. In 2018, Harris addressed the presence of ethnic/racial differences in the reading performance of Texas Grade 4 students. Analyzed in her study were three years of data (i.e., 2012-2013, 2013-2014, 2014-2015) from the state-mandated reading assessment, the State of Texas Assessment of Academic Readiness (STAAR) Reading exam, to determine whether ethnic/racial (i.e., Asian, Black, Hispanic, and White) differences were present. In her study, statistically significant ethnic/racial achievement gaps were present in reading for all three school years. Regarding the three reading reporting categories, Asian students outperformed White, Hispanic, and Black students (Harris, 2018). Similarly, White students outperformed Hispanic and Black students. In all three STAAR Reading Reporting categories, Hispanic students had higher reading test scores than their Black peers. With respect to passing rates, Harris (2018) also documented that Asian students had the highest passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading, followed by White students, Hispanic students, and then Black students. Consistent with the national scores previously discussed, racial/ethnic achievement gaps in reading were clearly present on the Texas state-mandated assessment for Grade 4 students.

McGown (2016) conducted a similar study of Texas Grade 3 students. She analyzed the Texas state-mandated reading assessment for the same three school years (i.e., 2012-2013, 2013-2014, 2014-2015) as Harris (2018), with the difference being that her sample consisted of Grade 3 students and the Harris study sample were Grade 4 students. Established in the McGown (2016) investigation were the presence of statistically significant ethnic/racial differences in reading. Similar to Harris (2018), statistically significant differences were present for all four student groups. Regarding the three STAAR Reading Reporting categories, Asian students outperformed White, Hispanic, and Black students (McGown, 2016). Similarly, White students outperformed Hispanic and Black students. In all STAAR Reading Reporting categories, Hispanic students had higher reading test scores than their Black peers. With respect to passing rates, McGown (2016) also determined that Asian students had the highest passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading, followed by White students, Hispanic students, and then Black students. Consistent with the national scores previously discussed and with the Harris (2018) investigation on Grade 4 students, racial/ethnic achievement gaps in reading were clearly present on the Texas state-mandated assessment for Grade 3 students.

In another study conducted in Texas, Schleeter (2017) addressed differences in reading achievement by the ethnicity/race of Grade 3 English Language Learners. Analyzed in his study were the same three school years of data (i.e., 2012-2013, 2013-2014, 2014-2015) as Harris (2018) and McGown (2016) from the Texas state-mandated reading assessment. Similar to Harris (2018) and McGown (2016), statistically significant differences were present for all four student groups. Regarding all three school years, Asian English Language Learners outperformed White English Language Learners, followed by Black English Language Learners, and then Hispanic English Language Learners (Schleeter, 2017).

As of this investigation, only one published article was found in which performance on the Texas state-mandated assessment in mathematics was addressed. In that article, Davenport and Slate (2019) analyzed the degree to which differences were present in the STAAR Mathematics performance of Texas Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) at the Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Grade 3 students who were Not Poor had the highest passing rates on the Approaches Grade Level performance level standard, followed by the Moderately Poor group, and then by Grade 3 students who were Extremely Poor. A clear stair-step effect (Carpenter, Ramirez, & Severn, 2006) was present at the Approaches Grade Level performance level standard. Similarly, at the Meets Grade Level performance level standard, Grade 3 students who were Not Poor had the highest passing rates, followed by the Moderately Poor group, and then by Grade 3 students who were Extremely Poor. Finally, for the Masters Grade Level performance level standard, Grade 3 students who were Not Poor had the highest passing rates, followed by the Moderately Poor group, and then by Grade 3 students who were Extremely Poor. Thus, at all three indicators of mathematics performance, a stair-step effect (Carpenter et al., 2006) was present, 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 a comprehensive analysis of the previous Texas state-mandated assessment, the Texas Assessment of Knowledge and Skills, Alford-Stephens (2016) examined the mathematics performance of Texas high school boys by their ethnicity/race (i.e., Asian, Black, Hispanic, and White). She analyzed data from the 2004-2005 through the 2011-2012 school years. In her multiyear, statewide analyses, she documented the presence of statistically significant ethnic/racial differences in mathematics performance in each of the eight school years examined. Throughout the 8-year period, Asian boys had the highest met standard percentage, followed by White boys. White boys had a higher met standard percentage than Hispanic boys and Black boys. For all eight years analyzed, Black boys had the lowest met standard percentage. A stair-step effect (Carpenter et al., 2006) was present, with respect to ethnicity/race at the met standard proficiency level.

These findings were consistent with previous literature of established ethnic/racial achievement gaps in mathematics.

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

According to the National Center for Children in Poverty (2018b), 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 Black and Hispanic children than it is for White and Asian children. In 2018, 61% of Black children were classified as poor and 59% of Hispanic children were classified as poor (National Center for Children of Poverty 2018b). This percentage is considerably higher than the number 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 of Poverty, 2018b).

As it relates to the state of interest for this article, Texas, 48% of children in the state were classified as poor (National Center for Children in Poverty, 2018a). This statistic represents a percentage that is seven percentage points higher than the national average. Black children in Texas were classified as poor at a rate of 58%, three percentage points lower than the national average. Hispanic children in Texas were classified as poor at a rate of 63%, representative of a rate four percentage points higher than the national average (National Center for Children in Poverty, 2018a).

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; Reardon, 2011) have focused on the effects of these student demographic characteristics separately, Paschall, Gershoff, and Kuhfeld (2018) examined the mathematics and reading achievement of students based on interactions between poverty and ethnicity/race. Their data were indicative of substantial gaps in achievement scores between students of color in poverty and students of color not in poverty. Paschall et al. (2018) also stated that researchers who include demographic data but only analyze one dimension (e.g., economic status, gender, or ethnicity/race) may lead to a false indication of progress in educational equity. Researchers (e.g., Fryer & Levitt, 2010; Reardon & Robinson, 2008) have established that gender differences in mathematics grow at a similar rate to racial/ethnic differences and economic status differences.

In a nationwide study, Kuhfeld, Gershoff, and Paschall (2018) examined the academic development in mathematics and reading of students based on their race/ethnicity and poverty status. They established that White students in poverty outperformed both Black and Hispanic students who were in poverty in mathematics and reading. 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 Black and Hispanic students not in poverty. Their findings were consistent with other researchers (e.g., Fryer & Levitt, 2006; Lee & Burkham, 2002; McDonough, 2015; Reardon, 2011) who have established that students of color enter school with academic gaps that persist or grow as children progress through school. Finally, Kuhfeld et al. (2018) contended that poverty plays a role in delineating racial/ethnic gaps but does not sufficiently explain the gaps by itself.

In a recent statewide study in Texas, Hamilton and Slate (2019) analyzed the reading achievement of Grade 3 students of color by their economic status (i.e., Poor and

Not Poor). Analyzed in their study were data from the Texas state mandated assessment, the State of Texas Assessment of Academic Readiness (STAAR) Reading assessment from the 2015-2016 school year. In their study, statistically significant gaps were present in reading by the economic status of both Black and Hispanic students. Regarding the three passing standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level), Black and Hispanic students who were Poor performed statistically significantly poorer than their Black and Hispanic peers who were Not Poor.

In 2018, Harris conducted a study, also in Texas, to determine the extent to which differences were present in the reading achievement of Texas Grade 4 students as a function of their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). Results from three years of data (i.e., 2012-2013, 2013-2014, 2014-2015) from the STAAR Reading assessment were indicative of statistically significant differences for all three school years. In the three STAAR Reading Reporting categories, students who were Extremely Poor had statistically significantly lower reading scores than their peers who were Moderately Poor and their peers who were Not Poor, and students who were Moderately Poor had statistically significantly lower reading scores than their peers who were Not Poor for all three school years (Harris, 2018). A clear stair-step effect was present in all three school years for all three reporting categories (Carpenter, Ramirez, & Severn, 2006). With regard to passing rates, Harris (2018) established that in all three school years (i.e., 2012-2013, 2013-2014, 2014-2015) students who were Extremely Poor had the lowest passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading than students who were Moderately Poor and students who were Not

Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor.

Similar to Harris (2018), McGown (2016) addressed the degree to which differences existed in the reading performance of Texas Grade 3 students by their economic status. Included in her study were results from the Texas state-mandated reading assessment for three school years (i.e., 2012-2013, 2013-2013, 2014-2015). McGown established a clear stair-step effect (Carpenter et al., 2006) for all three school years in the three STAAR Reading Reporting categories. McGown (2016) documented that Texas Grade 3 students who were Extremely Poor had statistically significant lower reading scores than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower reading test scores than students who were Not Poor all three school years. Regarding passing rates, McGown (2016) established that students who were Extremely Poor had lower passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading than students who were Moderately Poor and students who were Not Poor, and students who were Moderately poor had lower passing rates than students who were Not Poor. Consistent with the findings from in the Harris (2018) investigation on Texas Grade 4 students, economic achievement gaps in reading were clearly present for Texas Grade 3 students.

Rojas-LeBouef (2010) conducted a study of Grade 5 White and Hispanic students in Texas. In her study, data from both previously used Texas state-mandated assessments, the Texas Assessment of Knowledge and Skills and the Texas Assessment of Academic Skills, were analyzed from the 1993-1994 school year through the 2008-2009 school year. Established in the Rojas-LeBouef (2010) study were the presence of statistically significant differences in the mathematics passing rates for Grade 5 White and Hispanic students in Texas. For all 16 years analyzed in this study, Hispanic students had lower passing rates than their White peers. The largest achievement gap between Hispanic students and White students was 13.61% and occurred in the 1993-1994 school year and the smallest achievement gap between Hispanic students and White students was 1.50% in the 2001-2002 school year (Rojas-LeBouef, 2010). Over the 16-year time period, Hispanic students were outperformed by their White peers by an average of 7.76% in mathematics.

In 2016, Alford-Stephens examined data from the previously used Texas state-mandated assessment, the Texas Assessment of Knowledge and Skills, to ascertain the extent to which differences were presented in the mathematics skills of Black 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, Black boys who were Extremely Poor performed more poorly than Black boys who were Moderately Poor and more poorly than Black boys who were Not Poor in all 10 mathematics skills (Alford-Stephens, 2016).

With respect to this article, the most recent published article on mathematics and poverty that could be located was conducted by Davenport and Slate (2019). In their study, Davenport and Slate (2019) examined data from the STAAR Mathematics assessment to determine the extent to which economic status was related to the mathematics performance of Grade 3 students in Texas. Mathematics performance was defined by the STAAR Performance Levels (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level). At the Approaches Grade Level standard, Grade 3 students who were Extremely Poor had lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor. Regarding the Meets Grade Level standard, Grade 3 students in Texas who were Extremely Poor had lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor. Similarly, at the Masters Grade Level standard, students who were Extremely Poor had lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor. At all three performance level standards, Davenport and Slate (2019) established the presence of a clear stair-step effect (Carpenter et al., 2006) was present in the mathematics performance of Grade 3 students in Texas by their economic status. Students who were Extremely Poor had the lowest passing rates at all three performance levels followed by students who were Moderately Poor and students who were Not Poor had the highest passing rates.

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

Difficulties in mathematics that start for students at an early age often persist through adulthood (Kiss, Nelson, & Christ, 2019). Researchers (e.g., Geary, Hoard, Nugent, & Bailey, 2012; Jordan & Hanich, 2003; Vukovic, 2012) have stated that mathematics achievement gaps evident in preschool remain in Grade 5 and often increase each year. Kiss et al. (2019) determined the importance of identifying concepts where students may struggle as well as identifying the contributing factors. Previous researchers (e.g., Duncan et al., 2007; Eccles, Vida, & Barber, 2004; Starkey, Klein, & Wakeley, 2004; Vortruba-Drzal, 2006) have indicated that ethnicity/race, poverty, and gender are contributing factors in students' mathematics achievement.

In 2016, the National Science Board stated that women were underrepresented in the fields of science, technology, engineering, and mathematics (STEM). More specifically, the authors reported that the underrepresentation was especially present for Black and Hispanic women. Researchers (e.g., Beasley & Fischer, 2012; Leaper, Farkas, & Brown, 2012; Saw, Chang, & Chan, 2018) have provided evidence that students who are female, Black, Hispanic, or low socioeconomic are less likely to develop and maintain an interest in STEM fields than their peers who are male, White, or from higher socioeconomic backgrounds. The development of an interest in the STEM fields is correlated to student achievement in mathematics (Sadler, Sonnert, Hazari, & Tai, 2014; Tyson, Lee, Borman, & Hanson, 2007)

The intersection of ethnicity/race and gender is prevalent when it comes to mathematics achievement for Black and Hispanic girls (Evans-Winters & Esposito, 2010; Larke, Young, & Young, 2011; Young, 2016). According to the Nation's Report Card (2019c), Black students in Grade 4 were outperformed by 25 points by their White peers on the 2015 National Assessment of Educational Progress Mathematics assessments. Hispanic students were outperformed by 18 points by their White counterparts on the 2015 National Assessment of Educational Progress Mathematics Assessment. With regard to gender, girls in Grade 4 were outperformed by 3 points by their male peers (The Nation's Report Card, 2019c).

In the State of Texas, poverty is well documented because of the high percentage of students who are economically disadvantaged. During the 2018-2019 school year, 61% of Texas students were identified as economically disadvantaged (Texas Education Agency, 2019b). 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 identified as economically disadvantaged. According to the Texas Education Agency (2019b), 74% of Black students and 76% of Hispanic students were living in poverty during the 2018-2019 school year. With high percentages of students living in poverty and researchers (e.g., Conradi, Amendum, & Liebfreund, 2016; McGown & Slate, 2017; Owens, 2010) 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.

Differences in the reading achievement of Texas students by gender, ethnicity/race, or economic status have been well documented (Harris, 2018; McGown, 2016; Schleeter, 2017). These studies were limited as these researchers did not perform analyses of the poverty differences within a given ethnic/racial group. In a recent study, Hamilton and Slate (2019) analyzed Texas statewide data of Grade 3 Black and Hispanic students who took the State of Texas Assessment of Academic Readiness (STAAR) Reading exam during the 2015-2016 school year. Statistically significant differences were present in the reading achievement of Grade 3 Black and Hispanic students by their economic status (Hamilton & Slate, 2019). Black students who were poor were outperformed by Black students who not poor at the Approaches Grade Level, Meets Grade Level, and Masters Grade Level STAAR Performance Level Standards (Hamilton & Slate, 2019). Similarly, Hispanic students who were poor were outperformed by Hispanic students who were not poor at all three STAAR Performance Level Standards (Hamilton & Slate, 2019).

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 assessment. Data from the Grade 5 and Grade 8 STAAR Mathematics exam were examined to ascertain if differences were present in the performance of Grade 5 and Grade 8 students 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 as a function of 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).

Anderson (2016) also examined the extent to which ethnic/racial differences were present in the mathematics performance of Grade 5 and Grade 8 students. Analyzed in her study were data from the STAAR Mathematics exam for four school years.

Statistically significant differences were revealed in both Grade 5 and Grade 8, with Black and Hispanic students performing lower than their peers who were White and Asian (Anderson, 2016). A stair-step effect (Carpenter et al., 2006) was present for each year with Asian students having the highest scores followed by White, Hispanic, and Black students.

In 2019, Davenport and Slate addressed the effect of poverty on mathematics performance for students in Texas. Statewide data from the STAAR Mathematics assessment for the 2015-2016 school year was used to ascertain the degree to which differences were present in the mathematics performance of Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). For mathematics performance, the STAAR Performance Level Standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) were used. Grade 3 students who were Extremely Poor had statistically significant lower passing rates than students who were Moderately Poor and students who were Not Poor at the Approaches Grade Level standard, and students who were Moderately Poor had statistically significant lower passing rates than students who were Not Poor at the Approaches Grade Level standard (Davenport & Slate, 2019). At the Meets Grade Level standard, Grade 3 students who were Extremely Poor had statistically significant lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had statistically significant lower passing rates than students who were Not Poor. Finally, at the Masters Grade Level standard, students who were Extremely Poor had statistically significant lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had statistically significant lower passing rates than students who were Not Poor (Davenport & Slate, 2019). Davenport and Slate (2019) documented the presence of a clear stair-step effect (Carpenter et al., 2006) at all three performance level standards. The lowest passing rates were present for students who were Extremely Poor; the next lowest passing rates were present for students who were Moderately Poor; and the highest passing rates were present for students who were Not Poor.

Statement of the Problem

Since the United States Supreme Court decision in Brown vs. The Board of Education of Topeka, education has been viewed as a way for all individuals, regardless of their background, to succeed in life (Colleen & Carlos, 2001). However, researchers (e.g., Barton & Coley, 2010; Paschall et al., 2018) have established achievement gaps based on ethnicity/race are still present, although some researchers (e.g., Burchinal et al., 2011; Reardon & Portilla, 2016) have discussed how gains have been made that have resulted in slight decreases in the gaps from 1998 to 2010. Reardon and Galindo (2009) reported the gaps in achievement between White and Hispanic students were narrowing at a faster pace than the gaps between White and Black students. In 2019a, documented in the Nation's Report Card was a mathematics achievement gap of 32 percentage points between White and Black students and a 24 percentage point gap between White and Hispanic students. Researchers (e.g., Alford-Stephens, 2016; Harris, 2018; McGown, 2016; Schleeter, 2017) have established the presence of achievement gaps in Texas which are consistent with national research on ethnic/racial achievement gaps in that Asian and White students are achieving at a higher level than their peers who are Black and Hispanic in the area of reading. An extensive search of the extant research literature, however, revealed the presence of only one published article (Davenport & Slate, 2019) on the mathematics performance of Texas Grade 3 students. Thus, one aim of this study is on Texas Grade 3 students and the degree to which ethnicity/race is related to their mathematics achievement on the state-mandated mathematics assessment.

Duncan et al. (2007) listed early mathematics achievement as the strongest predictor of later academic success in school for children. Paschall, Gershoff, and Kuhfeld (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. Previous researchers (David & Marchant, 2015; Wang, Shen, & Byrnes, 2013) stated that students from low income families are at risk for many social and academic disadvantages. Over 61% of public school students in Texas were from low income families (Texas Education Agency, 2019b). With high percentages of Black and Hispanic students in poverty in the State of Texas, 74% and 76% respectively (Texas Education Agency, 2019b), it is important to understand the educational inequities that may be present.

Relationships between poverty and mathematics achievement have been examined (e.g., Alford-Stephens, 2016; Anderson, 2016; and Davenport and Slate, 2019) for the state of Texas. Researchers (e.g., Alford-Stephens, 2016; Anderson, 2016; Rojas-LeBouef, 2010) have also examined the relationships between ethnicity/race and mathematics achievement. Concerning the intersection of economic status and ethnicity/race, few studies (e.g., Alford-Stephens, 2016; Hamilton & Slate, 2019) about students in the State of Texas could be located. Alford-Stephens (2016) focused only on the mathematics achievement of Black boys in Texas high schools by their economic status. Hamilton and Slate (2019) focused only on the reading achievement of Black and Hispanic students in Grade 3 by their economic status. Halpern et al. (2007) listed a wide range of social and personal factors that may contribute to the gender differences seen in mathematics achievement. Accordingly, it is crucial to analyze economic difference of both boys and girls to understand how to close educational gaps. Therefore, in this journal-ready dissertation, the focus was placed on Grade 3 boys of color and Grade 3 girls of color and the extent to which economic differences were present on the state-mandated assessment in Texas.

Purpose of the Study

The purpose of this journal-ready dissertation was to determine the degree to which the ethnicity/race and economic status of Texas Grade 3 students was related to their mathematics achievement. In the first study, the degree to which ethnic/racial (i.e., Asian, White, Hispanic, Black) differences were present in the mathematics achievement of Texas Grade 3 students was examined. In the second study, the extent to which economic status (i.e., Poor and Not Poor) was related to the mathematics achievement of Texas Grade 3 Black and Hispanic boys was addressed. In the third study, the degree to which economic (i.e., Poor and Not Poor) differences existed in the mathematics achievement of Texas Grade 3 Black and Hispanic girls was determined. In all three studies, analyses were performed to determine whether trends were present in the reporting categories and performance levels across three school years (i.e., 2016-2017, 2017-2018, 2018-2019) by the ethnicity/race and economic status of Texas Grade 3 students on the state-mandated mathematics assessment.

Significance of the Study

Previous researchers (e.g., Anderson, 2016; Davenport & Slate, 2019; Harris; 2018; McGown, 2016; Rojas-LeBouef, 2010; Schleeter, 2017) have established the presence of statistically significant differences in the academic performance of Texas students as a function of their economic status or ethnicity/race. However, few researchers (e.g., Alford-Stephens, 2016; Hamilton & Slate, 2019) analyzed how the combination of both economic status and ethnicity/race affects academic performance. Alford-Stephens (2016) documented economic differences in the mathematics performance of Black boys enrolled in Texas high schools on the previously used state-mandated assessment. Hamilton and Slate (2019) established that statistically significant differences were present in the reading performance of Texas Grade 3 Black and Hispanic students by their economic status. Currently, no published studies regarding the mathematics performance of Texas boys of color or Texas girls of color by their economic status could be located in the literature. Findings from this study can increase the available information on this salient topic. Stakeholders (e.g., district and campus leaders, curriculum writers, and policymakers) could benefit from this study by gaining an understanding on how economic status affects students of color.

Definition of Terms

The following key terms for the three research studies in this journal-ready dissertation are defined below.

Approaches Grade Level

Differentiated in the STAAR Mathematics assessment are three levels of performance. Students achieving the Masters Grade Level performance standard exhibit the ability to apply the tested knowledge and skills in familiar contexts (Texas Education Agency, 2017). Students in this performance standard group are likely to be successful in the next grade level with targeted academic interventions.

Asian

The Texas Education Agency (2018a) defined a person of Asian descent as "having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam" (p. 4).

Black

A person of Black descent is defined as "a non-Hispanic person having origins in any of the Black racial groups of Africa" (Texas Education Agency, 2018a, p. 4).

Economically Disadvantaged

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). 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).

Ethnicity/Race

The United States Census Bureau defined race as the self-identification of a person with one or more groups in society. A person may identify as Asian, Black, White or some other race. Ethnicity is defined as a person who is of Hispanic origin or not (United State Census Bureau, 2017, p. 1).

Hispanic

The Texas Education Agency (2018a) defined Hispanic as an individual “of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race” (p. 4).

Low Income Family

Families and children are considered to be low income if the family income is less than two times the federal poverty line of $24,339 in 2016 (National Center for Children in Poverty, 2018b).

Masters Grade Level

Differentiated in the STAAR Mathematics assessment are three levels of performance. Students achieving the Masters Grade Level performance standard exhibit the ability to think critically and apply the tested knowledge and skills in familiar contexts and unfamiliar contexts (Texas Education Agency, 2017). Students in this performance standard group are likely to be successful in the next grade level with minimal to no targeted academic interventions.

Meets Grade Level

Differentiated in the STAAR Mathematics assessment are three levels of performance. Students achieving the Meets Grade Level performance standard exhibit the ability to think critically and apply the tested knowledge and skills in familiar contexts (Texas Education Agency, 2017). Students in this performance standard group are likely to be successful in the next grade level with short-term targeted academic interventions.

Public Education Information Management System

The Public Education Information Management System consists of all public education information requested and provided by the Texas Education Agency, including student demographic and academic performance, personal, financial, and organizational information. The Public Education Information Management System database only contains the data required for the legislature and the Texas Education Agency to conduct its legally authorized functions in the supervision of public education (Public Education Information Management System Overview, 2018).

Reporting Category 1

The STAAR Mathematics assessment consists of four categories. In Reporting Category 1, students are assessed over numerical representations and relationships (Texas Education Agency, 2014). The Texas Education Agency (2014) stated "the student will be able to demonstrate an understanding of how to represent and manipulate numbers and expressions" (p. 3) with regard to Reporting Category 1. In addition, this reporting category consists of eight assessment questions (Texas Education Agency, 2016).

Reporting Category 2

The STAAR Mathematics assessment consists of four categories. In Reporting Category 2, students are assessed over computations and algebraic relationships. Regarding Reporting Category 2, "the student will demonstrate an understanding of how to perform operations and represent algebraic relationships" (Texas Education Agency, 2014, p. 5). In addition, this reporting category consists of 13 assessment questions (Texas Education Agency, 2016).

Reporting Category 3

The STAAR Mathematics assessment consists of four categories. In Reporting Category 3, students are assessed over geometry and measurement. With regard to this reporting category, the Texas Education Agency stated, "the student will demonstrate an understanding of how to represent and apply geometry and measurement concepts" (2014, p. 7). In addition, this reporting category consists of seven assessment questions (Texas Education Agency, 2016).

Reporting Category 4

The STAAR Mathematics assessment consists of four categories. In Reporting Category 4, students are assessed over data analysis and personal financial literacy. The Texas Education Agency (2014) stated "the student will be able to demonstrate an understanding of how to analyze data and how to describe and apply personal financial concepts" (p. 9) in regard to Reporting Category 4. In addition, this reporting category consists of four assessment questions (Texas Education Agency, 2016).

State of Texas Assessment of Academic Readiness (STAAR)

Since 2012, Texas has used a standardized test called the State of Texas Assessments of Academic Readiness (STAAR) to monitor student academic achievement based on the state curriculum standards. Students are administered a Mathematics assessment from Grade 4-8. Additionally, high school students enrolled in Algebra 1 are required to take a mathematics end-of-course exam (Texas Education Agency, 2018c).

Texas Education Agency

The Texas Education Agency is the state agency that oversees the public education of students in primary and secondary schools. Currently, the Texas Education

Agency provides educational services to more than five million students (Texas Education Agency, About TEA, 2018b).

White

A person of White descent is defined as “as person having origins in any of the original peoples of Europe, the Middle East, or North Africa” (Texas Education Agency, 2018a, p. 4).

Literature Review Search Procedures

For this journal-ready dissertation, the literature regarding academic achievement of students and its relationship with ethnicity/race, economic status, and gender was reviewed. To identify the available literature, the phrases mathematics achievement, poverty, ethnicity/race, minority, boys, and girls were used. The searches of literature for this journal-ready dissertation were performed through the EBSCO Host database for academic journals. Articles were filtered to include only those published works that were peer reviewed and published within the last 10 years.

Delimitations

For the purpose of this journal-ready dissertation, only the mathematics achievement of Texas Grade 3 students was analyzed. A delimitation is that only three school years (i.e., 2016-2017, 2017-2018, 2018-2019) of STAAR data were examined. This delimitation restricted the generalizability to these three school years. Another delimitation is the definition of economic status was limited to the definition provided by the federal government for the purposes of free and reduced lunch. The final delimitation is that data were analyzed on only the four major ethnic/racial groups in Texas (i.e., Asian, Black, Hispanic, and White).

Limitations

For the purpose of this journal-ready dissertation, only the mathematics achievement of Texas Grade 3 students was examined. The use of archival data in this study presents a limitation in that the independent variables (i.e., ethnicity/race and economic status) and the dependent variable (i.e., mathematics achievement) were not controlled (Johnson & Christensen, 2020). Other variables outside of student ethnicity/race and economic status could have contributed to differences in the mathematics achievement of Texas Grade 3 students. Because Grade 3 is the first year students are mandated to take the STAAR test, their familiarization with standardized testing is limited.

Assumptions

For the purpose of this journal-ready dissertation, the assumption was made that the mathematics achievement data and that the ethnicity/race, economic status, and gender of Texas Grade 3 students were accurately reported by the Texas Education Agency Public Education Information Management System. Also assumed was the consistency and validity in which STAAR Mathematics test scores were collected from schools. Therefore, any changes to these assumptions could lead to inaccurate data and conflicting results.

Procedures

For this journal-ready dissertation, approval was requested by this researcher's dissertation committee. Once approval was obtained from the dissertation committee, additional approval was requested from the Sam Houston State University Institutional Review Board. After both approvals were obtained, archival data that have been previously obtained for Grade 3 students who took the STAAR Mathematics assessment in the 2016-2017, 2017-2018, 2018-2019 school years were analyzed.

Organization of the Study

In this journal-ready dissertation, three research investigations occurred. In the first article, the degree to which differences were present in the mathematics achievement of Texas Grade 3 students as a function of their ethnicity/race (i.e., Asian, Black, Hispanic, and White) for the 2016-2017, 2017-2018, and 2018-2019 school years was addressed. In the second article, the degree to which differences were present in the mathematics achievement of Texas Grade 3 boys of color (i.e., Black and Hispanic) as a function of their economic status (i.e., Poor and Not Poor) for the 2016-2017, 2017-2018, and 2018-2019 school years was analyzed. In the third article, the degree to which differences existed in the mathematics achievement of Texas Grade 3 girls of color (i.e., Black and Hispanic) as a function of their economic status (i.e., Poor and Not Poor) for the 2016-2017, 2017-2018, and 2018-2019 school years was examined.

This journal-ready dissertation contains five chapters. Chapter I includes the background of the study, statement of the problem, purpose of the study, significance of the study, definition of terms, delimitations, limitations, assumptions and outline of the journal-ready study. Chapter II contains the background information for the first journal-ready article involving student ethnicity/race and mathematics achievement. Chapter III contains the background information for the second journal-ready article concerning economic status and mathematics achievement of boys of color (i.e., Black and Hispanic). Chapter IV contains the background information for the third journal-ready article regarding economic status and mathematics achievement for girls of color (i.e., Black and Hispanic). Lastly, in Chapter V, the results interpreted in the three research articles were discussed.

CHAPTER II

DIFFERENCES IN MATHEMATICS PERFORMANCE BY THE ETHNICITY/RACE OF TEXAS GRADE 3 STUDENTS: A MULTIYEAR, STATEWIDE STUDY

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

Abstract

In this investigation, the extent to which differences were present in the mathematics achievement by the ethnicity/race of Grade 3 students in Texas were analyzed. Data obtained from the Texas Education Agency Public Education Information Management System for all Texas Grade 3 students who took the State of Texas Assessment of Academic Readiness Mathematics exam were examined for the 2016-2017, 2017-2018, and 2018-2019 school years. In all three years analyzed, statistically significant differences were revealed in overall mathematics achievement and in all four Mathematics Reporting categories. Inferential statistical analyses revealed a clear stair-step effect. Asian students were the highest performing ethnic/racial group in all four Mathematics Reporting categories and all three performance level standards, followed by White, Hispanic, and Black students. Suggestions for future research and implications for policy and practice were provided.

Keywords: Mathematics achievement; Ethnicity/Race; Asian; White; Hispanic; Black; STAAR mathematics; Grade 3; Texas.

DIFFERENCES IN MATHEMATICS PERFORMANCE BY THE ETHNICITY/RACE OF TEXAS GRADE 3 STUDENTS: A MULTIYEAR, STATEWIDE STUDY

In 2001, the United States Department of Education passed the No Child Left Behind Act in which states and school districts were required to report the progress they were making on closing ethnic/racial achievement gaps (U.S. Department of Education, 2005). A focus was placed on closing the White-Black and White-Hispanic achievement gaps in the content areas of reading and mathematics. In 2015, a new education policy, the Every Students Succeeds Act, was enacted with mandates of a continued focus on the narrowing of achievement gaps. Maintained in this new law was state and school district accountability to continue to work toward closing racial/ethnic achievement gaps (U.S. Department of Education, 2017). Despite policies targeted at closing these achievement gaps, many researchers (e.g., Braun, Chapman, & Vezzu, 2010; Growe & Montgomery, 2003; Reardon, Cimpian, & Weathers, 2015; Reardon & Galindo, 2009; Reardon, Kalogrides, & Shores, 2019; Reardon & Portillo, 2016; Rowley & Wright, 2011; Shirvani, 2009) have established that the achievement gap is not closing at an appropriate rate. In fact, researchers (e.g., Fryer & Levitt, 2006; Kuhfeld, Gershoff, & Paschall, 2018; Lee & Burkham, 2002; McDonough, 2015; Reardon, 2011) have documented how students of color enter school with disparities which continue to be present as children progress through school.

Also mandated in the previously mentioned federal laws was that state education leaders and school practitioners must disaggregate student assessment data to ensure all student groups are mastering the content. According to the Nation’s Report Card (2019a), only 41% of Grade 4 students in the United States were at or above the proficient level on the National Assessment of Educational Progress Mathematics assessment. Within that percentage, 70% were Asian, 52% were White, 27% were Hispanic, and 20% were Black (The Nation's Report Card, 2019a). These percentages are congruent with previous researchers (e.g., Harris, 2018; Jencks & Phillips, 1998; Lee, 2002; McGown, 2016; Reardon & Galindo, 2009; Saw & Chang, 2018; Schleeter, 2017) who established that Asian students had the highest test scores, followed by White students, Hispanic students, and then Black students in mathematics. These data are indicative of a 32% gap between White and Black students and a 25% gap between White and Hispanic students. Compared to 2009, the White-Black achievement gap and the White-Hispanic achievement gap decreased three and four percentage points, respectively, over 10 years (The Nation's Report Card, 2019a). In Grade 8, one third of the students in the United States were at or above proficient on the National Assessment of Educational Progress Mathematics assessment (The Nation's Report Card, 2019b). Of those students, 64% were Asian, 44% were White, 20% were Hispanic, and 14% were Black. The White-Black and White-Hispanic achievement gaps present for Grade 8 students were almost identical to the gaps present for Grade 4 students.

With regard to the state of interest in this study, Texas, achievement gaps by ethnicity/race in reading have been well documented. In 2018, Harris addressed the presence of ethnic/racial differences in the reading performance of Texas Grade 4 students. Analyzed in her study were three years of data (i.e., 2012-2013, 2013-2014, 2014-2015) from the state-mandated reading assessment, the State of Texas Assessment of Academic Readiness (STAAR) Reading exam, to determine whether ethnic/racial (i.e., Asian, Black, Hispanic, and White) differences were present. In her study, statistically significant ethnic/racial achievement gaps were present in reading for all three school years. Regarding the three reading reporting categories, Asian students outperformed White, Hispanic, and Black students (Harris, 2018). Similarly, White students outperformed Hispanic and Black students. In all three STAAR Reading Reporting categories, Hispanic students had higher reading test scores than their Black peers. With respect to passing rates, Harris (2018) also documented that Asian students had the highest passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading, followed by White students, Hispanic students, and then Black students. Consistent with the national scores previously discussed, racial/ethnic achievement gaps in reading were clearly present on the Texas state-mandated assessment for Grade 4 students.

McGown (2016) conducted a similar study of Texas Grade 3 students. She analyzed the Texas state-mandated reading assessment for the same three school years (i.e., 2012-2013, 2013-2014, 2014-2015) as Harris (2018), with the difference being that her sample consisted of Grade 3 students and the Harris study sample were Grade 4 students. Established in the McGown (2016) investigation were the presence of statistically significant ethnic/racial differences in reading. Similar to Harris (2018), statistically significant differences were present for all four student groups. Regarding the three STAAR Reading Reporting categories, Asian students outperformed White, Hispanic, and Black students (McGown, 2016). Similarly, White students outperformed Hispanic and Black students. In all STAAR Reading Reporting categories, Hispanic students had higher reading test scores than their Black peers. With respect to passing rates, McGown (2016) also determined that Asian students had the highest passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading, followed by White students, Hispanic students, and then Black students. Consistent with the national scores previously discussed and with the Harris (2018) investigation on Grade 4 students, racial/ethnic achievement gaps in reading were clearly present on the Texas state-mandated assessment for Grade 3 students.

In another study conducted in Texas, Schleeter (2017) addressed differences in reading achievement by the ethnicity/race of Grade 3 English Language Learners. Analyzed in his study were the same three school years of data (i.e., 2012-2013, 2013-2014, 2014-2015) as Harris (2018) and McGown (2016) from the Texas state-mandated reading assessment. Similar to Harris (2018) and McGown (2016), statistically significant differences were present for all four student groups. Regarding all three school years, Asian English Language Learners outperformed White English Language Learners, followed by Black English Language Learners, and then Hispanic English Language Learners (Schleeter, 2017).

As of this investigation, only one published article was located in which performance on the Texas state-mandated assessment in mathematics was addressed. In that article, Davenport and Slate (2019) analyzed the degree to which differences were present in the STAAR Mathematics performance of Texas Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor) at the Approaches Grade Level, Meets Grade Level, and Masters Grade Level performance standards. Grade 3 students who were Not Poor had the highest passing rates on the Approaches Grade Level performance level, followed by the Moderately Poor group, and then by Grade 3 students who were Extremely Poor. A clear stair-step effect (Carpenter, Ramirez, & Severn, 2006) was present at the Approaches Grade Level performance level. Similarly, at the Meets Grade Level performance level, Grade 3 students who were Not Poor had the highest passing rates, followed by the Moderately Poor group, and then by Grade 3 students who were Extremely Poor. Finally, for the Masters Grade Level performance level, Grade 3 students who were Not Poor had the highest passing rates, followed by the Moderately Poor group, and then by Grade 3 students who were Extremely Poor. Thus, at all three indicators of mathematics performance, a stair-step effect (Carpenter et al., 2006) was present, 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 a comprehensive analysis of the previous Texas state-mandated assessment, the Texas Assessment of Knowledge and Skills, Alford-Stephens (2016) analyzed the mathematics performance of Texas high school boys by their ethnicity/race (i.e., Asian, Black, Hispanic, and White). She analyzed data from the 2004-2005 through the 2011-2012 school years. In her multiyear, statewide analyses, she documented the presence of statistically significant ethnic/racial differences in mathematics performance in each of the eight school years examined. Throughout the 8-year time period, Asian boys had the highest met standard percentage, followed by White boys. White boys had a higher met standard percentage than Hispanic boys and Black boys. For all eight years analyzed, Black boys had the lowest met standard percentage. A stair-step effect (Carpenter et al., 2006) was present, with respect to ethnicity/race at the met standard proficiency level.

These findings were consistent with previous literature of ethnic/racial achievement gaps in mathematics.

Statement of the Problem

Since the United States Supreme Court decision in Brown vs. The Board of Education of Topeka, education has been viewed as a way for all individuals, regardless of their background, to succeed in life (Colleen & Carlos, 2001). However, researchers (e.g., Barton & Coley, 2010; Paschall, Gershoff, & Kuhfeld, 2018) have established achievement gaps based on ethnicity/race are still present, although some researchers (e.g., Burchinal et al., 2011; Reardon & Portilla, 2016) have discussed how gains have been made that have resulted in slight decreases in the gaps from 1998 to 2010. Reardon and Galindo (2009) reported the gaps in achievement between White and Hispanic students were narrowing at a faster pace than the gaps between White and Black students. Documented in the 2019 Nation's Report Card was a mathematics achievement gap of 32 percentage points between White and Black students in Grade 4 and a 24 percentage point gap between White and Hispanic students in Grade 4.

The State of Texas gives school campuses and school districts accountability scores on their closing of achievement gaps between the subpopulations they serve (Texas Education Agency, 2019). Researchers (e.g., Alford-Stephens, 2016; Harris, 2018; McGown, 2016; Schleeter, 2017) have established the presence of achievement gaps in Texas which are consistent with national research on ethnic/racial achievement gaps in that Asian and White students are achieving at a higher level than their peers who are Black and Hispanic in the area of reading. An extensive search of the extant research literature, however, revealed the presence of only one published article (Davenport & Slate, 2019) on the mathematics performance of Texas students.

Purpose of the Study

The purpose of this study was to determine the degree to which ethnicity/race (i.e., Asian, Black, Hispanic, and White) of Texas Grade 3 students is related to their mathematics performance. Specifically addressed herein was the degree to which differences were present by the ethnicity/race of Texas Grade 3 students on the STAAR Mathematics Reporting Categories. Also examined was the extent to which ethnic/racial differences existed in the percentages of Texas Grade 3 students achieving at the three performance levels (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level). The final purpose of this study was to determine if any trends were present in the reporting categories and performance levels across three school years (i.e., 2016-2017, 2017-2018, 2018-2019) by the ethnicity/race of Texas Grade 3 students.

Significance of the Study

Prior researchers (e.g., Harris, 2018; McGown, 2016; Schleeter, 2017) have documented the presence of statistically significant differences in the reading performance of Texas students on the state-mandated assessment over a 3-year time period. Alford-Stephens (2016) established ethnic/racial differences in the mathematics performance of Texas students on the previously used state-mandated assessment over an 8-year time period. Currently, the published research literature regarding the mathematics performance of Texas students by ethnicity/race on the current state-mandated assessment is minimal. Findings from this study can increase the literature on this topic. In addition, policymakers and practitioners can use these findings to understand how students from different ethnic/racial backgrounds learn and understand different mathematical concepts.

Research Questions

In this study, the following overarching research question was addressed: What is the difference in mathematics performance by the ethnicity/race (i.e., Asian, White, Hispanic, and Black) of Texas Grade 3 students? Specific subquestions under this overarching research question were: (a) What is the difference in numerical representations and relationships by the ethnicity/race of Texas Grade 3 students?; (b) What is the difference in computations and algebraic relationships by the ethnicity/race of Texas Grade 3 students?; (c) What is the difference in geometry and measurement by the ethnicity/race of Texas Grade 3 students?; (d) What is the difference in data analysis and personal financial literacy by the ethnicity/race of Texas Grade 3 students?; (e) What is the difference in performance on the Approaches Grade Level standard by the ethnicity/race of Texas Grade 3 students?; (f) What is the difference in performance on the Meets Grade Level standard by the ethnicity/race of Texas Grade 3 students?; (g) What is the difference in performance on the Masters Grade Level standard by the ethnicity/race of Texas Grade 3 students?; and (h) What is the degree to which trends are present in mathematics by the ethnicity/race of Texas Grade 3 students? The first seven research subquestions were addressed for three school years, whereas the last research question involved a comparison of results across all three school years.

Method

Research Design

For this study, the research design was a quantitative, non-experimental, causal comparative (Johnson & Christensen, 2020). Because the independent variables and dependent variables had already taken place, a causal comparative design was used to find relationships between independent and dependent variables (Johnson & Christensen, 2020). In this study, the mathematics achievement of Grade 3 students in Texas was analyzed to determine the extent to which ethnic/racial differences might be present. The independent variable in this study is the ethnicity/race (i.e., Asian, White, Hispanic, Black) of Grade 3 students in Texas. The dependent variables in this study were the STAAR Mathematics Reporting Categories (i.e., Reporting Category 1, Reporting Category 2, Reporting Category 3, and Reporting Category 4) and the three STAAR Mathematics performance levels (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) for Grade 3 Students in Texas.

Participants and Instrumentation

Participants in this study were Grade 3 students in Texas who had taken the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. Data were requested from the Texas Education Agency Public Education Information Management System. Analyses were conducted based on student ethnicity/race (i.e., Asian, White, Hispanic, Black), performance level (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level), and across the four STAAR Mathematics Reporting Categories (i.e. Reporting Category 1, Reporting Category 2, Reporting Category 3, and Reporting Category 4).

Mathematics achievement was determined based on the four STAAR Mathematics Reporting Categories. In Reporting Category 1, students are assessed over their ability to understand numerical representations and relationships. STAAR Mathematics Reporting Category 2 measures student ability to understand algebraic relationships and computations. Assessed in Reporting Category 3 is the ability for students to understand geometry and measurement. Finally, in Reporting Category 4, student ability to understand data analysis and financial literacy is measured.

In addition to the STAAR Mathematics Reporting Categories, three performance level standards were analyzed in this study. In 2017, the Texas Education Agency introduced three performance levels to determine how well students performed on the STAAR Mathematics Assessment (Texas Education Agency, 2017). The Approaches Grade Level standard predicts that students will be likely to succeed in the next grade level or course with targeted academic interventions to assist in the student's academic progress (Texas Education Agency, 2017). In the Meets Grade Level standard, students will be expected to succeed in the next grade level with some form of short-term, targeted academic interventions. Students who perform in the Masters Grade Level standard are expected to succeed in the next grade level. The students in this category will need very little to no academic intervention (Texas Education Agency, 2017).

Results

Prior to conducting multivariate analysis of variance (MANOVA) statistical procedures, its underlying assumptions were checked. Specifically examined were data normality, Box's Test of Equality of Covariance and the Levene's Test of Equality of Error Variance. Although a majority of these assumptions were not met, the robustness of the MANOVA procedure made it appropriate to use in this study (Field, 2009). Results of statistical analyses by the ethnicity/race of Grade 3 students in Texas who took the STAAR Mathematics assessment will be described by Mathematics Reporting Category in chronological order for the 2016-2017, 2017-2018, and 2018-2019 school years.

Overall Results Across All Three School Years

With respect to the 2016-2017 school year, the MANOVA revealed a statistically significant difference in overall mathematics performance by the ethnicity/race of Texas Grade 3 students, Wilks' $\Lambda = .90$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1998). Regarding the 2017-2018 school year, the MANOVA yielded a statistically significant difference, Wilks' $\Lambda = .88$, $p < .001$, partial $\eta^2 = .04$, in overall mathematics performance as a function of student ethnicity/race. According to Cohen (1988), the effect size for this statistically significant difference was small. Concerning the 2018-2019 school year, a statistically significant difference was again present in overall mathematics performance, Wilks' $\Lambda = .87$, $p < .001$, partial $\eta^2 = .04$. Using Cohen's (1988) criteria, the effect size was small. In all three school years, effect sizes were small for the statistically significant differences in overall mathematics performance of Texas Grade 3 students by their ethnicity/race.

Mathematics Reporting Category 1 Results Across All Three School Years

Following the overall results of the MANOVA, univariate follow-up Analysis of Variance (ANOVA) procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 1 scores by student ethnicity/race for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 1 by ethnicity/race, $F(2, 212283) = 6662.25$, $p < .001$, partial $\eta^2 = .09$, moderate effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 1 by ethnicity/race, $F(2, 176326) = 5166.69$, $p < .001$, partial $\eta^2 = .08$, moderate effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 1 by ethnicity/race, $F(2, 165811) = 5946.50$, $p < .001$, partial $\eta^2 = .10$, moderate effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 1, the effect sizes for the statistically significant differences on the STAAR Mathematics Reporting Category 1 by ethnicity/race were moderate for all three school years.

To determine which ethnic/racial pairings were statistically significantly different, Scheffe' post hoc procedures were conducted. Statistically significant differences on the STAAR Mathematics Reporting Category 1 were revealed for all of the ethnic/racial comparisons. With respect to the 2016-2017 school year, Asian students answered 0.72 more items correctly than White students, 1.68 more items correctly than Hispanic students, and 2.31 more items correctly than Black students. Similarly, White students answered 0.96 more items correctly than Hispanic students and 1.59 more items correctly than Black students. Hispanic students answered 0.63 more items correctly, on average, than Black students. Black students were the lowest performing group on the STAAR Mathematics Reporting Category 1 for the 2016-2017 school year.

For the 2017-2018 school year, Asian students answered 0.60 more items correctly than White students, 1.42 more items correctly than Hispanic students, and 2.11

more items correctly than Black students. Similarly, White students answered 0.82 more items correctly than Hispanic students and 1.51 more items correctly than Black students. Hispanic students answered 0.68 more items correctly than Black students. Again, Black students were the lowest performing group on the STAAR Mathematics Reporting Category 1 for the 2017-2018 school year.

Concerning the 2018-2019 school year, Asian students answered 0.70 more items correctly than White students, 1.60 more items correctly than Hispanic students, and 2.15 more items correctly than Black students. Similarly, White students answered 0.90 more items correctly than Hispanic students and 1.45 more items correctly than Black students. Hispanic students answered 0.55 more items correctly than Black students. Black students were again the lowest performing group on the STAAR Mathematics Reporting Category 1 for the 2018-2019 school year.

For STAAR Mathematics Reporting Category 1, a clear stair-step effect (Carpenter, Ramirez, & Severn, 2006) was present for all three school years. In all three school years, Asian students outperformed White, Hispanic, and Black students; White students outperformed Hispanic and Black students; and Hispanic students outperformed Black students. Black students had the poorest mathematics scores in all three school years. Descriptive statistics for these analyses are contained in Table 2.1.

Insert Table 2.1 about here

Mathematics Reporting Category 2 Results Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 2 by ethnicity/race, $F(2, 212283) = 6195.78$, $p < .001$, partial $\eta^2 = .08$, moderate effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 2 by ethnicity/race, $F(2, 176326) = 6714.64$, $p < .001$, partial $\eta^2 = .10$, moderate effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 2 by ethnicity/race, $F(2, 165811) = 6801.15$, $p < .001$, partial $\eta^2 = .11$, moderate effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 2, effect sizes were moderate for all three school years.

Following the three follow-up ANOVA procedures, Scheffe' post hoc procedures were conducted to determine which ethnic/racial pairings were statistically significantly different. Statistically significant differences on the STAAR Mathematics Reporting Category 2 were revealed for all of the ethnic/racial comparisons. With respect to the 2016-2017 school year, Asian students answered 1.42 more items correctly than White students, 2.84 more items correctly than Hispanic students, and 4.00 more items correctly than Black students. Similarly, White students answered 1.42 more items correctly than Hispanic students and 2.59 more items correctly than Black students. Hispanic students answered 1.16 more items correctly, on average, than Black students. Black students were the lowest performing group on the STAAR Mathematics Reporting Category 2 for the 2016-2017 school year.

For the 2017-2018 school year, Asian students answered 1.43 more items correctly than White students, 3.06 more items correctly than Hispanic students, and 4.05 more items correctly than Black students. Similarly, White students answered 1.64 more items correctly than Hispanic students and 2.63 more items correctly than Black students. Hispanic students answered 0.99 more items correctly than Black students. Again, Black students were the lowest performing group on the STAAR Mathematics Reporting Category 2 for the 2017-2018 school year.

Concerning the 2018-2019 school year, Asian students answered 1.21 more items correctly than White students, 2.82 more items correctly than Hispanic students, and 3.88 more items correctly than Black students. Similarly, White students answered 1.61 more items correctly than Hispanic students and 2.67 more items correctly than Black students. Hispanic students answered 1.06 more items correctly than Black students. Black students were again the lowest performing group on the STAAR Mathematics Reporting Category 2 for the 2018-2019 school year.

For STAAR Mathematics Reporting Category 2, a clear stair-step effect (Carpenter et al., 2006) was present for all three school years. In all three school years, Asian students outperformed White, Hispanic, and Black students; White students outperformed Hispanic and Black students; and Hispanic students outperformed Black students. Black students had the poorest mathematics scores in all three school years. Descriptive statistics for these analyses are contained in Table 2.2.

Insert Table 2.2 about here

Mathematics Reporting Category 3 Results Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 3 by ethnicity/race, $F(2, 212283) = 5894.83$, $p < .001$, partial $\eta^2 = .08$, moderate effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 3 by ethnicity/race, $F(2, 176326) = 5030.75$, $p < .001$, partial $\eta^2 = .08$, moderate effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 3 by ethnicity/race, $F(2, 165811) = 4897.95$, $p < .001$, partial $\eta^2 = .08$, moderate effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 3, effect sizes were moderate for all three school years.

Next, Scheffe' post hoc procedures revealed the presence of statistically significant differences on the STAAR Mathematics Reporting Category 3 for all ethnic/racial comparisons. With respect to the 2016-2017 school year, Asian students answered 0.76 more items correctly than White students, 1.53 more items correctly than Hispanic students, and 2.05 more items correctly than Black students. Similarly, White students answered 0.76 more items correctly than Hispanic students and 1.29 more items correctly than Black students. Hispanic students answered 0.53 more items correctly, on average, than Black students. Black students were the lowest performing group on the STAAR Mathematics Reporting Category 3 for the 2016-2017 school year.

For the 2017-2018 school year, Asian students answered 0.88 more items correctly than White students, 1.59 more items correctly than Hispanic students, and 2.13 more items correctly than Black students. Similarly, White students answered 0.71 more items correctly than Hispanic students and 1.25 more items correctly than Black students. Hispanic students answered 0.54 more items correctly than Black students. Again, Black students were the lowest performing group on the STAAR Mathematics Reporting Category 3 for the 2017-2018 school year.

Concerning the 2018-2019 school year, Asian students answered 0.63 more items correctly than White students, 1.31 more items correctly than Hispanic students, and 1.91 more items correctly than Black students. Similarly, White students answered 0.67 more items correctly than Hispanic students and 1.28 more items correctly than Black students. Hispanic students answered 0.60 more items correctly than Black students. Black students were again the lowest performing group on the STAAR Mathematics Reporting Category 3 for the 2018-2019 school year.

For the STAAR Mathematics Reporting Category 3, a clear stair-step effect (Carpenter et al., 2006) was present for all three school years. In all three school years, Asian students outperformed White, Hispanic, and Black students; White students outperformed Hispanic and Black students; and Hispanic students outperformed Black students. Black students had the poorest mathematics scores in all three school years. Descriptive statistics for these analyses are contained in Table 2.3.

Insert Table 2.3 about here

Mathematics Reporting Category 4 Results Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 4 by ethnicity/race, $F(2, 212283) = 4058.93$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 4 by ethnicity/race, $F(2, 176326) = 3211.55$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 4 by ethnicity/race, $F(2, 165811) = 2535.16$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 4, effect sizes were small for all three school years.

Scheffe' post hoc procedures were next conducted and revealed the presence of statistically significant differences on the STAAR Mathematics Reporting Category 4 for all ethnic/racial comparisons. With respect to the 2016-2017 school year, Asian students answered 0.44 more items correctly than White students, 0.80 more items correctly than Hispanic students, and 1.21 more items correctly than Black students. Similarly, White students answered 0.36 more items correctly than Hispanic students and 0.78 more items correctly than Black students. Hispanic students answered 0.42 more items correctly, on average, than Black students. Black students were the lowest performing group on the STAAR Mathematics Reporting Category 4 for the 2016-2017 school year.

For the 2017-2018 school year, Asian students answered 0.28 more items correctly than White students, 0.63 more items correctly than Hispanic students, and 1.00 more items correctly than Black students. Similarly, White students answered 0.35 more items correctly than Hispanic students and 0.72 more items correctly than Black students. Hispanic students answered 0.37 more items correctly than Black students. Again, Black students were the lowest performing group on the STAAR Mathematics Reporting Category 4 for the 2017-2018 school year.

Concerning the 2018-2019 school year, Asian students answered 0.33 more items correctly than White students, 0.58 more items correctly than Hispanic students, and 0.89 more items correctly than Black students. Similarly, White students answered 0.25 more items correctly than Hispanic students and 0.56 more items correctly than Black students. Hispanic students answered 0.31 more items correctly than Black students. Black students were again the lowest performing group on the STAAR Mathematics Reporting Category 4 for the 2018-2019 school year.

With respect to the STAAR Mathematics Reporting Category 4, a clear stair-step effect (Carpenter et al., 2006) was present for all three school years. In all three school years, Asian students outperformed White, Hispanic, and Black students; White students outperformed Hispanic and Black students; and Hispanic students outperformed Black students. Black students had the poorest mathematics scores in all three school years. Table 2.4 contains the descriptive statistics for these analyses.

Insert Table 2.4 about here

Results for the STAAR Mathematics Approaches Grade Level Standard Across All Three School Years

Student performance on the STAAR Mathematics Approaches Grade Level standard was examined next through the use of Pearson chi-square procedures. This statistical procedure was the optimal statistical procedure to use because dichotomous data were present for the STAAR Mathematics Approaches Grade Level standard (i.e., met or did not meet this standard) and categorical data were present for ethnicity/race (i.e., Asian, White, Hispanic, Black). As such, the Pearson chi-square is the preferred statistical procedure when both variables are categorical (Field, 2009). Because a large sample size was present, the assumptions for using a chi-square were met.

With respect to the STAAR Mathematics Approaches Grade Level standard by the ethnicity/race of Grade 3 students, the result for the 2016-2017 school year was statistically significant, $\chi^2(2) = 11683.95$, $p < .001$, small effect size, Cramer's V of .24 (Cohen, 1988). Statistically significantly higher percentages of Asian students met the STAAR Mathematics Approaches Grade Level standard than White, Hispanic, and Black students. Asian students had 6.5% more students who met the STAAR Mathematics Approaches Grade Level standard than White students, 21.1% more than Hispanic students, and 34.9% more than Black students. White students had 14.6% more students who met this standard than Hispanic students and 28.6% more than Black students. Hispanic students had 14% more students who met this standard than Black students. Black students had the lowest percentages who met the Approaches Grade Level standard for the 2016-2017 school year. Table 2.5 contains the frequencies and percentages for this school year.

Insert Table 2.5 about here

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(2) = 9605.03$, $p < .001$, small effect size, Cramer's V of .23 (Cohen, 1988). As delineated in Table 2.5, Asian students had 5.3% more students who met the STAAR Mathematics Approaches Grade Level standard than White students, 18.7% more than Hispanic students, and 32% more than Black students. White students had 13.4% more students who met this standard than Hispanic students and 26.7% more than Black students. Hispanic students had 13.3% more students who met this standard than Black students.

Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(2) = 9657.93$, $p < .001$, small effect size, Cramer's V of .24 (Cohen, 1988). As presented in Table 2.5, Asian students had 4.7% more students who met the STAAR Mathematics Approaches Grade Level standard than White students, 18.1% more than Hispanic students, and 31.7% more than Black students. White students had 13.4% more students who met this standard than Hispanic students and 27% more than Black students. Hispanic students had 13.6% more students who met this standard than Black students.

With respect to the STAAR Mathematics Approaches Grade Level Standard, a clear stair-step effect (Carpenter et al., 2006) was present for all three school years. In all three school years, Asian students were the highest performing group to meet the Approaches Grade Level standard, followed by White, Hispanic, and Black students. White students had the second highest percentage of students who met this performance standard, followed by Hispanic students. In all three school years, Black students had the lowest percentage of students who met this mathematics performance standard.

Results for the STAAR Mathematics Meets Grade Level Standard Across All Three School Years

With respect to the STAAR Mathematics Meets Grade Level standard by the ethnicity/race of Grade 3 students, the result for the 2016-2017 school year was statistically significant, $\chi^2(2) = 16728.56.95$, $p < .001$, small effect size, Cramer's V of .28 (Cohen, 1988). Statistically significantly higher percentages of Asian students met the STAAR Mathematics Meets Grade Level standard than White, Hispanic, and Black students. Asian students had 22.2% more students who met the STAAR Mathematics Meets Grade Level standard than White students, 44.4% more than Hispanic students, and 58.1% more than Black students. White students had 22.2% more students who met this standard than Hispanic students and 25.9% more than Black students. Hispanic students had 16.7% more students who met this standard than Black students. Black students had the lowest percentages who met the Meets Grade Level standard for the 2016-2017 school year. Table 2.6 contains the frequencies and percentages for this school year.

Insert Table 2.6 about here

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(2) = 15786.91$, $p < .001$, moderate effect size, Cramer's V of .30 (Cohen, 1988). As delineated in Table 2.6, Asian students had 21.7% more students who met the

STAAR Mathematics Meets Grade Level standard than White students, 44.7% more than Hispanic students, and 59.3% more than Black students. White students had 23% more students who met this standard than Hispanic students and 36.6% more than Black students. Hispanic students had 14.6% more students who met this standard than Black students.

Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(2) = 15848.13$, $p < .001$, moderate effect size, Cramer's V of .31 (Cohen, 1988). As presented in Table 2.6, Asian students had 4.7% more students who met the STAAR Mathematics Meets Grade Level standard than White students, 18.1% more than Hispanic students, and 31.7% more than Black students. White students had 13.4% more students who met this standard than Hispanic students and 27% more than Black students. Hispanic students had 13.6% more students who met this standard than Black students.

With respect to the STAAR Mathematics Meets Grade Level Standard, a clear stair-step effect (Carpenter et al., 2006) was present for all three school years. In all three school years, Asian students were the highest performing group to meet the Meets Grade Level standard, followed by White, Hispanic, and Black students. White students had the second highest percentage of students who met this performance standard, followed by Hispanic students. In all three school years, Black students had the lowest percentage of students who met this mathematics performance standard.

Results for the STAAR Mathematics Masters Grade Level Standard Across All Three School Years

With respect to the STAAR Mathematics Masters Grade Level standard by the ethnicity/race of Grade 3 students, the result for the 2016-2017 school year was statistically significant, $\chi^2(2) = 15205.24$, $p < .001$, small effect size, Cramer's V of .27 (Cohen, 1988). Statistically significantly higher percentages of Asian students met the STAAR Mathematics Masters Grade Level standard than White, Hispanic, and Black students. Asian students had 30.5% more students who met the STAAR Mathematics Masters Grade Level standard than White students, 48.1% more than Hispanic students, and 56.4% more than Black students. White students had 17.6% more students who met this standard than Hispanic students and 25.9% more than Black students. Hispanic students had 8.3% more students who met this standard than Black students. Black students had the lowest percentages who met the Masters Grade Level standard for the 2016-2017 school year. Table 2.7 contains the frequencies and percentages for this school year.

Insert Table 2.7 about here

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(2) = 15178.82$, $p < .001$, small effect size, Cramer's V of .29 (Cohen, 1988). As delineated in Table 2.7, Asian students had 30.8% more students who met the STAAR Mathematics Masters Grade Level standard than White students, 50.3% more than Hispanic students, and 58.3% more than Black students. White students had 19.5% more students who met this standard than Hispanic students and 27.5% more than Black students. Hispanic students had 8% more students who met this standard than Black students.

Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(2) = 15383.09$, $p < .001$, moderate effect size, Cramer's V of .30 (Cohen, 1988). As presented in Table 2.7, Asian students had 28.3% more students who met the STAAR Mathematics Masters Grade Level standard than White students, 49.4% more than Hispanic students, and 57.7% more than Black students. White students had 21.1% more students who met this standard than Hispanic students and 29.4% more than Black students. Hispanic students had 8.3% more students who met this standard than Black students.

With respect to the STAAR Mathematics Masters Grade Level Standard, a clear stair-step effect (Carpenter et al., 2006) was present for all three school years. In all three school years, Asian students were the highest performing group to meet the Masters Grade Level standard, followed by White, Hispanic, and Black students. White students had the second highest percentage of students who met this performance standard, followed by Hispanic students. In all three school years, Black students had the lowest percentage of students who met this mathematics performance standard.

Trends in Mathematics Performance by Student Ethnicity/Race

In analyzing the mathematics achievement of Grade 3 students in Texas across the three years of data that were examined, trends in scores were present by ethnicity/race. In each STAAR Mathematics Reporting Category and in all three years investigated, a clear stair-step effect was observed (Carpenter et al., 2006). In all instances Asian students had the highest mathematics achievement, followed by White students, then Hispanic students and finally Black students. Concerning the STAAR Mathematics Performance Level standards, the same stair-step effect was present. Statistically significantly higher percentages of Asian students met each of the three STAAR Mathematics Performance Level Standards, followed by White students, then Hispanic students, and finally by Black student. These trends are revealed in Figures 2.1 through 2.6.

Insert Figures 2.1 through 2.7 about here

Discussion

The mathematics achievement of Grade 3 students by their ethnicity/race was investigated in this statewide, multiyear study. Mathematics achievement was determined using two different sets of measures: (a) number of test items answered correctly in each STAAR Mathematic Reporting Category and (b) percentages of students who met the three performance level standards. Statistically significant results were present in all of the mathematics achievement measures in all three school years examined.

Connections to Existing Literature

As revealed in this study, ethnic/racial differences were present in the mathematics achievement of Grade 3 students. These findings were congruent with the results of other researchers (Alford-Stephens, 2016; Harris, 2018; McGown, 2016) who established the presence of ethnic/racial achievement gaps being present for students in

Texas. Their investigations, as well as the findings discussed in this article, provide evidence for a clear stair-step effect (Carpenter et al., 2006) in student mathematics achievement. Asian students consistently outperformed White students, Hispanic students, and Black students. In addition, results are commensurate with national research of substantial ethnic/racial academic gaps (e.g., Braun, Chapman, & Vezzu, 2010; Growe & Montgomery, 2003; Reardon, Cimpian, & Weathers, 2015; Reardon & Galindo, 2009; Reardon, Kalogrides, & Shores, 2019; Reardon & Portillo, 2016; Rowley & Wright, 2011; Shirvani, 2009). The Nation's Report Card (2019) revealed a similar clear stair-step effect (Carpenter et al., 2006) as this study with Asian students having the best performance, followed by White students, Hispanic students, and Black students.

Implications for Policy and for Practice

Based upon the results discussed herein, several implications for policy and practice can be recommended. Black and Hispanic students continue to be outperformed by Asian and White students in mathematics achievement. First, with respect to policy, funds should be provided to districts and schools who have a high population of Black and Hispanic students to assist with mathematics interventions and resources. Second, teacher preparation programs must ensure prospective teachers are learning about the challenges faced by students from different ethnic/racial backgrounds. Prospective teachers should be taught strategies that will allow them to meet the academic, social, and emotional needs of their students. Last, annual professional development should be mandated to provide teachers with the latest research evidence regarding how students from different ethnic/racial backgrounds are progressing in mathematics. Trainings should be required yearly so teachers can learn about new strategies and resources to assist them in their classrooms.

Concerning practice, district and campus leaders must monitor student performance in mathematics before Grade 3 when state testing begins for students. Second, with the monitoring of student achievement in earlier grades, earlier interventions should be put in place for students struggling to master mathematical concepts and skills. Progress monitoring should be implemented by districts and schools to ensure all interventions are effective for students, especially students from historically low performing groups. Finally, school leaders should utilize assessment scores from the Grade 3 STAAR Mathematics exam to choose proper interventions and remediations for students to ensure growth for the next school year.

Recommendations for Future Research

Several recommendations for future research can be offered based on the results of this statewide, multiyear investigation. First, researchers should determine if similar gaps are present in the mathematics achievement of students in other grade levels as a function of student ethnicity/race. Second, researchers should examine how economic status may affect the mathematics achievement of Black and Hispanic boys. A similar study should also be conducted for Black and Hispanic girls. Third, researchers should conduct this study in other states to determine the extent to which findings presented herein would be generalizable to other states. In this particular study, the focus was only on ethnic/racial differences. Therefore, researchers should analyze if mathematical differences are present based upon other student demographics. Last, researchers should include qualitative and mixed studies to obtain a better understanding regarding the relationship between ethnicity/race and mathematics achievement.

Conclusion

The purpose of this research study was to determine the extent to which differences were present in the mathematics achievement of Texas Grade 3 students as a function of their ethnicity/race. Analysis of three school years of Texas statewide data yielded statistically significant differences in the mathematics achievement by ethnicity/race. In all three school years, a stair-step effect (Carpenter et al., 2006) was clearly present. Asian students consistently outperformed White, Hispanic, and Black students in all four STAAR Mathematic Reporting Categories as well as all three STAAR Mathematics Performance Level standards. White students outperformed Hispanic and Black students. Black students were consistently the lowest performing ethnic/racial group. Findings were consistent with prior researchers (e.g., Alford-Stephen, 2016; Braun et al., 2010; Growe & Montgomery, 2003; Harris, 2018; McGown, 2016; Reardon et al., 2015; Reardon & Galindo, 2009; Reardon & Portillo, 2016; Rowley & Wright, 2011; Shirvani, 2009).

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Table 2.1

Descriptive Statistics for the STAAR Mathematics Reporting Category 1 by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

School Year and Ethnicity/Race	*n*	*M*	*SD*
2016-2017			
Asian	6,585	6.96	1.53
White	75,677	6.23	1.73
Hispanic	106,539	5.27	2.05
Black	23,486	4.64	2.15
2017-2018			
Asian	6,149	7.10	1.44
White	63,223	6.50	1.64
Hispanic	87,533	5.68	1.92
Black	19,425	4.99	2.07
2018-2019			
Asian	6,730	6.96	1.40
White	61,628	6.27	1.60
Hispanic	79,354	5.37	1.81
Black	18,103	4.81	1.93

Table 2.2

Descriptive Statistics for the STAAR Mathematics Reporting Category 2 by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

School Year and Ethnicity/Race	*n*	*M*	*SD*
2016-2017			
Asian	6,585	11.55	2.36
White	75,677	10.13	2.90
Hispanic	106,539	8.71	3.39
Black	23,486	7.54	3.55
2017-2018			
Asian	6,149	11.36	2.25
White	63,223	9.93	2.76
Hispanic	87,533	8.30	3.19
Black	19,425	7.31	3.38
2018-2019			
Asian	6,730	11.51	2.17
White	61,628	10.30	2.66
Hispanic	79,354	8.69	3.07
Black	18,103	7.63	3.31

Table 2.3

Descriptive Statistics for the STAAR Mathematics Reporting Category 3 by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

School Year and Ethnicity/Race	*n*	*M*	*SD*
2016-2017			
Asian	6,585	5.76	1.44
White	75,677	5.00	1.65
Hispanic	106,539	4.24	1.74
Black	23,486	3.71	1.79
2017-2018			
Asian	6,149	5.92	1.40
White	63,223	5.04	1.60
Hispanic	87,533	4.33	1.71
Black	19,425	3.79	1.76
2018-2019			
Asian	6,730	6.16	1.24
White	61,628	5.53	1.45
Hispanic	79,354	4.85	1.66
Black	18,103	4.25	1.76

Table 2.4

Descriptive Statistics for the STAAR Mathematics Reporting Category 4 by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

School Year and Ethnicity/Race	*n*	*M*	*SD*
2016-2017			
Asian	6,585	3.30	0.95
White	75,677	2.87	1.08
Hispanic	106,539	2.51	1.16
Black	23,486	2.09	1.21
2017-2018			
Asian	6,149	3.44	0.84
White	63,223	3.16	0.95
Hispanic	87,533	2.81	1.12
Black	19,425	2.44	1.20
2018-2019			
Asian	6,730	3.38	0.82
White	61,628	3.05	0.91
Hispanic	79,354	2.80	0.95
Black	18,103	2.49	1.01

Table 2.5

Frequencies and Percentages for the STAAR Mathematics Approaches Grade Level Standard by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
School Year and Ethnicity/Race	*n*	%	*n*	%
2016-2017				
Asian	6,280	95.40	305	4.60
White	67,260	88.90	8,417	11.10
Hispanic	79,193	74.30	27,346	25.70
Black	14,165	60.30	9,321	39.70
2017-2018				
Asian	5,959	96.90	190	3.10
White	57,892	91.60	5,331	8.40
Hispanic	68,490	78.20	19,043	21.80
Black	12,610	64.90	6,815	35.10
2018-2019				
Asian	6,526	97.00	204	3.00
White	56,853	92.30	4,775	7.70
Hispanic	62,648	78.90	16,706	21.10
Black	11,827	65.30	6,276	34.70

Table 2.6

Frequencies and Percentages for the STAAR Mathematics Meets Grade Level Standard by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
School Year and Ethnicity/Race	*n*	%	*n*	%
2016-2017				
Asian	5,740	87.20	845	12.80
White	49,208	65.00	26,469	35.00
Hispanic	45,616	42.80	60,923	57.20
Black	6,845	29.10	16,641	70.90
2017-2018				
Asian	5,479	89.10	670	10.90
White	42,615	67.40	20,608	32.60
Hispanic	38,003	43.40	49,500	56.60
Black	5,798	29.80	13,627	70.20
2018-2019				
Asian	5,988	89.00	742	11.00
White	42,728	69.30	18,900	30.70
Hispanic	35,616	44.90	43,738	55.10
Black	5,514	30.50	12,589	69.50

Table 2.7

Frequencies and Percentages for the STAAR Mathematics Masters Grade Level Standard by the Ethnicity/Race of Grade 3 Students in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
School Year and Ethnicity/Race	*n*	%	*n*	%
2016-2017				
Asian	4,538	68.90	2,047	31.10
White	29,088	38.40	46,589	61.60
Hispanic	22,171	20.80	84,368	79.20
Black	2,925	12.50	20,561	87.50
2017-2018				
Asian	4,269	69.49	1,880	30.60
White	24,395	38.60	38,828	61.40
Hispanic	16,733	19.10	70,800	80.90
Black	2,159	11.10	17,266	88.90
2018-2019				
Asian	4,688	69.70	2,042	30.30
White	25,540	41.40	36,088	58.60
Hispanic	16,128	20.30	63,226	79.70
Black	2,176	12.00	15,927	88.00

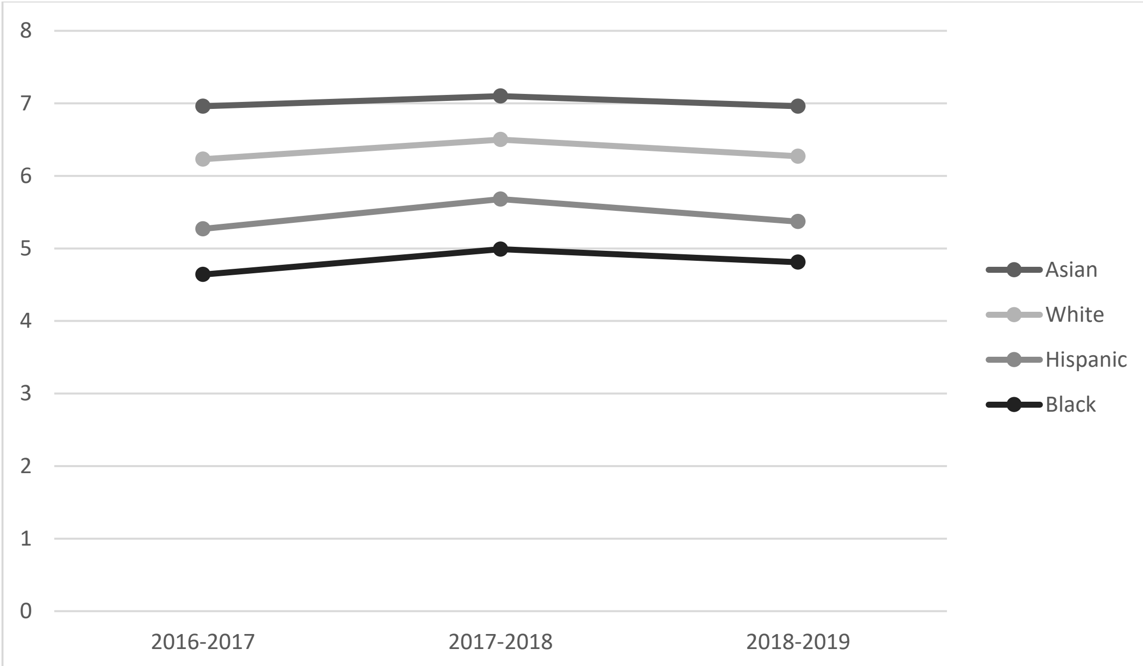

Figure 2.1. Average scores by ethnicity/race of Grade 3 students in Texas for the STAAR Grade 3 Mathematics Reporting Category 1 for the 2016-2017, 2017-2018, and 2018-2019 school years.

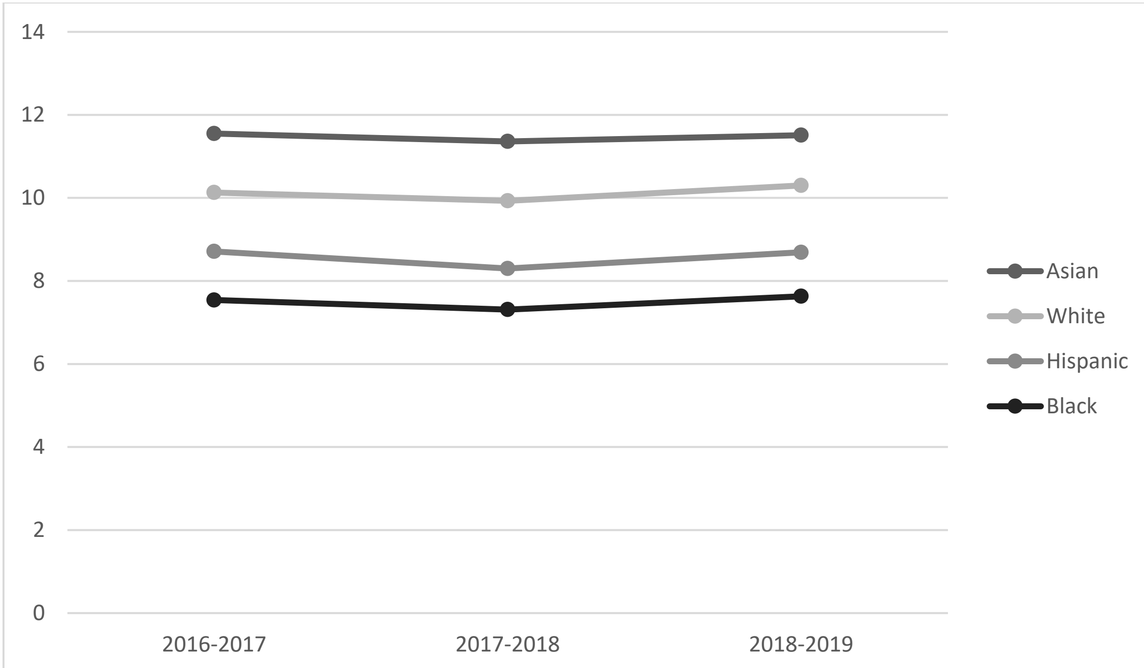

Figure 2.2. Average scores by ethnicity/race of Grade 3 students in Texas for the STAAR Grade 3 Mathematics Reporting Category 2 for the 2016-2017, 2017-2018, and 2018-2019 school years.

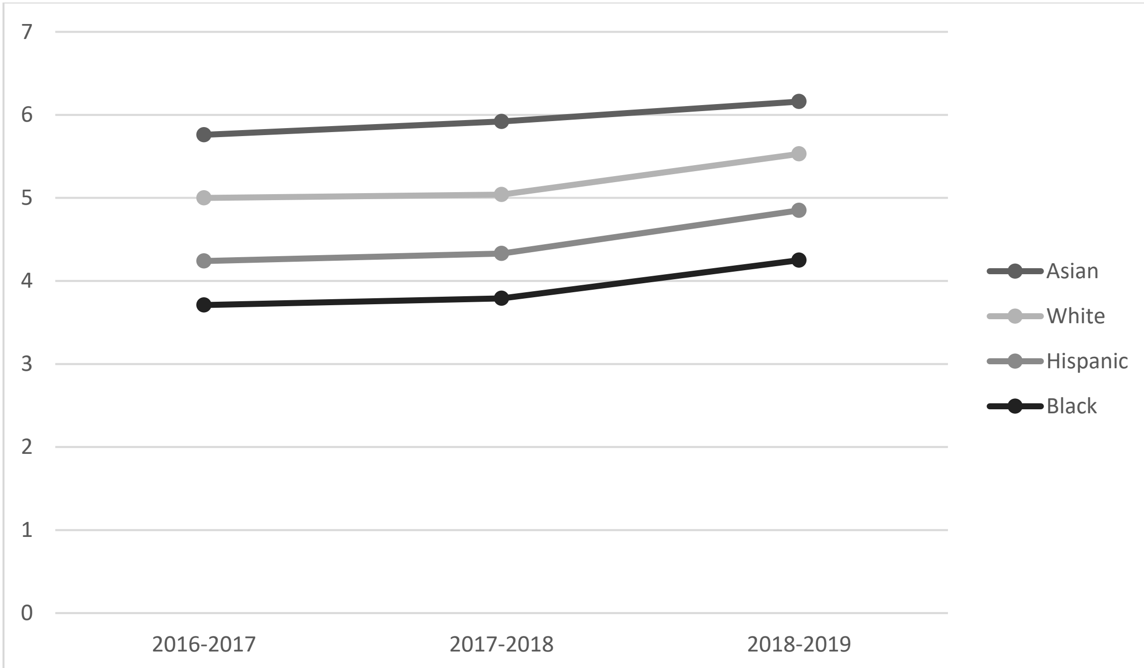

Figure 2.3. Average scores by ethnicity/race of Grade 3 students in Texas for the STAAR Grade 3 Mathematics Reporting Category 3 for the 2016-2017, 2017-2018, and 2018-2019 school years.

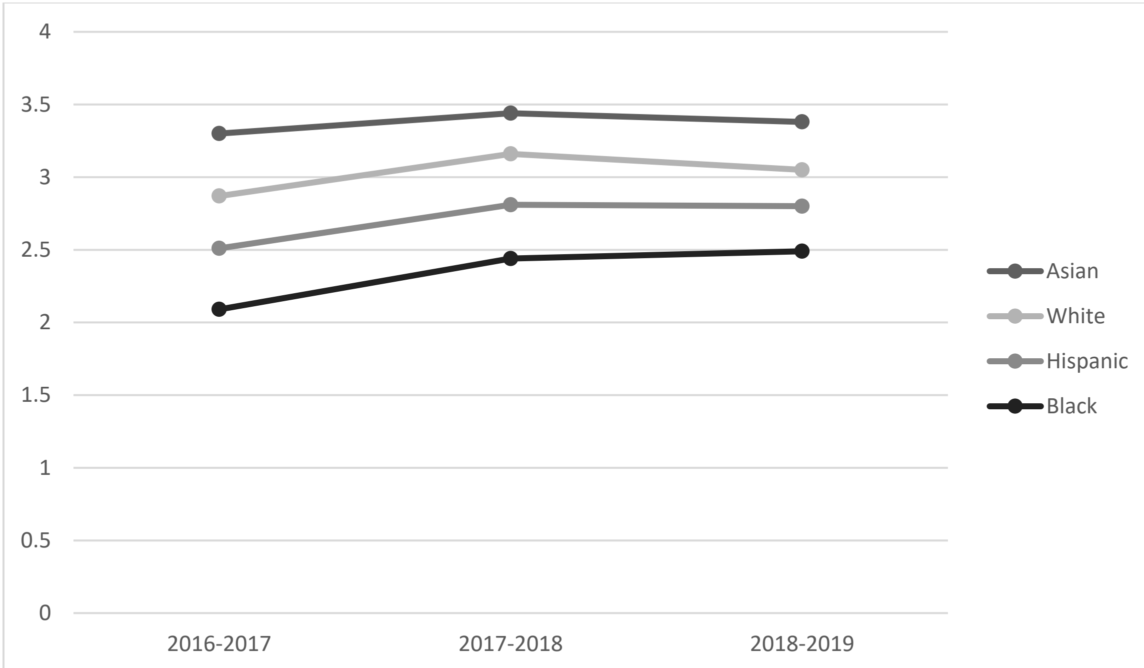

Figure 2.4. Average scores by ethnicity/race of Grade 3 Students in Texas for the STAAR Grade 3 Mathematics Reporting Category 4 for the 2016-2017, 2017-2018, and 2018-2019 school years.

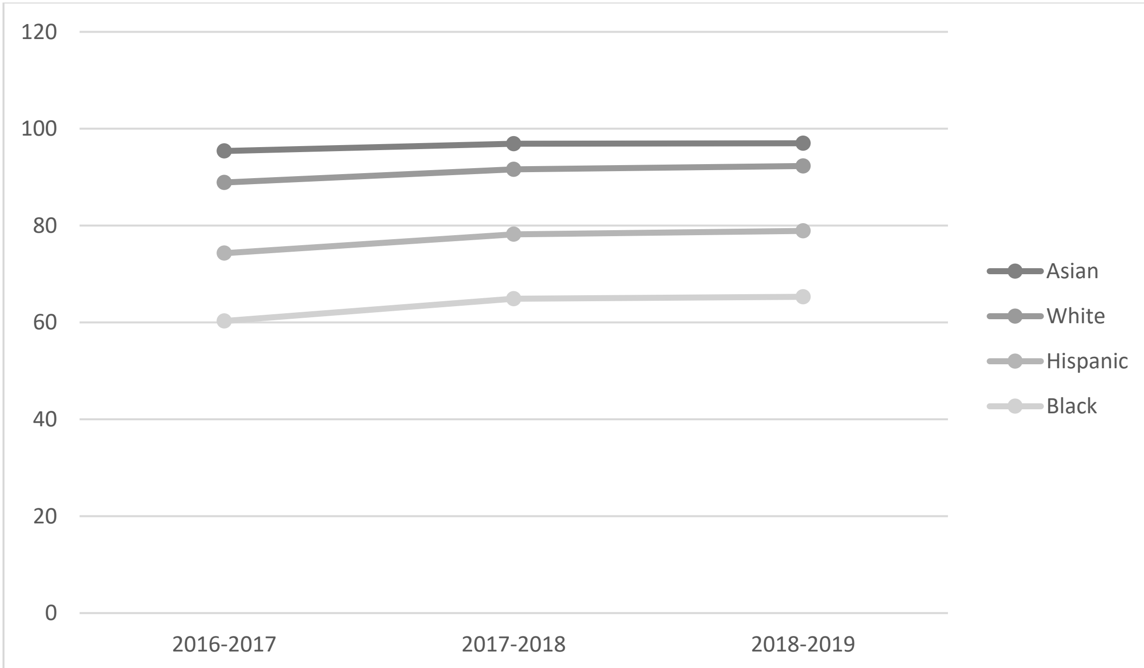

Figure 2.5. Average percentages by ethnicity/race for the STAAR Grade 3 Mathematics Approaches Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

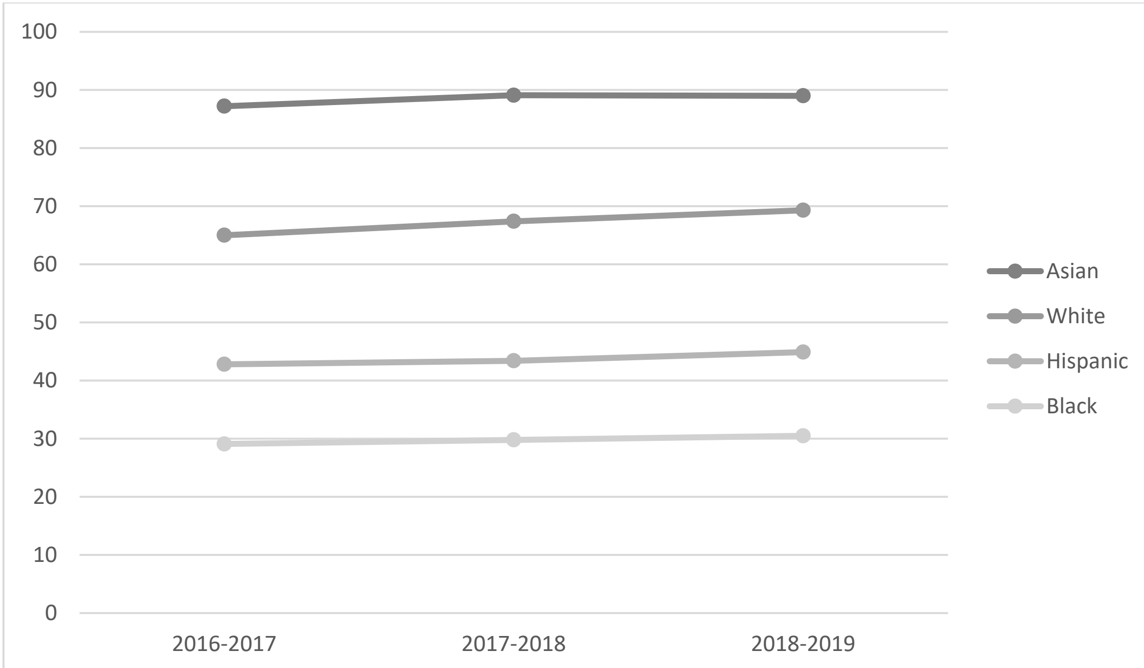

Figure 2.6. Average percentages by ethnicity/race for the STAAR Grade 3 Mathematics Meets Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

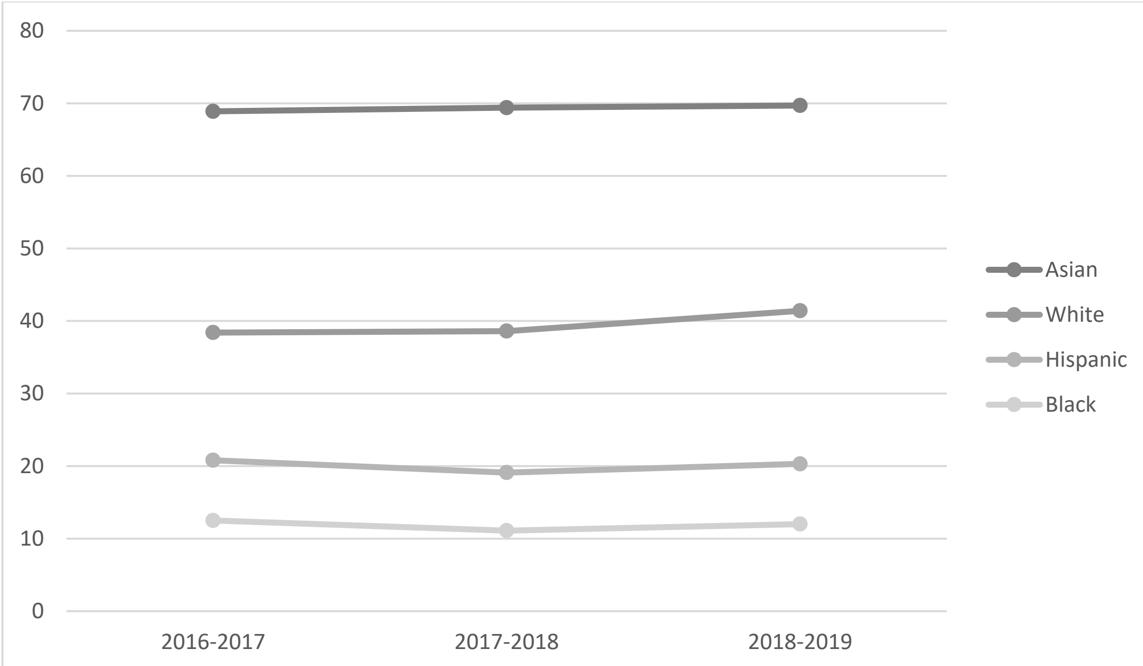

Figure 2.7. Average percentages by ethnicity/race for the STAAR Grade 3 Mathematics Masters Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

CHAPTER III

DIFFERENCES IN MATHEMATICS PERFORMANCE BY THE ECONOMIC STATUS OF TEXAS GRADE 3 BOYS OF COLOR: A MULTIYEAR, STATEWIDE ANALYSIS

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

Abstract

In this investigation, the degree to which differences were present in the mathematics achievement of Texas Grade 3 boys of color as a function of their economic status (i.e., Poor and Not Poor) was addressed. Data were obtained from the Texas Education Agency Public Education Information Management System for all Grade 3 Black and Hispanic boys who took the State of Texas Assessment of Academic Readiness Mathematics exam in the 2016-2017, 2017-2018, and 2018-2019 school years. Inferential analyses revealed the presence of statistically significant differences in overall mathematics achievement and the four Mathematics Reporting Categories. Hispanic boys who were Poor performed poorer than Hispanic boys who were Not Poor. Similarly, Black boys who were Poor performed poorer than Black boys who were Not Poor. Future research recommendations and implications for policy and practice were suggested.

Keywords: Mathematics achievement; Poverty; Economic status; Black; Hispanic; Boys; Grade 3; STAAR; Texas

DIFFERENCES IN MATHEMATICS PERFORMANCE BY THE ECONOMIC STATUS OF TEXAS GRADE 3 BOYS OF COLOR: A MULTIYEAR, STATEWIDE ANALYSIS

According to the National Center for Children in Poverty (2018b), 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 Black and Hispanic children than it is for White and Asian children. In 2018, 61% of Black children were classified as poor and 59% of Hispanic children were classified as poor (National Center for Children of Poverty 2018b). This percentage is considerably higher than the number of Asian and White children who lived in income families, as both of these groups had only 28% of their children living in low income families (National Center for Children of Poverty, 2018b).

As it relates to the state of interest for this article, Texas, 48% of children in the state were classified as poor (National Center for Children in Poverty, 2018a). This statistic represents a percentage that is seven percentage points higher than the national average. Black children in Texas were classified as poor at a rate of 58%, three percentage points lower than the national average. Hispanic children in Texas were classified as poor at a rate of 63%, representative of a rate four percentage points higher than the national average (National Center for Children in Poverty, 2018a).

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; Reardon, 2011) have focused on the effects of these student demographic characteristics separately, Paschall, Gershoff, and Kuhfeld (2018) examined the mathematics and reading achievement of students based on interactions between poverty and ethnicity/race. Their data were indicative of substantial gaps in achievement scores between students of color in poverty and students of color not in poverty. Paschall et al. (2018) also stated that researchers who include demographic data but only analyze one dimension (e.g., economic status, gender, or ethnicity race) may lead to a false indication of progress in educational equity. Researchers (e.g., Fryer & Levitt, 2010; Reardon & Robinson, 2008) have documented that gender differences in mathematics grow at a similar rate to racial/ethnic differences and economic status differences.

In a nationwide study, Kuhfeld, Gershoff, and Paschall (2018) examined the academic development in mathematics and reading of students based on their race/ethnicity and poverty status. They established that White students in poverty outperformed both Black and Hispanic students who were in poverty in mathematics and reading. The gaps between these groups of students widened from school entry to age 15. Kuhfeld et al. (2018) also established that White students in poverty performed similarly to Black and Hispanic students not in poverty. Their findings were consistent with other researchers (e.g., Fryer & Levitt, 2006; Lee & Burkham, 2002; McDonough, 2015; Reardon, 2011) who have stated how students of color enter school with academic gaps that persist or grow as children progress through school. Finally, Kuhfeld et al. (2018) contended that poverty plays a role in delineating racial/ethnic gaps but does not sufficiently explain the gaps by itself.

In a recent statewide study in Texas, Hamilton and Slate (2019) analyzed the reading achievement of Grade 3 students of color by their economic status (i.e., Poor and Not Poor). Analyzed in their study were data from the Texas state mandated assessment, the State of Texas Assessment of Academic Readiness (STAAR) Reading assessment from the 2015-2016 school year. In their study, statistically significant gaps were present in reading by the economic status of both Black and Hispanic students. Regarding the three passing standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level), Black and Hispanic students who were Poor performed statistically significantly poorer than their Black and Hispanic peers who were Not Poor.

In 2018, Harris conducted a study, also in Texas, to determine the extent to which differences were present in the reading achievement of Texas Grade 4 students as a function of their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). Results from three years of data (i.e., 2012-2013, 2013-2014, 2014-2015) from the STAAR Reading assessment were indicative of statistically significant differences for all three school years. In the three STAAR Reading Reporting categories, students who were Extremely Poor had statistically significantly lower reading scores than their peers who were Moderately Poor and their peers who were Not Poor, and students who were Moderately Poor had statistically significantly lower reading scores than their peers who were Not Poor for all three school years (Harris, 2018). A clear stair-step effect was present in all three school years for all three reporting categories (Carpenter, Ramirez, & Severn, 2006). With regard to passing rates, Harris (2018) established that in all three school years (i.e., 2012-2013, 2013-2014, 2014-2015) students who were Extremely Poor had the lowest passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor.

Similar to Harris (2018), McGown (2016) addressed the degree to which differences existed in the reading performance of Texas Grade 3 students by their economic status. Included in her study were results from the Texas state-mandated reading assessment for three school years (i.e., 2012-2013, 2013-2013, 2014-2015). McGown established a clear stair-step effect (Carpenter et al., 2006) for all three school years in the three STAAR Reading Reporting categories. McGown (2016) documented that Texas Grade 3 students who were Extremely Poor had statistically significant lower reading scores than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower reading test scores than students who were Not Poor all three school years. Regarding passing rates, McGown (2016) established that students who were Extremely Poor had lower passing rates on the STAAR Level II Final Satisfactory Performance Standard in reading than students who were Moderately Poor and students who were Not Poor, and students who were Moderately poor had lower passing rates than students who were Not Poor. Consistent with the findings from in the Harris (2018) investigation on Texas Grade 4 students, economic achievement gaps in reading were clearly present for Texas Grade 3 students.

Rojas-LeBouef (2010) conducted a study of Grade 5 White and Hispanic students in Texas. In her study, data from both previously used Texas state-mandated assessments, the Texas Assessment of Knowledge and Skills and the Texas Assessment of Academic Skills, were analyzed from the 1993-1994 through the 2008-2009 school years. Established in the Rojas-LeBouef (2010) study were the presence of statistically significant differences in the mathematics passing rates for Grade 5 White and Hispanic students in Texas. For all 16 years analyzed in this study, Hispanic students had lower passing rates than their White peers. The largest achievement gap between Hispanic students and White students was 13.61% and occurred in the 1993-1994 school year and the smallest achievement gap between Hispanic students and White students was 1.50% in the 2001-2002 school year (Rojas-LeBouef, 2010). Over the 16-year time period, Hispanic students were outperformed by their White peers by an average of 7.76% in mathematics.

In 2016, Alford-Stephens examined data from the previously used Texas state-mandated assessment, the Texas Assessment of Knowledge and Skills, to ascertain the extent to which differences were presented in the mathematics skills of Black 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, Black boys who were Extremely Poor performed more poorly than Black boys who were Moderately Poor and more poorly than Black boys who were Not Poor in all 10 mathematics skills (Alford-Stephens, 2016).

With respect to this article, the most recent published article on mathematics and poverty that could be located was conducted by Davenport and Slate (2019). In their study, Davenport and Slate (2019) examined data from the STAAR Mathematics assessment to determine the extent to which economic status was related to the mathematics performance of Grade 3 students in Texas. Mathematics performance was defined by the STAAR Performance Levels (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level). At the Approaches Grade Level standard, Grade 3 students who were Extremely Poor had lower passing rates than students who were Moderately Poor and students who were Not Poor and students who were Moderately Poor had lower passing rates than students who were Not Poor. Regarding the Meets Grade Level standard, Grade 3 students in Texas who were Extremely Poor had lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor. Similarly, at the Masters Grade Level standard, students who were Extremely Poor had lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had lower passing rates than students who were Not Poor. At all three performance level standards, Davenport and Slate (2019) established the presence of a clear stair-step effect (Carpenter et al., 2006) was present in the mathematics performance of Grade 3 students in Texas by their economic status. Student who were Extremely Poor had the lowest passing rates at all three performance levels followed by students who were Moderately Poor, and students who were Not Poor had the highest passing rates.

Statement of the Problem

Duncan et al. (2007) listed early mathematics achievement as the strongest predictor of later academic success in school for children. Previous researchers (David & Marchant, 2015; Wang, Shen, & Byrnes, 2013) stated that students from low income families are at risk for many social and academic disadvantages. Over 61% of public school students in Texas were from low income families (Texas Education Agency, 2019). Relationships between poverty and mathematics achievement have been examined (e.g., Alford-Stephens, 2016; Anderson, 2016; and Davenport and Slate, 2019) for the state of Texas. Researchers (e.g., Alford-Stephens, 2016; Anderson, 2016; Rojas-LeBouef, 2010) have also examined the relationships between ethnicity/race and mathematics achievement. However, only one study (e.g., Alford-Stephens 2016) was located in which the author addressed the relationship between mathematics achievement and the combination of ethnicity/race and economic status. Alford-Stephens (2016) focused only on the mathematics achievement of Black boys in Texas high schools by their economic status. Paschall et al. (2018) have stated the importance of including multiple student demographic characteristics in the analysis of student achievement to obtain a better understanding of educational equity in the United States.

Purpose of the Study

The purpose of this study was to determine the degree to which economic status (i.e., Poor and Not Poor) of Texas Grade 3 Black and Hispanic boys was related to their mathematics performance. Specifically addressed herein was the degree to which differences were present by the economic status of Texas Grade 3 Black and Hispanic boys on the STAAR Mathematics Reporting Categories. Also examined was the extent to which economic differences existed in the percentages of Texas Grade 3 Black and Hispanic boys achieving at the three performance levels (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level). The final purpose of this study was to determine if any trends were present in the reporting categories and performance levels across three school years (i.e., 2016-2017, 2017-2018, 2018-2019) by the economic status of Texas Grade 3 Black and Hispanic boys.

Significance of the Study

Previous researchers (e.g., Anderson, 2016; Davenport & Slate, 2019; Harris; 2018; McGown, 2016; Rojas-LeBouef, 2010) have established the presence of statistically significant differences in the academic performance of Texas students as a function of their economic status or ethnicity/race. However, only one researcher (e.g., Alford-Stephens, 2016) analyzed how the combination of both economic status and ethnicity/race affects academic performance. Alford-Stephens (2016) documented economic differences in the mathematics performance of Black boys enrolled in Texas high schools on the previously used state-mandated assessment. Only a few published studies regarding the mathematics performance of Texas boys of color by their economic status could be located in the literature. Findings from this study can increase the available information on this salient topic. Stakeholders (e.g., district and campus leaders, curriculum writers, and policymakers) could benefit from this study by gaining an understanding on how economic status affects students of color.

Research Questions

In this study, the following overarching research question was addressed: What is the difference in mathematics performance by the economic status (i.e., Poor and Not Poor) of Texas Grade 3 boys? Specific subquestions under this overarching research question were: (a) What is the difference in numerical representations and relationships by the economic status of Texas Grade 3 boys?; (b) What is the difference in computations and algebraic relationships by the economic status of Texas Grade 3 boys?; (c) What is the difference in geometry and measurement by the economic status of Texas Grade 3 boys?; (d) What is the difference in data analysis and personal financial literacy by the economic status of Texas Grade 3 boys?; (e) What is the difference in performance on the Approaches Grade Level standard by the economic status of Texas Grade 3 boys?; (f) What is the difference in performance on the Meets Grade Level standard by the economic status of Texas Grade 3 boys?; (g) What is the difference in performance on the Masters Grade Level standard by the economic status of Texas Grade 3 boys?; and (h) What is the degree to which trends are present in mathematics by the economic status of Texas Grade 3 boys? These research questions were answered separately for Hispanic boys and for Black boys. The first seven research subquestions were addressed for three school years, whereas the last research question involved a comparison of results across all three school years.

Method

Research Design

For this investigation, the research design was non-experimental, quantitative, causal comparative (Johnson & Christensen, 2020). A causal comparative design was used to find relationships between the independent and dependent variables that have already taken place (Johnson & Christensen, 2020). In this investigation, statewide archival data of the mathematics achievement of Grade 3 boys of color was analyzed to ascertain the effect of economic status on their achievement in mathematics. The independent variable in this investigation was the economic status (i.e., Poor and Not Poor) of Grade 3 boys of color in Texas. The dependent variables were the four STAAR Mathematics Reporting Categories (i.e., Reporting Category 1, Reporting Category 2, Reporting Category 3, and Reporting Category 4) and the three STAAR Mathematics

Performance Levels (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) for Grade 3 boys of color in Texas.

Participants and Instrumentation

The data that were analyzed in this investigation were requested from the Texas Education Agency Public Education Information Management System. The participants in this investigation included Grade 3 boys of color in Texas who were administered the STAAR Mathematics exam in the 2016-2017, 2017-2018, 2018-2019 school years. The request was made for datasets to include: (a) Grade 3 boys of color, (b) STAAR Mathematics Performance Levels, (c) STAAR Reporting Categories, and (d) student economic status for the years of data in this investigation.

Mathematics achievement was ascertained using the three STAAR Mathematics Performance Levels and the four STAAR Mathematics Reporting Categories. The Texas Education Agency introduced three performance levels (i.e., Approaches Grade Level, Meets Grade Level, Masters Grade Level) in 2017 to communicate how well students achieved on the STAAR Mathematics Assessment (Texas Education Agency, 2017). At the Approaches Grade Level standard, students are predicted to have the ability to succeed in the next grade level or course. To be successful in the grade level course, students at this performance level will needs targeted academic intervention to assist with their progress (Texas Education Agency, 2017). At the Meets Grade Level standard, students are predicted to have the ability to succeed in the next grade level or course but will need short-term, targeted interventions. At the Masters Grade Level standard, students are predicted to have the ability to succeed in the next grade level or course with very little to no academic intervention (Texas Education Agency, 2017).

The four STAAR Mathematics Reporting Categories are assessed to determine student mathematics achievement. In STAAR Mathematics Reporting Category 1, students' ability to understand numerical representations and relationships is measured. In STAAR Mathematics Reporting Category 2, students' ability to understand algebraic relationships and computations is measured. In STAAR Mathematics Reporting Category 3, the students' ability to understand geometry and measurement is measured. In STAAR Mathematics Reporting Category 4, students' ability to understand data analysis and personal financial literature is measured.

For the purpose of this investigation, economic status referred to two groups of students (e.g., Poor and Not Poor). Since 2015, the Texas Education Agency has used the National School Lunch and Child Nutrition Program to define the level of economic status for students. Students who were defined as Not Poor did not qualify for either free or reduced-priced meals. Students who were defined as Poor qualified for either reduced-priced meals or free meals.

Results

Prior to conducting multivariate analysis of variance (MANOVA) statistical procedures, its underlying assumptions were checked. Specifically examined were data normality, Box's Test of Equality of Covariance and the Levene's Test of Equality of Error Variance. Although a majority of these assumptions were not met, the robustness of the MANOVA procedure made it appropriate to use in this study (Field, 2009). Results of statistical analyses by the economic status of Grade 3 boys of color in Texas who took the STAAR Mathematics assessment will be described by Mathematics

Reporting Category in chronological order for the 2016-2017, 2017-2018, and 2018-2019 school years.

Overall Results for Hispanic Boys Across All Three School Years

With respect to the 2016-2017 school year, the MANOVA revealed a statistically significant difference in overall mathematics performance by the economic status of Texas Grade 3 Hispanic boys, Wilks' $\Lambda = .96$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1998). Regarding the 2017-2018 school year, the MANOVA yielded a statistically significant difference, Wilks' $\Lambda = .96$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1998) in overall mathematics performance as a function of student economic status. Concerning the 2018-2019 school year, a statistically significant difference was again present in overall mathematics performance, Wilks' $\Lambda = .95$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1998). In all three school years, effect sizes were small for the statistically significant differences in overall mathematics performance of Texas Grade 3 Hispanic boys by their economic status.

Mathematics Reporting Category 1 Results for Hispanic Boys Across All Three School Years

Following the overall results of the MANOVA, univariate follow-up Analysis of Variance (ANOVA) procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 1 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 45527) = 1580.97$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 35559) = 975.76$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 32270) = 1291.12$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 1, effect sizes the STAAR Mathematics Reporting Category 1 by economic status were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Hispanic boys who were Poor answered slightly less than one item correctly than Hispanic boys who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Hispanic boys were Poor answered about eight tenths fewer items correctly than Hispanic boys who were Not Poor. For the 2018-2019, school year, Grade 3 Hispanic boys were Poor answered slightly more than nine tenths items fewer correctly than Hispanic boys who were Not Poor. Descriptive statistics are contained in Table 3.1.

Insert Table 3.1 about here

Mathematics Reporting Category 2 Results for Hispanic Boys Across All Three School Years

Univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 2 scores by student economic status for all three school years. Concerning the

2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 45527) = 1476.08$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 35559) = 1523.23$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 32270) = 1506.90$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 2, effect sizes on the STAAR Mathematics Reporting Category 2 by economic status were small for all three school years.

Concerning the 2016-2017 school year, Grade 3 Hispanic boys who were Poor answered more than one and a half items fewer correctly than Hispanic boys who were Not Poor. Concerning the 2017-2018 and 2018-2019 school years, Grade 3 Hispanic boys were Poor answered about one and three quarter fewer items correctly than Hispanic boys who were Not Poor. Descriptive statistics for the STAAR Mathematics Reporting Category 2 are delineated in Table 3.1.

Mathematics Reporting Category 3 Results for Hispanic Boys Across All Three School Years

Next, univariate ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 3 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR

Mathematics Reporting Category 3 by economic status, $F(1, 45527) = 1395.12$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 35559) = 1049.94$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 32270) = 889.40$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 3, effect sizes were small for all three school years.

With respect to the 2016-2017 and 2017-2018 school years, Grade 3 Hispanic boys were Poor answered about eight tenths fewer items correctly than Hispanic boys who were Not Poor. For the 2018-2019, school year, Grade 3 Hispanic boys were Poor answered seven tenths items fewer correctly than Hispanic boys who were Not Poor. Delineated in Table 3.1 are the descriptive statistics for the STAAR Mathematics Reporting Category 3.

Mathematics Reporting Category 4 Results for Hispanic Boys Across All Three School Years

Univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 4 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 45527) = 854.36$, $p < .001$, partial $\eta^2 = .02$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting

Category 4 by economic status, $F(1, 35559) = 697.12$, $p < .001$, partial $\eta^2 = .02$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 32270) = 474.42$, $p < .001$, partial $\eta^2 = .01$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 4, effect sizes were small for all three school years.

With respect to the 2016-2017 and 2017-2018 school years, Grade 3 Hispanic boys who were Poor answered about four tenths items fewer correctly than Hispanic boys who were Not Poor. For the 2018-2019, school year, Grade 3 Hispanic boys were Poor answered slightly more than one quarter items fewer correctly than Hispanic boys who were Not Poor. Revealed in Table 3.1 are the descriptive statistics for the STAAR Mathematics Reporting Category 4.

Overall Results for Black Boys Across All Three School Years

With respect to the 2016-2017 school year, the MANOVA revealed a statistically significant difference in overall mathematics performance by the economic status of Texas Grade 3 Black boys, Wilks' $\Lambda = .95$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1998). Regarding the 2017-2018 school year, the MANOVA yielded a statistically significant difference, Wilks' $\Lambda = .94$, $p < .001$, partial $\eta^2 = .06$, moderate effect size (Cohen, 1988). Concerning the 2018-2019 school year, a statistically significant difference was again present in overall mathematics performance, Wilks' $\Lambda = .94$, $p < .001$, partial $\eta^2 = .06$, moderate effect size (Cohen, 1988). In the 2016-2017 school year, the effect size was small and in the 2017-2018 and 2018-2019 school years the effect sizes were moderate.

Mathematics Reporting Category 1 Results for Black Boys Across All Three School Years

Univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 1 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 10678) = 424.84$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 8031) = 324.98$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 7322) = 374.17$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 1, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Black boys who were Poor answered about nine tenths items fewer correctly than Black boys who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Black boys were Poor answered about one and one tenth fewer items correctly than Black boys who were Not Poor. For the 2018-2019 school year, Grade 3 Black boys were Poor answered slightly less than one and one quarter items correctly than Black boys who were Not Poor. Descriptive statistics are contained in Table 3.2.

Insert Table 3.2 about here

Mathematics Reporting Category 2 Results for Black Boys Across All Three School Years

Univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 2 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 10678) = 444.04$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 8031) = 496.52$, $p < .001$, partial $\eta^2 = .06$, moderate effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 7322) = 401.99$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 2, effect sizes were small for the 2016-2017 and 2018-2019 school years and moderate for the 2017-2018 school year.

With respect to the 2016-2017 school year, Grade 3 Black boys who were Poor answered more than one and three quarter items fewer correctly than Black boys who were Not Poor. Concerning the 2017-2018, Grade 3 Black boys were Poor answered about than two and one quarter fewer items correctly than Black boys who were Not

Poor. For the 2018-2019 school year, Grade 3 Black boys who were Poor answered slightly less than two and one tenth items correctly than Black boys who were Not Poor. Delineated in Table 3.2 are the descriptive statistics for the STAAR Mathematics Reporting Category 2.

Mathematics Reporting Category 3 Results for Black Boys Across All Three School Years

Next, univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 3 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 10678) = 362.94$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 8031) = 315.13$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 7322) = 271.94$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 3, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Black boys were Poor answered more than eight tenths fewer items correctly than Black boys who were Not Poor. Concerning the 2017-2018 school year and 2018-2019 school years, Grade 3 Black boys were Poor answered about nine tenths items fewer correctly than Black boys who were Not Poor. Descriptive statistics for the STAAR Mathematics Reporting Category 3 are contained in Table 3.2.

Mathematics Reporting Category 4 Results for Black Boys Across All Three School Years

Univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 4 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 10678) = 277.00$, $p < .001$, partial $\eta^2 = .02$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 8031) = 275.30$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 7322) = 163.57$, $p < .001$, partial $\eta^2 = .02$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 4, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Black boys who were Poor answered about one half an item fewer correctly than Black boys who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Black boys who were Poor answered slight less than six tenths items fewer correctly than Black boys who were Not Poor. For the 2018-2019 school year, Grade 3 Black boys were Poor answered four tenths items fewer correctly than Black boys who were Not Poor. Descriptive statistics for the STAAR Mathematics Reporting Category 4 are contained in Table 3.2.

Results for the STAAR Mathematics Approaches Grade Level Standard for Hispanic Boys Across All Three School Years

Student performance on the STAAR Mathematics Approaches Grade Level standard was examined next through the use of Pearson chi-square procedures. This statistical procedure was the optimal statistical procedure to use because dichotomous data were present for the STAAR Mathematics Approaches Grade Level standard (i.e., met or did not meet this standard) and categorical data were present for economic status (i.e., Poor and Not Poor). As such, the Pearson chi-square is the preferred statistical procedure when both variables are categorical (Field, 2009). Because a large sample size was present, the assumptions for using a chi-square were met.

With respect to the STAAR Mathematics Approaches Grade Level standard by the economic status of Grade 3 Hispanic boys, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 983.70$, $p < .001$, small effect size, Cramer's V of .15 (Cohen, 1988). Grade 3 Hispanic boys who were Poor had 2.38 times more boys who did not meet this standard than Hispanic boys who were Not Poor. Table 3.3 contains the frequencies and percentages for this school year.

Insert Table 3.3 about here

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 721.26$, $p < .001$, small effect size, Cramer's V of .14 (Cohen, 1988). As delineated in Table 3.3, Grade 3 Hispanic boys who were Poor had 2.72 times more boys who did not meet this standard than Hispanic boys who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 741.53$, $p < .001$, small effect size, Cramer's V of .15 (Cohen, 1988). As presented in Table 3.3, Grade 3 Hispanic boys who were Poor had 2.94 times more boys who did not meet this standard than Hispanic boys who were Not Poor.

Results for the STAAR Mathematics Meets Grade Level Standard for Hispanic Boys Across All Three School Years

With respect to the STAAR Mathematics Meets Grade Level standard by the economic status of Grade 3 Hispanic boys, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 1478.68$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). Grade 3 Hispanic boys who were Poor had 1.61 times more boys who did not meet this standard than Hispanic boys who were Not Poor. Table 3.3 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 1252.06$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As delineated in Table 3.3, Grade 3 Hispanic boys who were Poor had 1.70 times more boys who did not meet this standard than Hispanic boys who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 1254.01$, $p < .001$, small effect size, Cramer's V of .20 (Cohen, 1988). As presented in Table 3.3, Grade 3 Hispanic boys who were Poor had 1.75 times more boys who did not meet this standard than Hispanic boys who were Not Poor.

Results for the STAAR Mathematics Masters Grade Level Standard for Hispanic Boys Across All Three School Years

With respect to the STAAR Mathematics Masters Grade Level standard by the economic status of Grade 3 Hispanic boys, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 1229.97$, $p < .001$, small effect size, Cramer's V of .16 (Cohen, 1988). Grade 3 Hispanic boys who were Poor had 1.27 times more boys who did not meet this standard than Hispanic boys who were Not Poor. Table 3.3 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 1197.07$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As delineated in Table 3.3, Grade 3 Hispanic boys who were Poor had 1.30 times more boys who did not meet this standard than Hispanic boys who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 1215.12$, $p < .001$, small effect size, Cramer's V of .19 (Cohen, 1988). As revealed in Table 3.3, Grade 3 Hispanic boys who were Poor had 1.33 times more boys who did not meet this standard than Hispanic boys who were Not Poor.

Results for the STAAR Mathematics Approaches Grade Level Standard for Black Boys Across All Three School Years

With respect to the STAAR Mathematics Approaches Grade Level standard by the economic status of Grade 3 Black boys, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 299.37$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). Grade 3 Black boys who were Poor had 1.91 times more boys who did not meet this standard than Black boys who were Not Poor. Table 3.4 contains the frequencies and percentages for this school year.

Insert Table 3.4 about here

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 281.16$, $p < .001$, small effect size, Cramer's V of .19 (Cohen, 1988). As delineated in Table 3.4, Grade 3 Black boys who were Poor had 2.44 times more boys who did not meet this standard than Black boys who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 250.94$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As delineated in Table 3.4, Grade 3 Black boys who were Poor had 2.48 times more boys who did not meet this standard than Black boys who were Not Poor.

Results for the STAAR Mathematics Meets Grade Level Standard for Black Boys Across All Three School Years

With respect to the STAAR Mathematics Meets Grade Level standard by the economic status of Grade 3 Black boys, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 492.71$, $p < .001$, small effect size, Cramer's V of .22 (Cohen, 1988). Grade 3 Black boys who were Poor had 1.49 times more boys who did not meet this standard than Black boys who were Not Poor. Table 3.4 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) =452.46$, $p < .001$, small effect size, Cramer's V of .24 (Cohen, 1988). As delineated in Table 3.4, Grade 3 Black boys who were Poor had 1.62 times more boys who did not meet this standard than Black boys who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 347.88$, $p < .001$, small effect size, Cramer's V of .22 (Cohen, 1988). As revealed in Table 3.4, Grade 3 Black boys who were Poor had 1.58 times more boys who did not meet this standard than Black boys who were Not Poor.

Results for the STAAR Mathematics Masters Grade Level Standard for Black Boys Across All Three School Years

With respect to the STAAR Mathematics Masters Grade Level standard by the economic status of Grade 3 Black boys, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 300.03$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). Grade 3 Black boys who were Poor had 1.19 times more boys who did not meet this standard than Black boys who were Not Poor. Table 3.4 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 317.92$, $p < .001$, small effect size, Cramer's V of .20 (Cohen, 1988). As delineated in Table 3.4, Grade 3 Black boys who were Poor had 1.22 times more boys who did not meet this standard than Black boys who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 239.58$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As revealed in Table 3.4, Grade 3 Black boys who were Poor had 1.22 times more boys who did not meet this standard thane Black boys who were Not Poor.

Trends in Mathematics Performance for Hispanic and Black Boys

In analyzing the mathematics achievement of Grade 3 Hispanic and Black boys in Texas across the three years of data that were examined, trends in scores were present by economic status. In each STAAR Mathematics Reporting Category and in all three years investigated, Hispanic boys who were Poor had lower mathematics achievement than Hispanic Boys who were Not Poor. Similarly, Black boys who were Poor also had lower mathematics achievement than Black boys who were Not Poor on each of the STAAR Mathematics Reporting Categories for the three school years examined. Concerning the STAAR Mathematics Performance Level standards, statistically significantly higher percentages of Hispanic boys who were Poor did not meet each of the three STAAR Mathematics Performance Level Standards than Hispanic boys who were Not Poor. Again, Black boys who were Poor also had statistically significantly higher percentages of students who did not meet each of the three STAAR Mathematics Performance Level Standards than Black boys who were Not Poor. These trends are revealed in Figures 3.1 through 3.12.

Insert Figures 3.1 through 3.14 about here

Discussion

The mathematics achievement of Grade 3 boys of color by their economic status was investigated in this statewide, multiyear study. Mathematics achievement was determined using two different sets of measures: (a) number of test items answered correctly in each STAAR Mathematic Reporting Category and (b) percentages of students who met the three performance level standards. Statistically significant results were present in all of the mathematics achievement measures in all three school years examined for both Hispanic and Black boys.

In all three years examined, Hispanic and Black boys who were Poor answered statistically significant fewer items correctly in each STAAR Mathematics Reporting Category than Hispanic and Black boys who were Not Poor, respectively. In addition, similar trends existed concerning the STAAR Mathematics Performance Level Standards. Hispanic and Black boys who were Poor had lower percentages of boys who met each Mathematics Performance Level Standard than Hispanic and Black boys who were Not Poor.

Connections to Existing Literature

As discussed in the literature review, researchers (Harris, 2018; McGown, 2016; Reardon, 2011) have established that poverty matters when it comes to academic gaps evidenced in student performance. Concerning mathematics achievement, previous researchers (e.g., Alford-Stephens, 2016; Anderson, 2016; Davenport & Slate, 2019) have documented findings congruent with results discussed herein that students who were economically disadvantaged performed poorer than students who were not economically disadvantaged. The disparity in mathematics achievement can be attributed to the fact that students who come from low-income families experience numerous social and academic disadvantages (David & Marchant, 2015; Wang, Shen, & Byrnes, 2013). Results of this research study are consistent with the outcomes of prior researchers (Alford-Stephens, 2016; Hamilton & Slate, 2019) that students of color who are economically disadvantaged perform more poorly than students of color who were not economically disadvantaged.

Implications for Policy and for Practice

Based on the analysis of this multiyear investigation, several implications for policy and practice can be suggested. First, concerning policy, funding and resources should be made available to communities with high population of Hispanic and Black boys who are economically disadvantaged. The additional funding and resources can be used to provide social and academic support to these communities. Second, teacher preparation programs should provide cultural responsiveness practices to teachers. New teachers must be equipped with the understanding of how to educate students from different backgrounds, especially those from low performing groups. Third, funding should be provided for districts and schools to hire and train mathematics interventionist to assists boys of color who struggle in the area of mathematics. Finally, communities that serve Hispanic and Black boys from economically disadvantaged families should be provided the opportunity with resources to help meet the academic, social, and emotional needs of these students.

With respect to practice, students who are identified as economically disadvantaged should be monitored upon school entry for possible academic disparities that may be present. Second, early interventions should be provided to Hispanic and Black boys who are economically disadvantaged. Results previously discussed were reflective that boys of color who are economically disadvantaged struggle in the area of mathematics, therefore early interventions may assist with lowering the disparities these students have. Third, all interventions should be monitored for effectiveness and adjusted based on students' needs. Teachers and mathematics interventionists should receive frequent professional development about new research and strategies to stay current on the necessities to educate students on mathematical concepts and skills. Finally, data from the Grade 3 STAAR Mathematics assessment should be used to inform school leaders on necessary interventions and remediations for students entering Grade 4 to ensure student growth.

Recommendations for Future Research

Given the results of this study, several recommendations for future research can be made. The first recommendation would be for researchers to conduct this same study but with a focus on girls of color. In this analysis, data on only boys of color were addressed. Second, future researchers could examine how mathematics achievement is affected by economic status for students in special populations (e.g., special education, gifted and talented, English Language Learners). In this investigation, only the mathematics performance of Grade 3 boys of color was addressed. Therefore, future researchers should examine the mathematics achievement of boys of color in other grade levels to determine the extent to which differences may be present as a function of economic status. Fourth, researchers should analyze the mathematics achievement of boys of color in other states. Last, researchers should conduct qualitative and mixed studies to provide a deeper understanding to practitioners and policymakers about the academic and social disparities seen with Hispanic and Black boys.

Conclusion

The purpose of this research investigation was to determine the degree to which differences were present in the mathematics achievement of Grade 3 boys of color as a function of their economic status. Inferential statistical analyses of the 2016-2017, 2017-2018, 2018-2019 school years of Texas statewide data yielded the presences of statistically significant differences between Hispanic and Black students who were Poor and Hispanic and Black students who were Not Poor. In all three school years, Hispanic and Black students who were Poor answered fewer items corrects than Hispanic and Black students who were Not Poor. Hispanic and Black boys who were Poor also had lower percentages of boys who met each Performance Level Standard than Hispanic and Black boys who were Not Poor.

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Table 3.1

Descriptive Statistics for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Hispanic Boys in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

Reporting Category and Year	*n*	*M*	*SD*
Reporting Category 1: 2016-2017			
Poor	37,436	5.12	2.06
Not Poor	8,093	6.10	1.81
Reporting Category 1: 2017-2018			
Poor	29,519	5.57	1.95
Not Poor	6,042	6.41	1.69
Reporting Category 1: 2018-2019			
Poor	26,289	5.25	1.84
Not Poor	5,983	6.18	1.62
Reporting Category 2: 2016-2017			
Poor	37,436	8.39	3.45
Not Poor	8,093	9.98	2.96
Reporting Category 2: 2017-2018			
Poor	29,519	8.03	3.24
Not Poor	6,042	9.77	2.80
Reporting Category 2: 2018-2019			
Poor	26,289	8.38	3.16
Not Poor	5,983	10.10	2.70
Reporting Category 3: 2016-2017			
Poor	37,436	4.08	1.79
Not Poor	8,093	4.88	1.69
Reporting Category 3: 2017-2018			
Poor	29,519	4.13	1.74
Not Poor	6,042	4.92	1.66
Reporting Category 3: 2018-2019			
Poor	26,289	4.73	1.68
Not Poor	5,983	5.43	1.48
Reporting Category 4: 2016-2017			
Poor	37,436	2.43	1.18
Not Poor	8,093	2.84	1.08
Reporting Category 4: 2017-2018			
Poor	29,519	2.72	1.15
Not Poor	6,042	3.14	0.97
Reporting Category 4: 2018-2019			
Poor	26,289	2.74	0.95
Not Poor	5,983	3.03	0.91

Table 3.2

Descriptive Statistics for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Black Boys in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

Reporting Category and Year	*n*	*M*	*SD*
Reporting Category 1: 2016-2017			
Poor	8,717	4.43	2.13
Not Poor	1,963	5.52	2.05
Reporting Category 1: 2017-2018			
Poor	6,705	4.79	2.08
Not Poor	1,328	5.90	1.89
Reporting Category 1: 2018-2019			
Poor	6,113	4.63	1.96
Not Poor	1,211	5.80	1.72
Reporting Category 2: 2016-2017			
Poor	8,717	7.05	3.51
Not Poor	1,963	8.90	3.43
Reporting Category 2: 2017-2018			
Poor	6,705	6.81	3.37
Not Poor	1,328	9.04	3.14
Reporting Category 2: 2018-2019			
Poor	6,113	7.16	3.36
Not Poor	1,211	9.24	3.04
Reporting Category 3: 2016-2017			
Poor	8,717	3.49	1.80
Not Poor	1,963	4.35	1.83
Reporting Category 3: 2017-2018			
Poor	6,705	3.53	1.77
Not Poor	1,328	4.48	1.78
Reporting Category 3: 2018-2019			
Poor	6,113	4.07	1.76
Not Poor	1,211	4.98	1.64
Reporting Category 4: 2016-2017			
Poor	8,717	1.99	1.20
Not Poor	1,963	2.49	1.21
Reporting Category 4: 2017-2018			
Poor	6,705	2.30	1.21
Not Poor	1,328	2.89	1.11
Reporting Category 4: 2018-2019			
Poor	6,113	2.42	1.00
Not Poor	1,211	2.82	0.98

Table 3.3

Frequencies and Percentages for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Hispanic Boys in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
Performance Level Standard and School Year	*n*	%	*n*	%
Approaches Grade Level: 2016-2017				
Poor	26,551	70.9	10,885	29.10
Not Poor	7,106	87.80	987	12.20
Approaches Grade Level: 2017-2018				
Poor	22,194	75.20	7,325	24.80
Not Poor	5,494	90.90	548	9.10
Approaches Grade Level: 2018-2019				
Poor	19,941	75.90	6,346	24.10
Not Poor	5,492	91.80	491	8.20
Meets Grade Level: 2016-2017				
Poor	14,523	38.80	22,913	61.20
Not Poor	5,028	62.10	3,065	37.90
Meets Grade Level: 2017-2018				
Poor	11,798	40.00	17,721	60.00
Not Poor	3,914	64.80	2,128	35.20
Meets Grade Level: 2018-2019				
Poor	10,792	41.10	15,497	58.90
Not Poor	3,968	66.30	2,015	33.70
Masters Grade Level: 2016-2017				
Poor	6,697	17.90	30,739	82.10
Not Poor	2,865	35.40	5,228	64.60
Masters Grade Level: 2017-2018				
Poor	4,775	16.20	24,744	83.80
Not Poor	2,146	35.50	3,896	64.50
Masters Grade Level: 2018-2019				
Poor	4,636	17.60	21,653	82.40
Not Poor	2,281	38.10	3,702	61.90

Table 3.4

Frequencies and Percentages for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Black Boys in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
Performance Level Standard and School Year	*n*	%	*n*	%
Approaches Grade Level: 2016-2017				
Poor	4,813	55.20	3,904	44.80
Not Poor	1,501	76.50	462	23.50
Approaches Grade Level: 2017-2018				
Poor	3,942	58.80	2,763	41.20
Not Poor	1,104	83.10	224	16.90
Approaches Grade Level: 2018-2019				
Poor	3,666	60.00	2,447	40.00
Not Poor	1,016	83.90	195	16.10
Meets Grade Level: 2016-2017				
Poor	2,071	23.80	6,646	76.20
Not Poor	957	48.80	1,006	51.20
Meets Grade Level: 2017-2018				
Poor	1,629	24.30	5,076	75.70
Not Poor	708	53.30	620	46.70
Meets Grade Level: 2018-2019				
Poor	1,594	26.10	4,519	73.90
Not Poor	643	53.10	568	46.90
Masters Grade Level: 2016-2017				
Poor	844	9.70	7,873	90.30
Not Poor	469	23.90	1,494	76.10
Masters Grade Level: 2017-2018				
Poor	561	8.40	6,144	91.60
Not Poor	335	25.20	993	74.80
Masters Grade Level: 2018-2019				
Poor	601	9.80	5,512	90.20
Not Poor	314	25.90	897	74.10

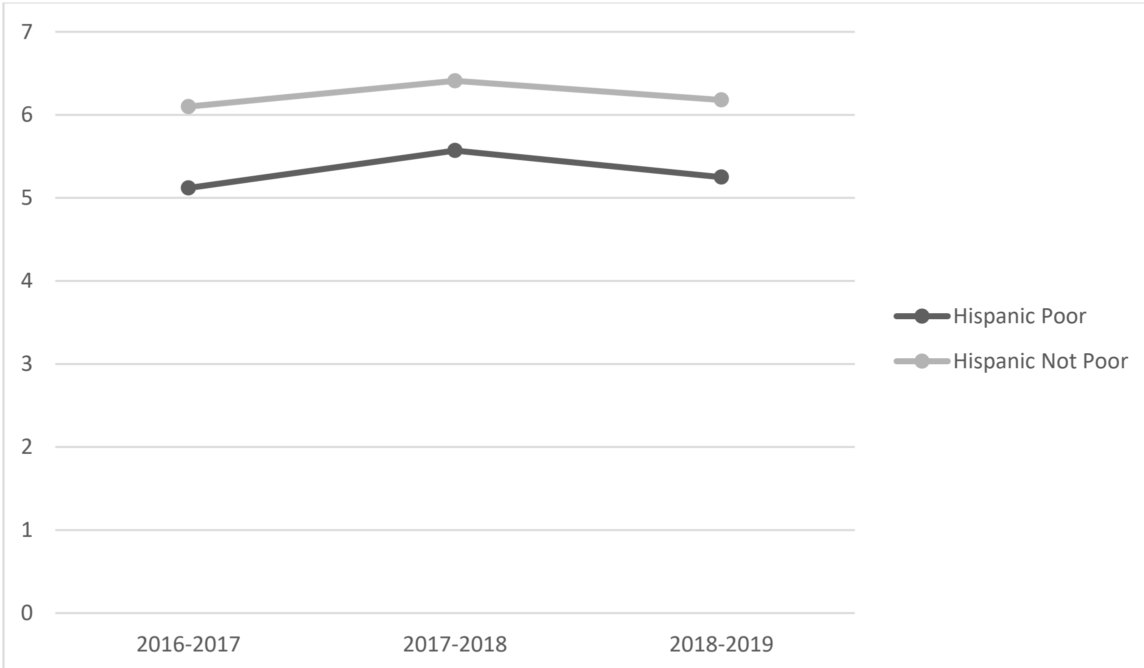

Figure 3.1. Average scores by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Reporting Category 1 for the 2016-2017, 2017-2018, and 2018-2019 school years.

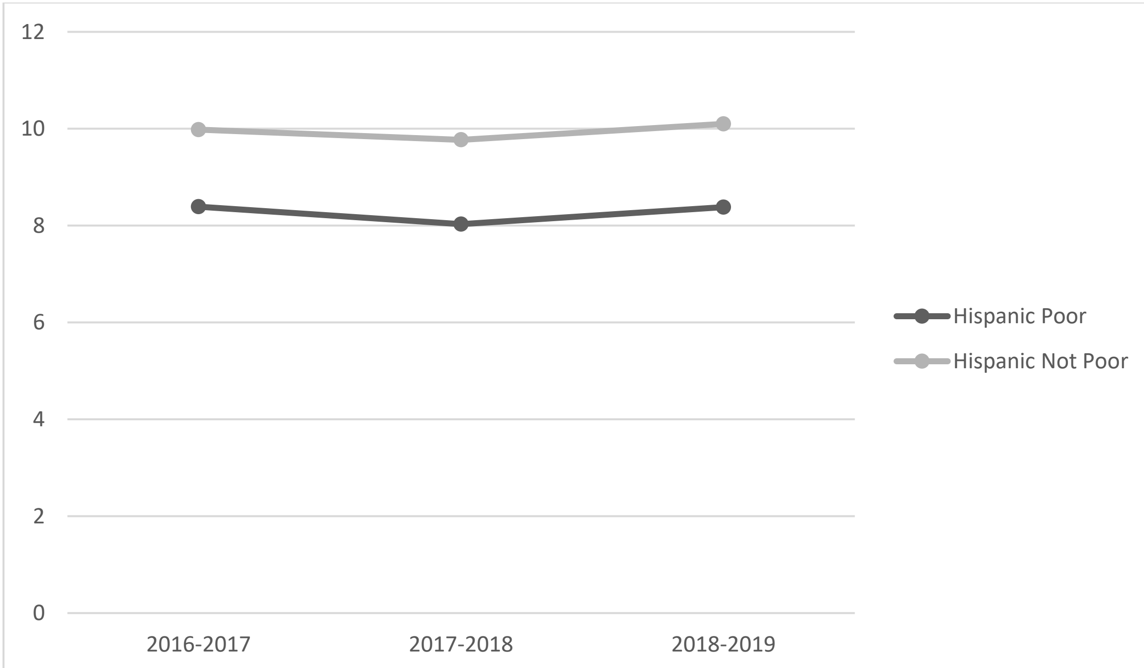

Figure 3.2. Average scores by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Reporting Category 2 for the 2016-2017, 2017-2018, and 2018-2019 school years.

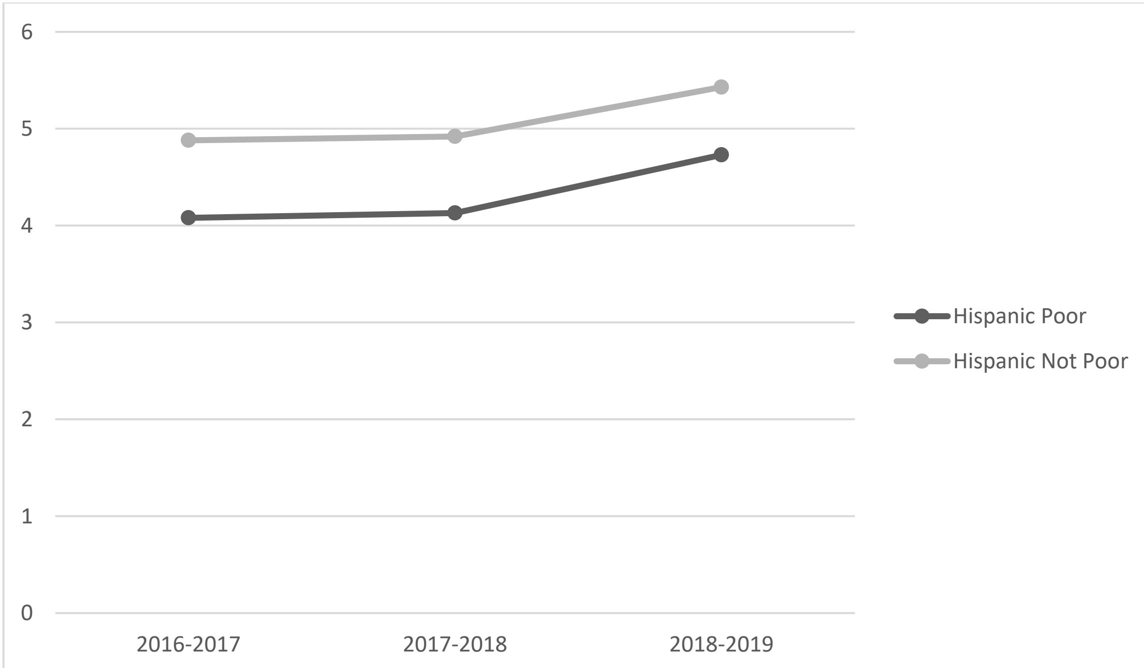

Figure 3.3. Average scores by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Reporting Category 3 for the 2016-2017, 2017-2018, and 2018-2019 school years.

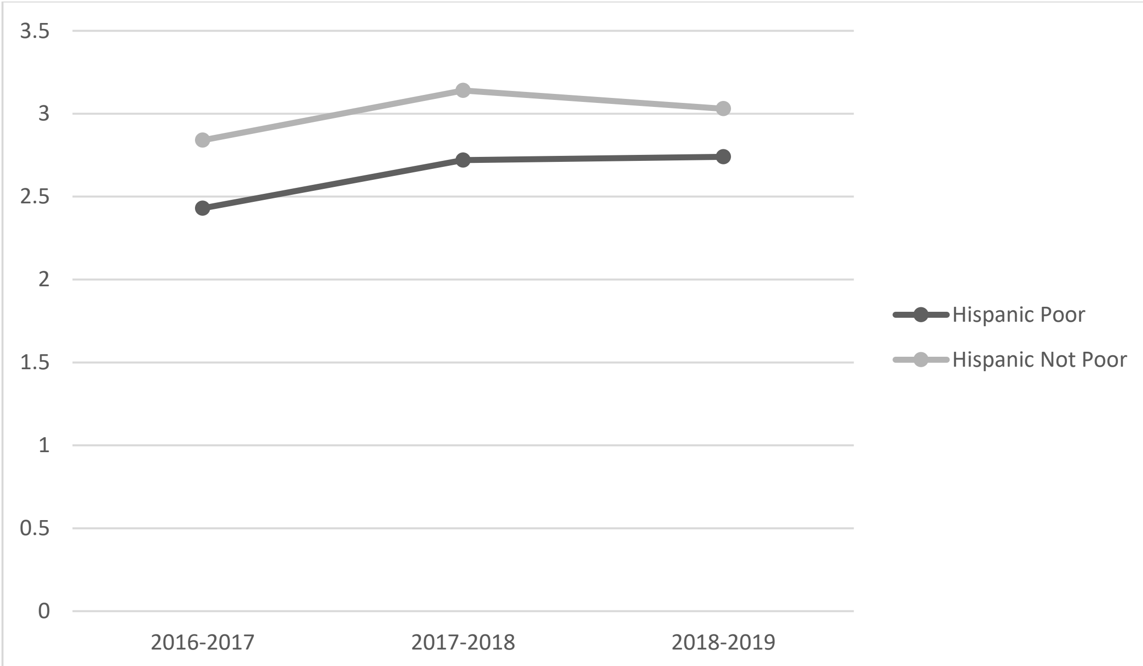

Figure 3.4. Average scores by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Reporting Category 4 for the 2016-2017, 2017-2018, and 2018-2019 school years.

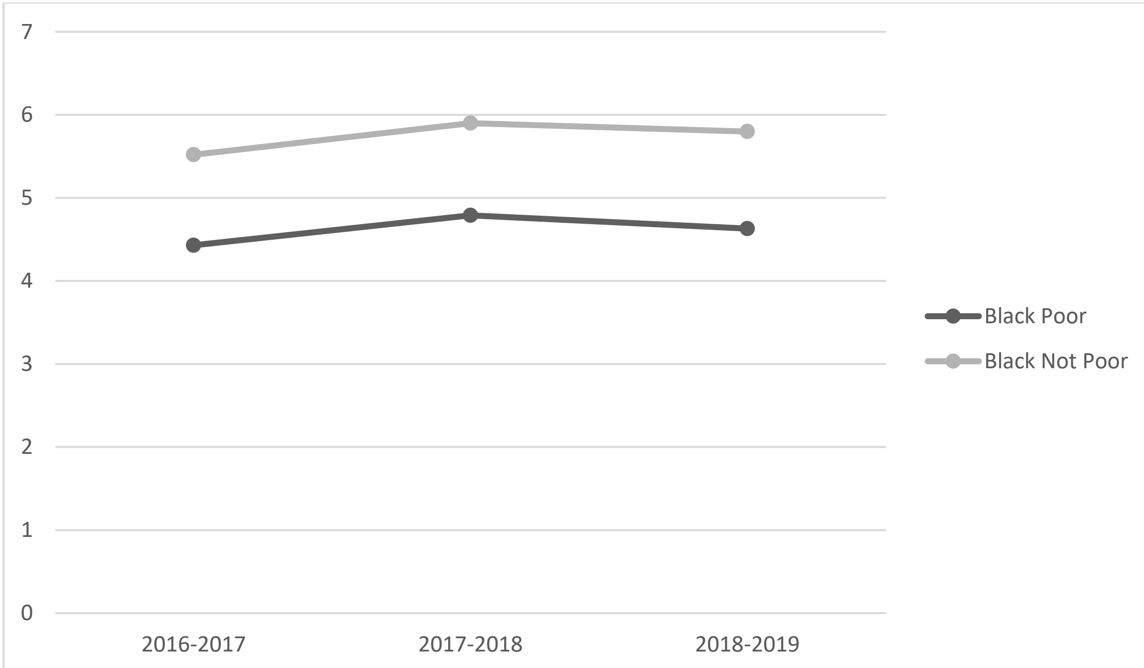

Figure 3.5. Average scores by the economic status of Black boys for the STAAR Grade 3 Mathematics Reporting Category 1 for the 2016-2017, 2017-2018, and 2018-2019 school years.

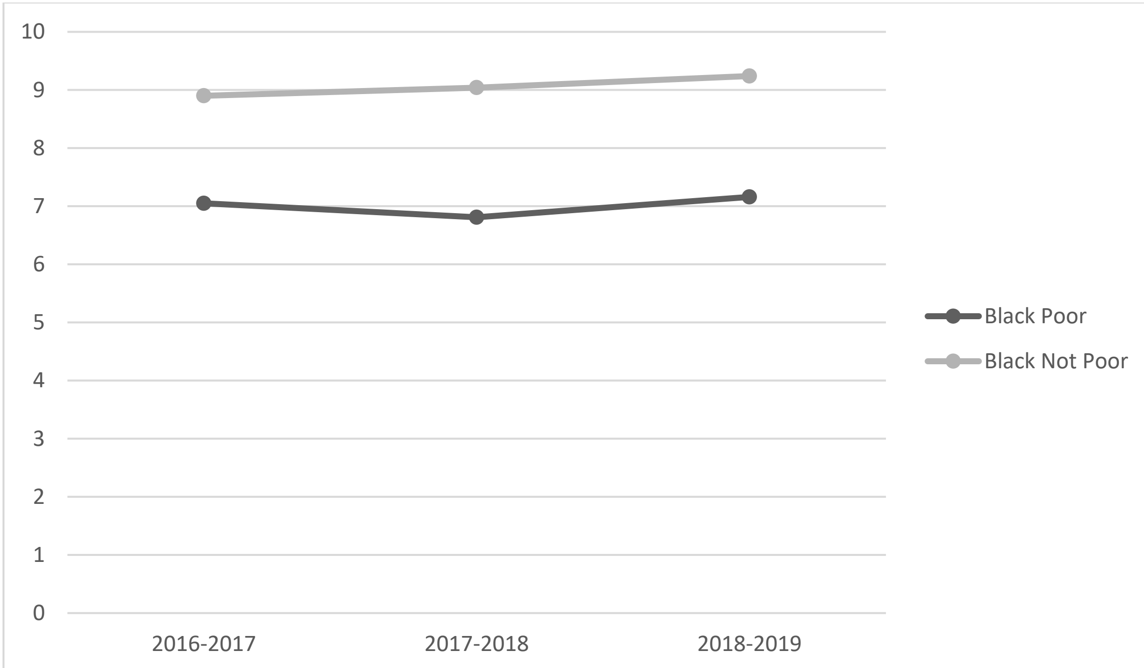

Figure 3.6. Average scores by the economic status of Black boys for the STAAR Grade 3 Mathematics Reporting Category 2 for the 2016-2017, 2017-2018, and 2018-2019 school years.

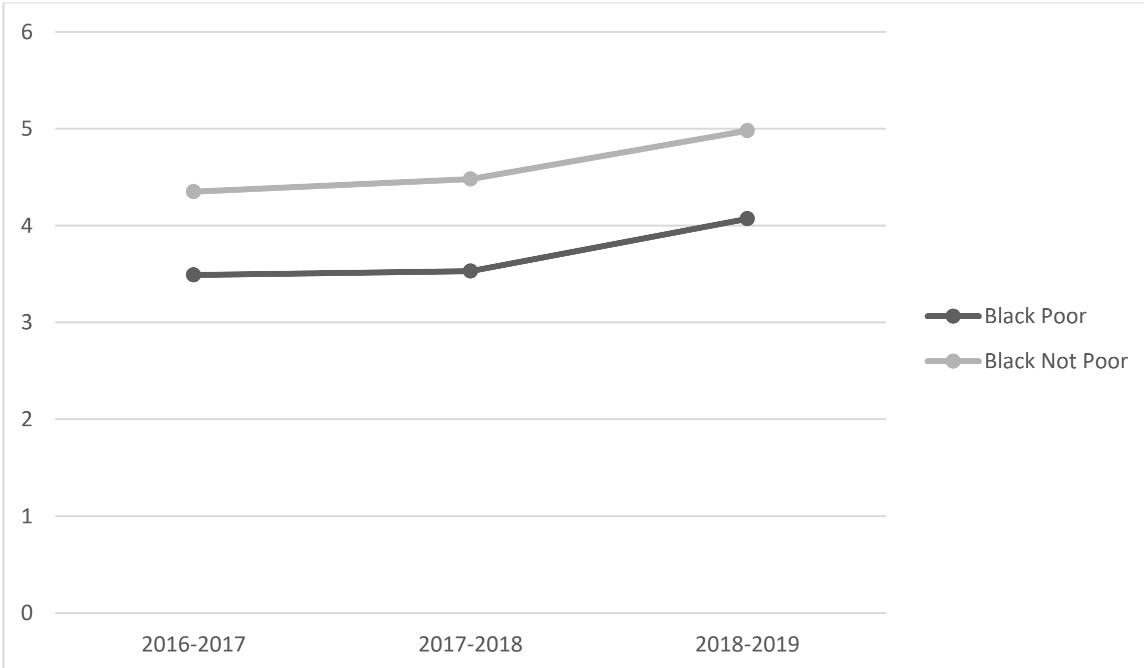

Figure 3.7. Average scores by the economic status of Black boys for the STAAR Grade 3 Mathematics Reporting Category 3 for the 2016-2017, 2017-2018, and 2018-2019 school years.

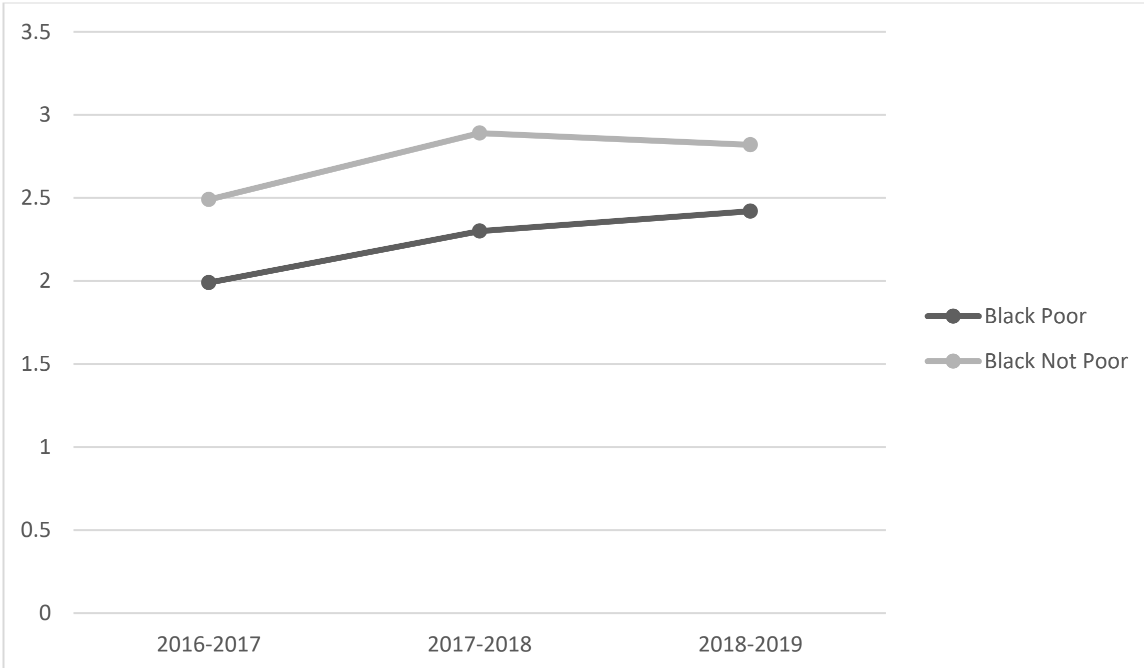

Figure 3.8. Average scores by the economic status of Black boys for the STAAR Grade 3 Mathematics Reporting Category 4 for the 2016-2017, 2017-2018, and 2018-2019 school years.

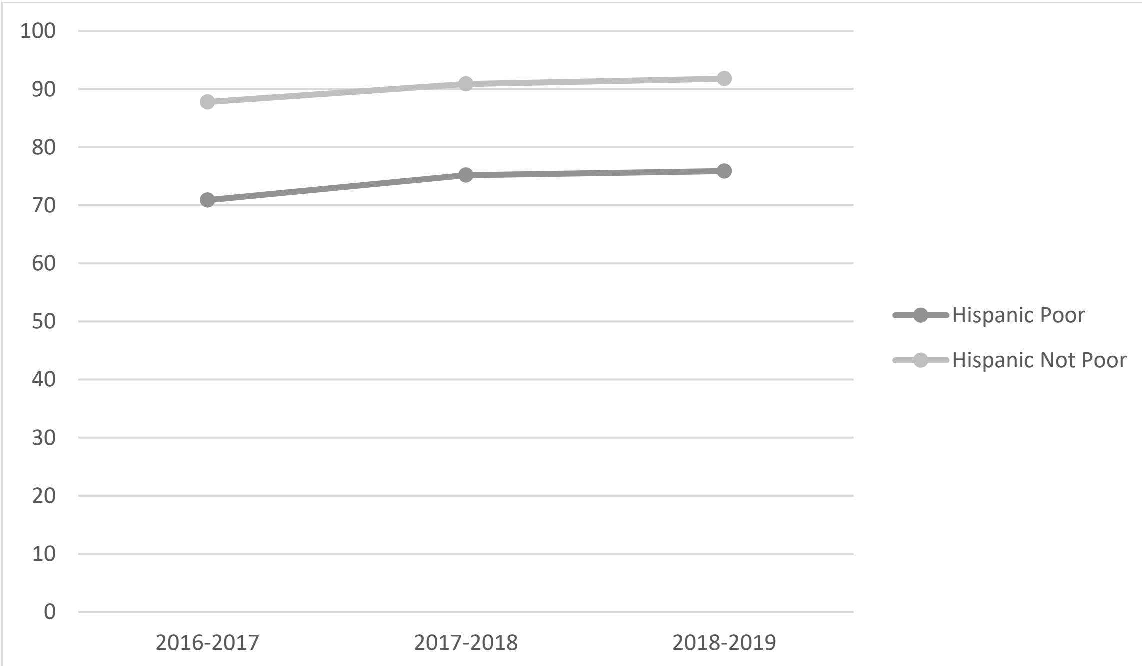

Figure 3.9. Average percentages by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Approaches Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

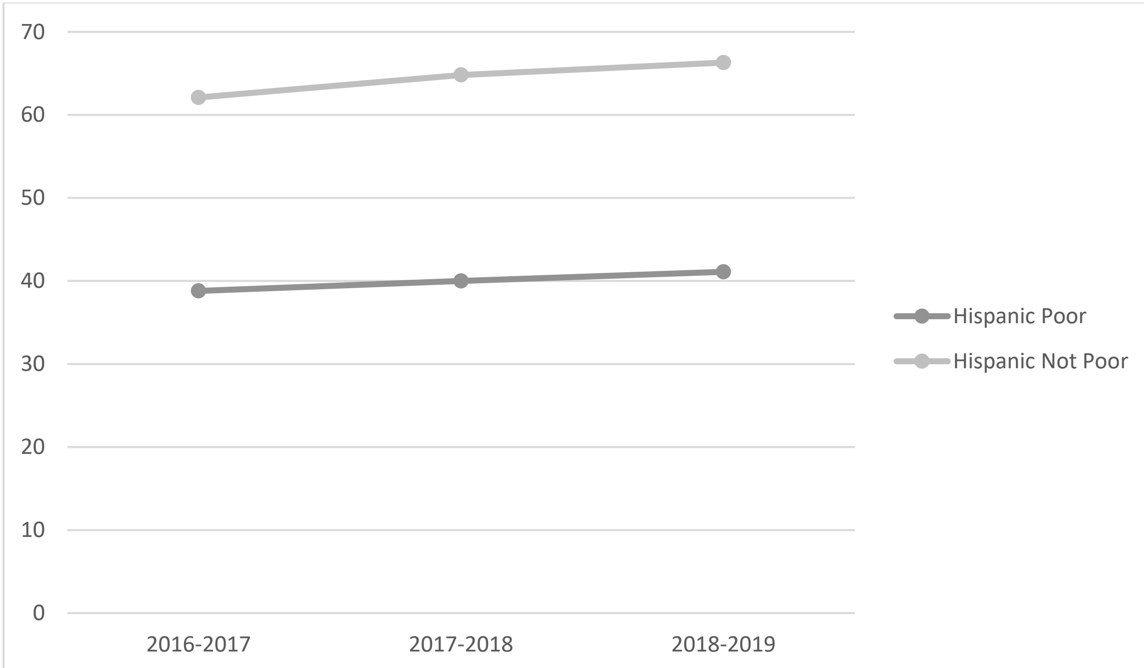

Figure 3.10. Average percentages by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Meets Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

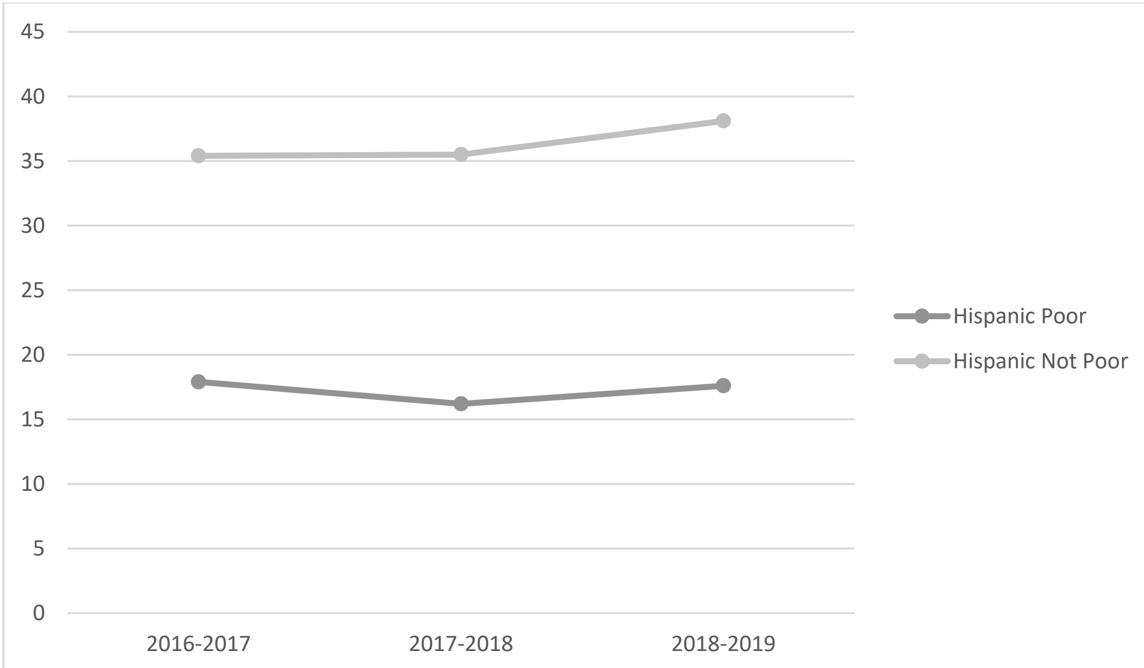

Figure 3.11. Average percentages by the economic status of Hispanic boys for the STAAR Grade 3 Mathematics Masters Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

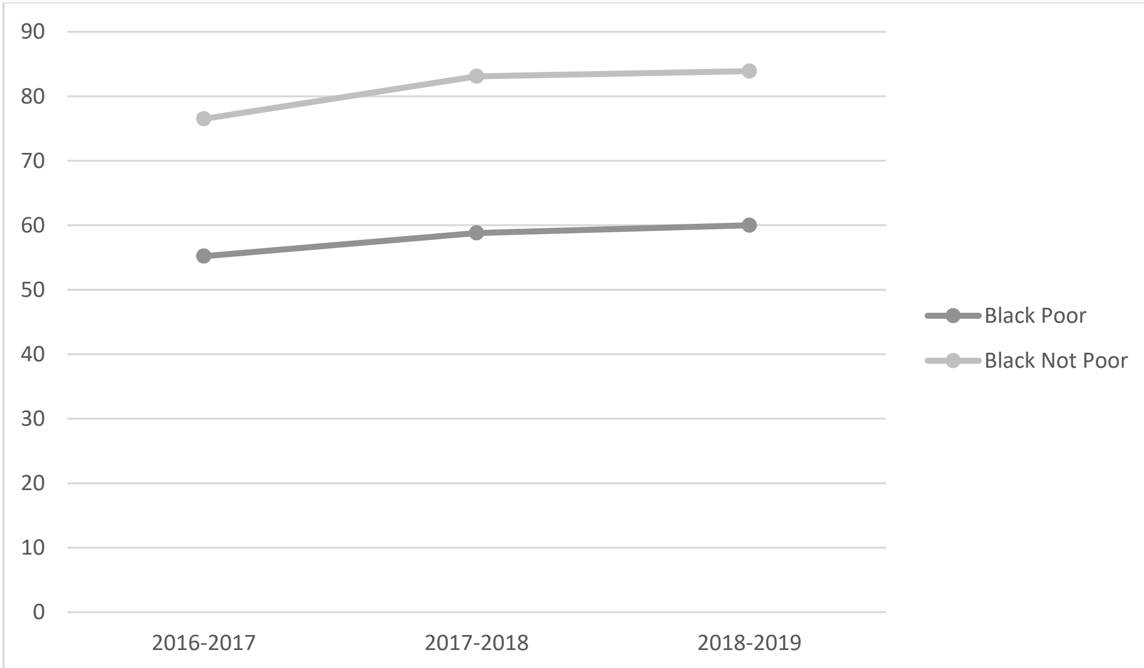

Figure 3.12. Average percentages by the economic status of Black boys for the STAAR Grade 3 Mathematics Approaches Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

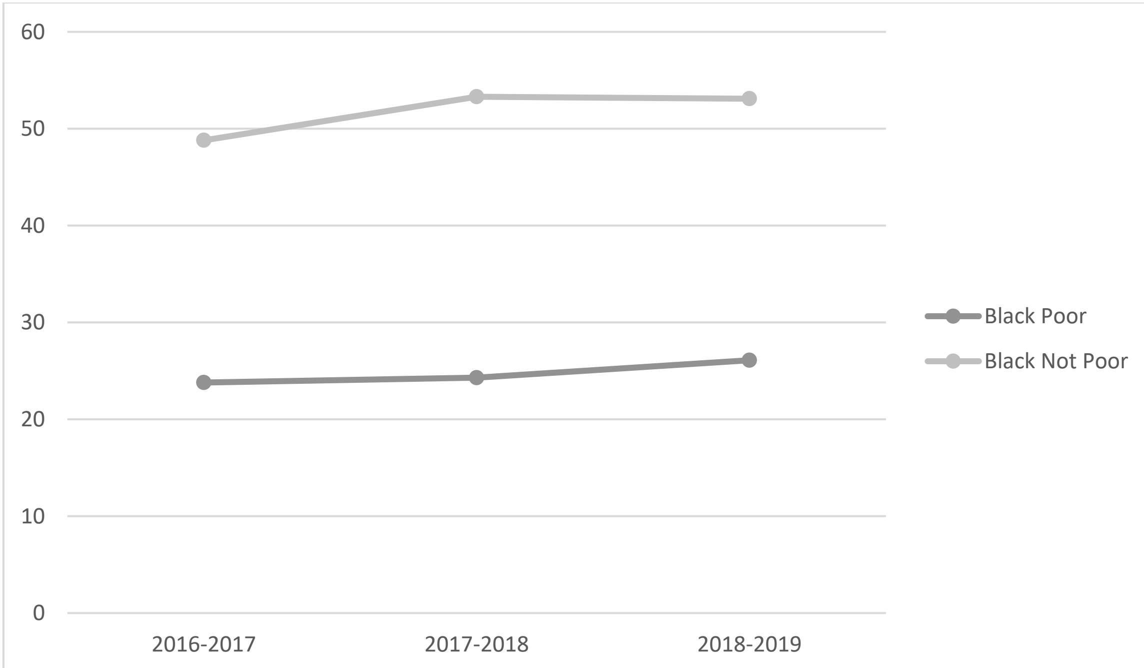

Figure 3.13. Average percentages by the economic status of Black boys for the STAAR Grade 3 Mathematics Meets Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

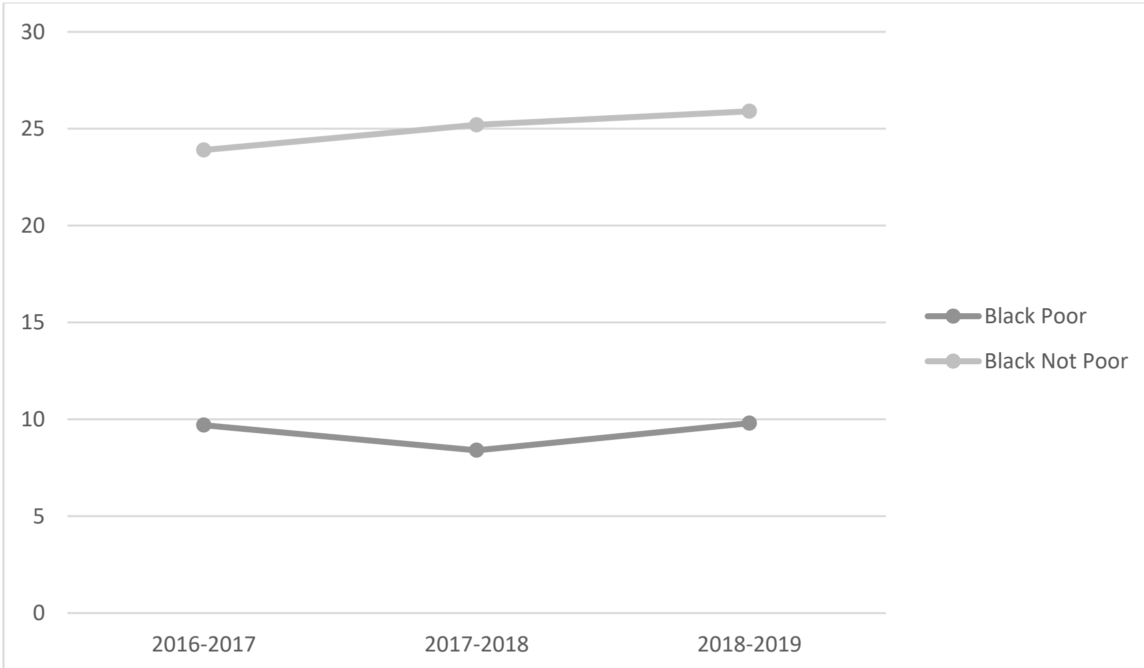

Figure 3.14. Average percentages by the economic status of Black boys for the STAAR Grade 3 Mathematics Masters Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

CHAPTER IV

DIFFERENCES IN MATHEMATICS PERFORMANCE BY THE ECONOMIC STATUS OF TEXAS GRADE 3 GIRLS OF COLOR: A MULTIYEAR, STATEWIDE ANALYSIS

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

Abstract

In this investigation, the extent to which differences were present in the mathematics achievement of Texas Grade 3 girls of color as a function of their economic status (i.e., Poor and Not Poor) was examined. Data were obtained from the Texas Education Agency Public Education Information Management System for all Grade 3 Hispanic and Black girls who took the State of Texas Assessment of Academic Readiness Mathematics exam in the 2016-2017, 2017-2018, and 2018-2019 school years. In all three school year examined, inferential analyses revealed the presence of statistically significant differences in overall mathematics achievement and the four Mathematics Reporting Categories. Hispanic girls who were Poor performed more poorly than Hispanic girls who were Not Poor. Similarly, Black girls who were Poor performed more poorly than Black girls who were Not Poor. Future research recommendations and implications for policy and practice were suggested.

Keywords: Mathematics achievement; Poverty; Economic status; Black; Hispanic; Girls; Grade 3; STAAR; Texas

DIFFERENCES IN MATHEMATICS PERFORMANCE BY THE ECONOMIC STATUS OF TEXAS GRADE 3 GIRLS OF COLOR: A MULTIYEAR, STATEWIDE ANALYSIS

Difficulties in mathematics that start for students at an early age often persist through adulthood (Kiss, Nelson, & Christ, 2019). Researchers (e.g., Geary, Hoard, Nugent, & Bailey, 2012; Jordan & Hanich, 2003; Vukovic, 2012) have stated that mathematics achievement gaps evident in preschool still remain in Grade 5 and often increase each year. Kiss et al. (2019) determined the importance of identifying concepts where students may struggle as well as identifying the contributing factors. Previous researchers (e.g., Duncan et al., 2007; Eccles, Vida, & Barber, 2004; Starkey, Klein, & Wakeley, 2004; Vortruba-Drzal, 2006) have indicated that ethnicity/race, poverty, and gender are contributing factors into mathematics achievement for students.

In 2016, the National Science Board stated that women were underrepresented in the fields of science, technology, engineering, and mathematics (STEM). More specifically, the authors reported that the underrepresentation was especially present for Black and Hispanic women. Researchers (e.g., Beasley & Fischer, 2012; Leaper, Farkas, & Brown, 2012; Saw, Chang, & Chan, 2018) have provided evidence that students who are female, Black, Hispanic, or low socioeconomic are less likely to develop and to 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 corelated to student achievement in mathematics (Sadler, Sonnert, Hazari, & Tai, 2014; Tyson, Lee, Borman, & Hanson, 2007)

The intersection of ethnicity/race and gender is prevalent when it comes to mathematics achievement for Black and Hispanic girls (Evans-Winters & Esposito, 2010; Larke, Young, & Young, 2011; Young, 2016). According to the Nation's Report Card (2019), Black students in Grade 4 were outperformed by 25 points by their White peers on the 2015 National Assessment of Educational Progress Mathematics assessments. Hispanic students were outperformed by 18 points by their White counterparts on the 2015 National Assessment of Educational Progress Mathematics Assessment. In regard to gender, girls in Grade 4 were outperformed by 3 points by their male peers (The Nation's Report Card, 2019).

In the State of Texas, poverty is well documented because of the high percentage of students who are economically disadvantaged. During the 2018-2019 school year, 61% of Texas students were identified as economically disadvantaged (Texas Education Agency, 2019). 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 identified as economically disadvantaged. According to the Texas Education Agency (2019), 74% of Black students and 76% of Hispanic students were living in poverty during the 2018-2019 school year. With high percentages of students living in poverty and researchers (e.g., Conradi, Amendum, & Liebfreund, 2016; McGown & Slate, 2017; Owens, 2010) having established that students in poverty perform lower than their peers at a disproportionate rate, it is important to identify achievement gaps that may exist.

Differences in the reading achievement of Texas students by gender, ethnicity/race, or economic status have been well documented (Harris, 2018; McGown, 2016; Schleeter, 2017). These studies were limited as these researchers did not perform analyses of the poverty differences within a given ethnic/racial group. In a recent study in which this limitation was not present, Hamilton and Slate (2019) analyzed Texas statewide data of Grade 3 Black and Hispanic students who took the State of Texas Assessment of Academic Readiness (STAAR) Reading exam during the 2015-2016 school year. Statistically significant differences were present in the reading achievement of Grade 3 Black and Hispanic students by their economic status (Hamilton & Slate, 2019). Black students who were poor were outperformed by Black students who not poor at the Approaches Grade Level, Meets Grade Level, and Masters Grade Level STAAR Performance Level standards (Hamilton & Slate, 2019). Similarly, Hispanic students who were poor were outperformed by Hispanic students who were not poor at all three STAAR Performance Level Standards (Hamilton & Slate, 2019).

With respect to the effects of poverty on mathematics performance in Texas, Anderson (2016) examined statewide data for four school years (i.e., 2011-2012, 2012-2013, 2013-2014, 2014-2015) from the Texas state-mandated assessment. Data from the Grade 5 and Grade 8 STAAR Mathematics exam were examined to ascertain if differences were present in the performance of Grade 5 and Grade 8 students 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 as a function of 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).

Anderson (2016) also analyzed the extent to which ethnic/racial differences were present in the mathematics performance of Grade 5 and Grade 8 students. Analyzed in her study were data from the STAAR Mathematics exam for four school years. Statistically significant differences were revealed in both Grade 5 and Grade 8, with Black and Hispanic students performing lower than their peers who were White and Asian (Anderson, 2016). A stair-step effect (Carpenter, Ramirez, & Severn, 2006) was present for each year with Asian students having the highest scores followed by White, Hispanic, and Black students.

In a recent investigation, Davenport and Slate (2019) addressed the effect of poverty on mathematics performance for students in Texas. Statewide data from the STAAR Mathematics assessment for the 2015-2016 school year was used to ascertain the degree to which differences were present in the mathematics performance of Grade 3 students by their economic status (i.e., Not Poor, Moderately Poor, and Extremely Poor). For mathematics performance, the STAAR Performance Level Standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) were used. Grade 3 students who were Extremely Poor had statistically significant lower passing rates than students who were Moderately Poor and students who were Not Poor at the Approaches Grade Level standard, and students who were Moderately Poor had statistically significant lower passing rates than students who were Not Poor at the

Approaches Grade Level standard (Davenport & Slate, 2019). At the Meets Grade Level standard, Grade 3 students who were Extremely Poor had statistically significant lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had statistically significant lower passing rates than students who were Not Poor. Finally, at the Masters Grade Level standard, students who were Extremely Poor had statistically significant lower passing rates than students who were Moderately Poor and students who were Not Poor, and students who were Moderately Poor had statistically significant lower passing rates than students who were Not Poor (Davenport & Slate, 2019). Davenport and Slate (2019) documented the presence of a clear stair-step effect (Carpenter et al., 2006) at all three performance level standards. The lowest passing rates were present for students who were Extremely Poor; the next lowest passing rates were present for students who were Moderately Poor; and the highest passing rates were present for students who were Not Poor.

Statement of the Problem

Halpern et al. (2007) listed a wide range of social and personal factors that may contribute to the gender differences seen in mathematics achievement. Paschall, Gershoff, and Kuhfeld (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. Researchers (e.g., Anderson, 2016; Davenport & Slate, 2019; Harris, 2018; McGown, 2016) have analyzed the effects of economic status on academic achievement. The relationship between ethnicity/race and academic achievement have been examined (e.g., Anderson, 2016; Harris, 2018; McGown, 2016). With regard to the intersection of economic status and ethnicity/race, only one published study (e.g., Hamilton & Slate, 2019) about students in the State of Texas could be located. Hamilton and Slate (2019) focused only on the reading achievement of Black and Hispanic students in Grade 3 by their economic status. With high percentages of Black and Hispanic students in poverty in the State of Texas, 74% and 76% respectively (Texas Education Agency, 2019), it is important to understand what educational inequities may be present.

Purpose of the Study

The overall purpose of this study was to determine the degree to which differences were present in the mathematics performance by the economic status (i.e., Poor or Not Poor) of Texas Grade 3 Black and Hispanic girls. Specifically addressed herein was the extent to which economic differences existed in the performance of Texas Grade 3 Black and Hispanic girls on the STAAR Mathematics Reporting Categories. Also examined was the degree to which differences were present in the percentages of Texas Grade 3 Black and Hispanic girls achieving at the three performance levels (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level). The final purpose of this study was to determine if any trends were present in the reporting categories and performance levels across three school years (i.e., 2016-2017, 2017-2018, 2018-2019) by the economic status of Texas Grade 3 Black and Hispanic girls.

Significance of the Study

Numerous researchers (e.g., Anderson, 2016; Davenport & Slate, 2019; Harris 2018; McGown, 2016) have established the presence of statistically significant economic differences in the academic achievement of Texas students. At the time of this study, only two researchers (e.g., Hamilton & Slate, 2019) had analyzed the intersection of economic status and ethnicity/race on academic performance. Hamilton and Slate (2019) documented statistically significant differences present in the reading performance of Texas Grade 3 Black and Hispanic students by their economic status. A limited number of published studies regarding the mathematics achievement of Texas girls of color by their economic status could be located. Findings from this study could fill the gaps in the literature. Also, practitioners and policymakers can use the findings from this study to become informed about the effects of poverty on the mathematics performance of girls of color.

Research Questions

In this study, the following overarching research question was addressed: What is the difference in mathematics performance by the economic status (i.e., Poor and Not Poor) of Texas Grade 3 girls of color? Specific subquestions under this overarching research question were: (a) What is the difference in numerical representations and relationships by the economic status of Texas Grade 3 girls of color?; (b) What is the difference in computations and algebraic relationships by the economic status of Texas Grade 3 girls of color?; (c) What is the difference in geometry and measurement by the economic status of Texas Grade 3 girls of color?; (d) What is the difference in data analysis and personal financial literacy by the economic status of Texas Grade 3 girls of color?; (e) What is the difference in performance on the Approaches Grade Level standard by the economic status of Texas Grade 3 girls of color?; (f) What is the difference in performance on the Meets Grade Level standard by the economic status of Texas Grade 3 girls of color?; (g) What is the difference in performance on the Masters Grade Level standard by the economic status of Texas Grade 3 girls of color?; and (h)

What is the degree to which trends are present in mathematics by the economic status of Texas Grade 3 girls of color? These research questions were answered separately for Hispanic girls and for Black girls. The first seven research subquestions were addressed for three school years, whereas the last research question involved a comparison of results across all three school years.

Method

Research Design

This research design for this study as non-experimental, quantitative, causal comparative (Johnson & Christensen, 2020). After both independent variables and dependent variables have occurred, a causal comparative design is used to find relationships (Johnson & Christensen, 2020). In this study, statewide archival data were analyzed to assess the effect of economic status on the mathematics achievement of Texas Grade 3 girls of color. In this study, the economic status (i.e., Poor and Not Poor) was the independent variable. The four STAAR Mathematics Reporting Categories (i.e. Reporting Category 1, Reporting Category 2, Reporting Category 3, and Reporting Category 4) and the three STAAR Mathematics Performance Levels (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) for Grade 3 girls of color were the dependent variables.

Participants and Instrumentation

Data for this study were requested from the Texas Education Agency Public Education Information Management System. Specifically addressed herein was the performance on the Texas state-mandated mathematics exam for the 2016-2017, 2017-2018, 2018-2019 school years for Grade 3 girls of color by their economic status (i.e., Poor and Not Poor). Analyses were also conducted to assess patterns across STAAR Mathematics Reporting Categories and STAAR Mathematics Performance Levels for Texas Grade 3 Black and Hispanic Girls.

Mathematics achievement was defined using the four STAAR Mathematics Reporting Categories and the three STAAR Mathematics Performance Levels. The STAAR Mathematics Reporting Category 1 measures student ability to apply numerical representations and relationships to problem situations. The STAAR Mathematics Reporting Category 2 measures student ability to apply algebraic relationships and computations to problem situations. The STAAR Mathematics Reporting Category 3 measures student ability to apply geometry and measurement to problem situations. Finally, STAAR Mathematics Reporting Category 4 measures students' ability to apply data analysis and personal financial literacy to problem situations.

The three STAAR Mathematics Performance Levels were introduced by the Texas Education Agency in 2017 to convey how well students performed on the STAAR Mathematics Assessment (Texas Education Agency, 2017). Students performing at the Approaches Grade Level Standard will be likely to succeed in the next grade level or course with the assistance of targeted academic interventions (Texas Education Agency, 2017). Students performing at the Meets Grade Level Standard will be likely to succeed in the next grade level or course with the assistance of short-term, targeted academic interventions. Students performing at the Masters Grade Level Standard will be likely to succeed in the next grade level or course with very little to no academic intervention (Texas Education Agency, 2017).

For the purpose of this study, economic status was defined in two groups of students (e.g., Poor and Not Poor). To define the level of economic status for students, the Texas Education Agency (2015) uses the National School Lunch and Child Nutrition Program. Students who do not qualify for free or reduced-priced meals are defined as Not Poor. Students who qualify for either reduced-priced meals or free meals are defined as Poor.

Results

Prior to conducting multivariate analysis of variance (MANOVA) statistical procedures, its underlying assumptions were checked. Specifically examined were data normality, Box's Test of Equality of Covariance and the Levene's Test of Equality of Error Variance. Although a majority of these assumptions were not met, the robustness of the MANOVA procedure made it appropriate to use in this study (Field, 2009). Results of statistical analyses by the economic status of Grade 3 girls of color in Texas who took the STAAR Mathematics assessment will be described by Mathematics Reporting Category in chronological order for the 2016-2017, 2017-2018, and 2018-2019 school years.

Overall Results for Hispanic Girls Across All Three School Years

With respect to the 2016-2017 school year, the MANOVA revealed a statistically significant difference in overall mathematics performance by the economic status of Texas Grade 3 Hispanic girls, Wilks' $\Lambda = .96$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1998). Regarding the 2017-2018 school year, the MANOVA yielded a statistically significant difference, Wilks' $\Lambda = .96$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1998) in overall mathematics performance as a function of student economic status. Concerning the 2018-2019 school year, a statistically significant difference was again present in overall mathematics performance, Wilks' $\Lambda = .95$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1998). In all three school years, effect sizes were small for the statistically significant differences in overall mathematics performance of Texas Grade 3 Hispanic girls by their economic status.

Mathematics Reporting Category 1 Results for Hispanic Girls Across All Three School Years

Following the overall results of the MANOVA, univariate follow-up Analysis of Variance (ANOVA) procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 1 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 43056) = 1574.01$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 36724) = 1109.50$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again revealed on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 32795) = 1161.72$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 1, effect sizes by economic status were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Hispanic girls who were Poor answered one fewer item correctly than Hispanic girls who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Hispanic girls were Poor answered slightly less than nine tenths fewer items correctly than Hispanic girls who were Not Poor. For the 2018-2019, school year, Grade 3 Hispanic girls were Poor answered slightly more than eight tenths items fewer correctly than Hispanic girls who were Not Poor. Descriptive statistics are contained in Table 4.1.

Insert Table 4.1 about here

Mathematics Reporting Category 2 Results for Hispanic Girls Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 43056) = 1476.46$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present, $F(1, 36275) = 1560.54$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). With respect to the 2018-2019 school year, a statistically significant difference was again, $F(1, 32795) = 1614.52$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 2, effect sizes were small for all three school years.

Regarding the 2016-2017 school year, Grade 3 Hispanic girls who were Poor answered more than one and a half items fewer correctly than Hispanic girls who were Not Poor. Concerning the 2017-2018 and 2018-2019 school years, Grade 3 Hispanic girls were Poor answered about one and two thirds fewer items correctly than Hispanic girls who were Not Poor. Descriptive statistics for the STAAR Mathematics Reporting Category 2 are contained in Table 4.1.

Mathematics Reporting Category 3 Results for Hispanic Girls Across All Three School Years

With respect to the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 43056) = 1337.00$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was, $F(1, 36275) = 982.48$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed, $F(1, 32795) = 1019.26$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 3, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Hispanic girls who were Poor answered slightly more than three fourths fewer item correctly than Hispanic girls who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Hispanic girls were Poor answered seven tenths fewer items correctly than Hispanic girls who were Not Poor. For the 2018-2019, school year, Grade 3 Hispanic girls were Poor answered slightly more than seven tenths items fewer correctly than Hispanic girls who were Not Poor. Delineated in Table 4.1 are the descriptive statistics for the STAAR Mathematics Reporting Category 3.

Mathematics Reporting Category 4 Results for Hispanic Girls Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 43056) = 872.39$, $p < .001$, partial $\eta^2 = .02$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present, $F(1, 36275) = 676.38$, $p < .001$, partial $\eta^2 = .02$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again, $F(1, 32795) = 337.35$, $p < .001$, partial $\eta^2 = .01$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 4, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Hispanic girls who were Poor answered four tenths fewer items correctly than Hispanic girls who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Hispanic girls were Poor answered slightly less than four tenths fewer items correctly than Hispanic girls who were Not Poor. For the 2018-2019, school year, Grade 3 Hispanic girls were Poor answered about one fourth items fewer correctly than Hispanic girls who were Not Poor. Revealed in Table 4.1 are the descriptive statistics for these analyses.

Overall Results for Black Girls Across All Three School Years

With respect to the 2016-2017 school year, the MANOVA revealed a statistically significant difference in overall mathematics performance by the economic status of Texas Grade 3 Black girls, Wilks' $\Lambda = .95$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1998). Regarding the 2017-2018 school year, the MANOVA yielded a statistically significant difference, Wilks' $\Lambda = .94$, $p < .001$, partial $\eta^2 = .06$, moderate effect size (Cohen, 1988). Concerning the 2018-2019 school year, a statistically significant difference was again present in overall mathematics performance, Wilks' Λ = .94, $p < .001$, partial $\eta^2 = .06$, moderate effect size (Cohen, 1988). In the 2016-2017 school year, the effect size was small and in the 2017-2018 and 2018-2019 school years, the effect sizes were moderate.

Mathematics Reporting Category 1 Results for Black Girls Across All Three School Years

Univariate follow-up ANOVA procedures were calculated to determine whether statistically significant differences were present in STAAR Mathematics Reporting Category 1 scores by student economic status for all three school years. Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 1 by economic status, $F(1, 10425) = 395.84$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present, $F(1, 8831) = 349.60$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again, $F(1, 7999) = 372.31$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 1, effect sizes were small for all three school years.

With respect to the 2016-2017 and 2018-2019 school years, Grade 3 Black girls who were Poor answered slightly more than one item fewer correctly than Black girls who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Black girls were Poor answered slightly less than one and one tenth fewer items correctly than Black girls who were Not Poor. Descriptive statistics are contained in Table 4.2.

Insert Table 4.2 about here

Mathematics Reporting Category 2 Results for Black Girls Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 2 by economic status, $F(1, 10425) = 468.05$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was, $F(1, 8831) = 475.78$, $p < .001$, partial $\eta^2 = .05$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed, $F(1, 7999) = 397.00$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 2, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Black girls who were Poor answered slightly less than one and nine tenths fewer items correctly than Black girls who were Not Poor. Concerning the 2017-2018, Grade 3 Black girls were Poor answered slightly more than one and nine tenths fewer items correctly than Black girls who were Not Poor. For the 2018-2019 school year, Grade 3 Black girls who were Poor answered about one and eight tenths fewer items correctly than Black girls who were Not Poor. Delineated in Table 4.2 are the descriptive statistics for these analyses.

Mathematics Reporting Category 3 Results for Black Girls Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 3 by economic status, $F(1, 10425) = 363.89$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the 2017-2018 school year, a statistically significant difference was present, $F(1, 8831) = 288.30$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again revealed, $F(1, 7999) = 310.68$, $p < .001$, partial $\eta^2 = .04$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 3, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Black girls who were Poor answered slightly more than eight tenths fewer items correctly than Black girls who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Black girls were Poor answered slightly less than eight tenths fewer items correctly than Black girls who were Not Poor. For the 2018-2019 school year, Grade 3 Black girls were Poor answered slightly less than nine tenths items fewer correctly than Black girls who were Not Poor. Descriptive statistics for the STAAR Mathematics Reporting Category 3 are contained in Table 4.2.

Mathematics Reporting Category 4 Results for Black Girls Across All Three School Years

Concerning the 2016-2017 school year, a statistically significant difference was yielded on the STAAR Mathematics Reporting Category 4 by economic status, $F(1, 10425) = 274.72$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). For the

2017-2018 school year, a statistically significant difference was present, $F(1, 8831) = 260.92$, $p < .001$, partial $\eta^2 = .03$, small effect size (Cohen, 1988). Regarding the 2018-2019 school year, a statistically significant difference was again, $F(1, 7999) = 105.39$, $p < .001$, partial $\eta^2 = .01$, small effect size (Cohen, 1988). On the STAAR Mathematics Reporting Category 4, effect sizes were small for all three school years.

With respect to the 2016-2017 school year, Grade 3 Black girls who were Poor answered slightly less than one half an item fewer correctly than Black girls who were Not Poor. Concerning the 2017-2018 school year, Grade 3 Black girls who were Poor answered slightly more than one half an item fewer correctly than Black girls who were Not Poor. For the 2018-2019 school year, Grade 3 Black girls were Poor answered about three tenths items fewer correctly than Black girls who were Not Poor. Descriptive statistics for the STAAR Mathematics Reporting Category 4 are contained in Table 4.2.

Results for the STAAR Mathematics Approaches Grade Level Standard for Hispanic Girls Across All Three School Years

Student performance on the STAAR Mathematics Approaches Grade Level standard was examined next through the use of Pearson chi-square procedures. This statistical procedure was the optimal statistical procedure to use because dichotomous data were present for the STAAR Mathematics Approaches Grade Level standard (i.e., met or did not meet this standard) and categorical data were present for economic status (i.e., Poor and Not Poor). As such, the Pearson chi-square is the preferred statistical procedure when both variables are categorical (Field, 2009). Because a large sample size was present, the assumptions for using a chi-square were met.

With respect to the STAAR Mathematics Approaches Grade Level standard by the economic status of Grade 3 Hispanic girls, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 910.59$, $p < .001$, small effect size, Cramer's V of .14 (Cohen, 1988). Grade 3 Hispanic girls who were Poor had 2.36 times more girls who did not meet this standard than Hispanic girls who were Not Poor. Table 4.3 contains the frequencies and percentages for this school year.

Insert Table 4.3 about here

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 766.13$, $p < .001$, small effect size, Cramer's V of .14 (Cohen, 1988). As delineated in Table 4.3, Grade 3 Hispanic girls who were Poor had 2.67 times more girls who did not meet this standard than Hispanic girls who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 715.62$, $p < .001$, small effect size, Cramer's V of .15 (Cohen, 1988). As presented in Table 4.3, Grade 3 Hispanic girls who were Poor had 2.67 times more girls who did not meet this standard than Hispanic girls who were Not Poor.

Results for the STAAR Mathematics Meets Grade Level Standard for Hispanic Girls Across All Three School Years

With respect to the STAAR Mathematics Meets Grade Level standard by the economic status of Grade 3 Hispanic girls, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 1434.70$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). Grade 3 Hispanic girls who were Poor had 1.61 times more girls who did not meet this standard than Hispanic girls who were Not Poor. Table 4.3 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 1238.64$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As delineated in Table 4.3, Grade 3 Hispanic girls who were Poor had 1.60 times more girls who did not meet this standard than Hispanic girls who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 1232.81$, $p < .001$, small effect size, Cramer's V of .19 (Cohen, 1988). As presented in Table 4.3, Grade 3 Hispanic girls who were Poor had 1.64 times more girls who did not meet this standard than Hispanic girls who were Not Poor.

Results for the STAAR Mathematics Masters Grade Level Standard for Hispanic Girls Across All Three School Years

With respect to the STAAR Mathematics Masters Grade Level standard by the economic status of Grade 3 Hispanic girls, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 1156.88$, $p < .001$, small effect size, Cramer's V of .16 (Cohen, 1988). Grade 3 Hispanic girls who were Poor had 1.26 times more girls who did not meet this standard than Hispanic girls who were Not Poor. Table 4.3 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 1072.31$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). As delineated in Table 4.3, Grade 3 Hispanic girls who were Poor had 1.25 times more girls who did not meet this standard than Hispanic girls who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 1226.08$, $p <$

.001, small effect size, Cramer's V of .19 (Cohen, 1988). As revealed in Table 4.3, Grade 3 Hispanic girls who were Poor had 1.29 times more girls who did not meet this standard than Hispanic girls who were Not Poor.

Results for the STAAR Mathematics Approaches Grade Level Standard for Black Girls Across All Three School Years

With respect to the STAAR Mathematics Approaches Grade Level standard by the economic status of Grade 3 Black girls, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 308.00$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). Grade 3 Black girls who were Poor had 2.06 times more girls who did not meet this standard than Black girls who were Not Poor. Table 4.4 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 276.69$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). As delineated in Table 4.4, Grade 3 Black girls who were Poor had 2.51 times more girls who did not meet this standard than Black girls who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 232.74$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). As delineated in Table 4.4, Grade 3 Black girls who were Poor had 2.43 times more girls who did not meet this standard than Black girls who were Not Poor.

Results for the STAAR Mathematics Meets Grade Level Standard for Black Girls Across All Three School Years

With respect to the STAAR Mathematics Meets Grade Level standard by the economic status of Grade 3 Black girls, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 420.58$, $p < .001$, small effect size, Cramer's V of .20 (Cohen, 1988). Grade 3 Black girls who were Poor had 1.48 times more girls who did not meet this standard than Black girls who were Not Poor. Table 4.4 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) =424.06$, $p < .001$, small effect size, Cramer's V of .20 (Cohen, 1988). As delineated in Table 4.4, Grade 3 Black girls who were Poor had 1.57 times more girls who did not meet this standard than Black girls who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 353.37$, $p < .001$, small effect size, Cramer's V of .21 (Cohen, 1988). As revealed in Table 4.4, Grade 3 Black girls who were Poor had 1.55 times more girls who did not meet this standard than Black girls who were Not Poor.

Results for the STAAR Mathematics Masters Grade Level Standard for Black Girls Across All Three School Years

With respect to the STAAR Mathematics Masters Grade Level standard by the economic status of Grade 3 Black girls, the result for the 2016-2017 school year was statistically significant, $\chi^2(1) = 296.96$, $p < .001$, small effect size, Cramer's V of .17 (Cohen, 1988). Grade 3 Black girls who were Poor had 1.19 times more girls who did not meet this standard than Black girls who were Not Poor. Table 4.4 contains the frequencies and percentages for this school year.

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(1) = 269.12$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As delineated in Table 4.4, Grade 3 Black girls who were Poor had 1.19 times more girls who did not meet this standard than Black girls who were Not Poor. Regarding the 2018-2019 school year, the result was statistically significant, $\chi^2(1) = 257.47$, $p < .001$, small effect size, Cramer's V of .18 (Cohen, 1988). As revealed in Table 4.4, Grade 3 Black girls who were Poor had 1.21 times more girls who did not meet this standard thane Black girls who were Not Poor.

Trends in Mathematics Performance for Hispanic and Black Girls

In analyzing the mathematics achievement of Grade 3 Hispanic and Black girls in Texas across the three years of data that were examined, trends in scores were present by economic status. In each STAAR Mathematics Reporting Category and in all three years investigated, Hispanic girls who were Poor had lower mathematics achievement than Hispanic girls who were Not Poor. Similarly, Black girls who were Poor also had lower mathematics achievement than Black girls who were Not Poor on each of the STAAR Mathematics Reporting Categories for the three school years examined. Concerning the STAAR Mathematics Performance Level standards, statistically significantly higher percentages of Hispanic girls who were Poor did not meet each of the three STAAR Mathematics Performance Level Standards than Hispanic girls who were Not Poor. Again, Black girls who were Poor also had statistically significantly higher percentages of students who did not meet each of the three STAAR Mathematics Performance Level

Standards than Black girls who were Not Poor. These trends are revealed in Figures 4.1 through 4.14.

Insert Figures 4.1 through 4.14 about here

Discussion

The mathematics achievement of Grade 3 girls of color by their economic status was investigated in this statewide, multiyear study. Mathematics achievement was determined using two different sets of measures: (a) number of test items answered correctly in each STAAR Mathematic Reporting Category and (b) percentages of students who met the three performance level standards. Statistically significant results were present in all of the mathematics achievement measures in all three school years examined for both Hispanic and Black girls.

In all three years examined, Hispanic and Black girls who were Poor answered statistically significant fewer items correctly in each STAAR Mathematics Reporting Category than Hispanic and Black girls who were Not Poor, respectively. In addition, similar trends existed concerning the STAAR Mathematics Performance Level Standards. Hispanic and Black girls who were Poor had lower percentages of girls who met each Mathematics Performance Level Standard than Hispanic and Black girls who were Not Poor.

Connections to Existing Literature

Results discussed herein were congruent with prior researchers (e.g., Duncan et al., 2007; Eccles et al., 2004; Starkey et al., 2004; Vortruba-Drzal, 2006) who established that ethnicity/race, poverty, and gender are factors that affect the mathematics achievement of students. The disparity seen among girls of color in mathematics achievement can be attributed to high number of Hispanic and Black students in Texas who are economically disadvantaged (Texas Education Agency, 2019). Researchers (e.g., Evans-Winters & Esposito, 2010; Larke et al., 2011; McGown & Slate, 2017; Owens, 2010) have determined that girls, students of color, and students who are economically disadvantaged perform at disproportionately lower rates than their peers. Results from this study were consistent with previous researchers (e.g., Anderson 2016; Davenport & Slate, 2019; Hamilton & Slate, 2019) who have documented that students in poverty perform poorer than students not in poverty.

Implications for Policy and for Practice

Based on the findings of this multiyear study, several implications for policy and practice can be made. First, funding and resources should be provided to assist communities with high population of girls of color who are economically disadvantaged. Students from these communities often suffer academically because of inadequate social services that more resources can help alleviate. Second, postsecondary programs must include coursework designed to equip new teachers with strategies to educate girls of color from low socioeconomic backgrounds in the area of mathematics. Finally, professional development of teachers should be mandated to include proven practices to increase the mathematics achievement of Hispanic and Black girls who are economically disadvantaged.

Concerning practice, districts and schools must employ early identification of academic gaps in mathematics for girls of color. Using early identification will give district and school leaders the opportunity to monitor the mathematical progress of girls of color who are economically disadvantaged. Second, interventions should be provided to Hispanic and Black girls who perform poorer than their peers in the area of mathematics. All interventions should be monitored and modified as needed to ensure students are receiving effective instruction. Finally, data from the Grade 3 STAAR Mathematics assessments should be used by district and school leaders to make informed instructional decisions for the future.

Recommendations for Future Research

Based upon the results of this study, several recommendations for future research can be made. First, this study was limited to only girls of color in Grade 3. Therefore, future researchers could examine the differences of mathematics performance of girls of color in other grade levels as a function of economic status. Second, this study could be replicated to analyze the mathematics achievement of girls of color in other states. Third, future researchers could analyze if differences are present in the mathematics achievement for students in special populations (e.g., special education, gifted and talented, English Language Learners) as a function of economic status. Fourth, researchers should conduct this study for other academic areas such as reading, science, writing, and social studies. Last, researchers should conduct qualitative and mixed method studies to help provide policymakers and practitioners with a deeper understanding concerning why girls of color who are economically disadvantaged have academic gaps in mathematics.

Conclusion

The purpose of this research study was to determine the degree to which differences were present in the mathematics achievement of Grade 3 girls of color as a function of their economic status. Inferential statistical analyses of three school years of Texas statewide data yielded the presence of statistically significant differences between Hispanic and Black girls who were Poor and Hispanic and Black girls who were Not Poor. Hispanic and Black girls who were Poor answered fewer items correctly than Hispanic and Black girls who were Not Poor in all three school years. Hispanic girls and Black girls who were Poor also had lower percentages who met each Performance Level Standard than Hispanic girls and Black girls who were Not Poor.

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Table 4.1

Descriptive Statistics for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Hispanic Girls in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

Reporting Category and Year	*n*	*M*	*SD*
Reporting Category 1: 2016-2017			
Poor	35,365	5.02	2.05
Not Poor	7,693	6.02	1.81
Reporting Category 1: 2017-2018			
Poor	29,694	5.40	1.94
Not Poor	6,583	6.26	1.70
Reporting Category 1: 2018-2019			
Poor	26,510	5.10	1.78
Not Poor	6,287	5.94	1.64
Reporting Category 2: 2016-2017			
Poor	35,365	8.42	3.38
Not Poor	7,693	10.01	2.89
Reporting Category 2: 2017-2018			
Poor	29,694	7.95	3.17
Not Poor	6,583	9.61	2.76
Reporting Category 2: 2018-2019			
Poor	26,510	8.33	3.00
Not Poor	6,287	9.99	2.64
Reporting Category 3: 2016-2017			
Poor	35,365	4.08	1.70
Not Poor	7,693	4.86	1.63
Reporting Category 3: 2017-2018			
Poor	29,694	4.19	1.66
Not Poor	6,583	4.89	1.57
Reporting Category 3: 2018-2019			
Poor	26,510	4.66	1.65
Not Poor	6,287	5.39	1.50
Reporting Category 4: 2016-2017			
Poor	35,365	2.40	1.17
Not Poor	7,693	2.83	1.08
Reporting Category 4: 2017-2018			
Poor	29,694	2.73	1.12
Not Poor	6,583	3.12	0.97
Reporting Category 4: 2018-2019			
Poor	26,510	2.73	0.95
Not Poor	6,287	2.97	0.91

Table 4.2

Descriptive Statistics for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Black Girls in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

Reporting Category and Year	*n*	*M*	*SD*
Reporting Category 1: 2016-2017			
Poor	8,481	4.51	2.12
Not Poor	1,946	5.56	1.99
Reporting Category 1: 2017-2018			
Poor	7,235	4.84	2.04
Not Poor	1,598	5.87	1.83
Reporting Category 1: 2018-2019			
Poor	6,568	4.71	1.87
Not Poor	1,433	5.75	1.72
Reporting Category 2: 2016-2017			
Poor	8,481	7.43	3.48
Not Poor	1,946	9.30	3.24
Reporting Category 2: 2017-2018			
Poor	7,235	7.20	3.27
Not Poor	1,598	9.14	2.96
Reporting Category 2: 2018-2019			
Poor	6,568	7.61	3.16
Not Poor	1,433	9.42	2.85
Reporting Category 3: 2016-2017			
Poor	8,481	3.65	1.72
Not Poor	1,946	4.48	1.71
Reporting Category 3: 2017-2018			
Poor	7,235	3.80	1.69
Not Poor	1,598	4.59	1.62
Reporting Category 3: 2018-2019			
Poor	6,568	4.21	1.71
Not Poor	1,433	5.08	1.59
Reporting Category 4: 2016-2017			
Poor	8,481	2.03	1.18
Not Poor	1,946	2.52	1.17
Reporting Category 4: 2017-2018			
Poor	7,235	2.44	1.18
Not Poor	1,598	2.95	1.04
Reporting Category 4: 2018-2019			
Poor	6,568	2.47	0.98
Not Poor	1,433	2.76	0.95

Table 4.3

Frequencies and Percentages for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Hispanic Girls in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
Performance Level Standard and School Year	*n*	%	*n*	%
Approaches Grade Level: 2016-2017				
Poor	25,170	71.2	10,195	28.80
Not Poor	6,754	87.80	939	12.20
Approaches Grade Level: 2017-2018				
Poor	22,228	74.90	7,466	25.10
Not Poor	5,961	90.60	622	9.40
Approaches Grade Level: 2018-2019				
Poor	19,978	75.40	6,532	24.60
Not Poor	5,710	90.80	577	9.20
Meets Grade Level: 2016-2017				
Poor	13,218	37.40	22,147	60.90
Not Poor	4,682	60.90	3,011	39.10
Meets Grade Level: 2017-2018				
Poor	11,043	37.20	18,651	62.80
Not Poor	4,003	60.80	2,580	39.20
Meets Grade Level: 2018-2019				
Poor	10,091	38.10	16,419	61.90
Not Poor	3,925	62.40	2,362	37.60
Masters Grade Level: 2016-2017				
Poor	5,916	16.70	29,449	83.30
Not Poor	2,598	33.80	5,095	66.20
Masters Grade Level: 2017-2018				
Poor	4,346	14.60	25,348	85.40
Not Poor	2,085	31.70	4,498	68.30
Masters Grade Level: 2018-2019				
Poor	3,940	14.90	22,570	85.10
Not Poor	2,134	33.90	4,153	66.10

Table 4.4

Frequencies and Percentages for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Black Girls in Texas for the 2016-2017 School Year Through the 2018-2019 School Year

	Met Standard		Did Not Meet Standard	
Performance Level Standard and School Year	*n*	%	*n*	%
Approaches Grade Level: 2016-2017				
Poor	4,976	58.70	3,505	41.30
Not Poor	1,557	80.00	389	20.00
Approaches Grade Level: 2017-2018				
Poor	4,659	64.40	2,576	35.60
Not Poor	1,371	85.80	227	14.20
Approaches Grade Level: 2018-2019				
Poor	4,269	65.00	2,299	35.00
Not Poor	1,227	85.60	206	14.40
Meets Grade Level: 2016-2017				
Poor	2,246	26.50	6,235	73.50
Not Poor	979	50.30	967	49.70
Meets Grade Level: 2017-2018				
Poor	1,946	26.90	5,289	73.10
Not Poor	853	53.40	745	46.60
Meets Grade Level: 2018-2019				
Poor	1,832	27.90	4,736	72.10
Not Poor	767	53.50	666	46.50
Masters Grade Level: 2016-2017				
Poor	879	10.40	7,602	89.60
Not Poor	486	25.00	1,460	75.00
Masters Grade Level: 2017-2018				
Poor	648	9.00	6,587	91.00
Not Poor	375	23.50	1,223	76.50
Masters Grade Level: 2018-2019				
Poor	656	10.00	5,912	90.00
Not Poor	367	25.60	1,066	74.40

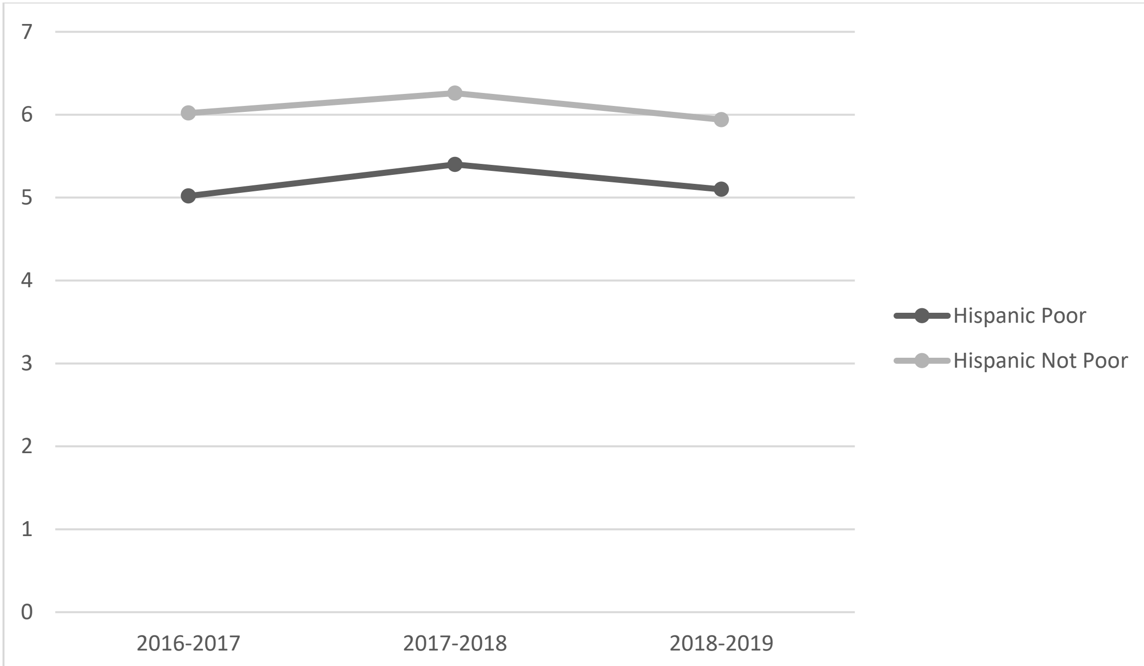

Figure 4.1. Average scores by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Reporting Category 1 for the 2016-2017, 2017-2018, and 2018-2019 school years.

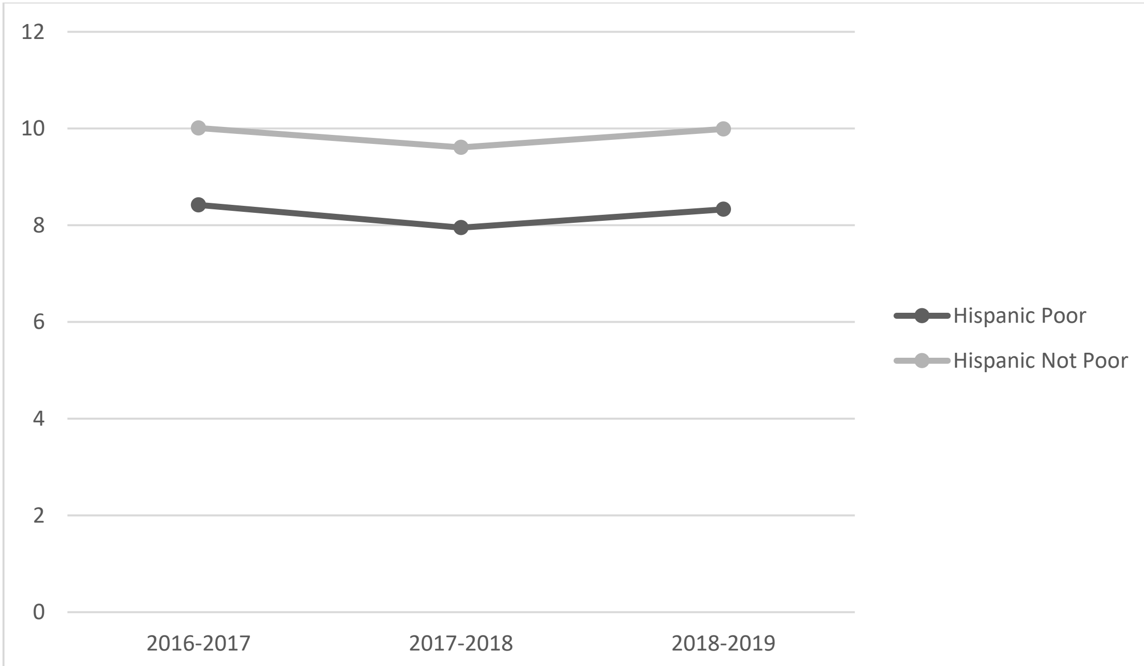

Figure 4.2. Average scores by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Reporting Category 2 for the 2016-2017, 2017-2018, and 2018-2019 school years.

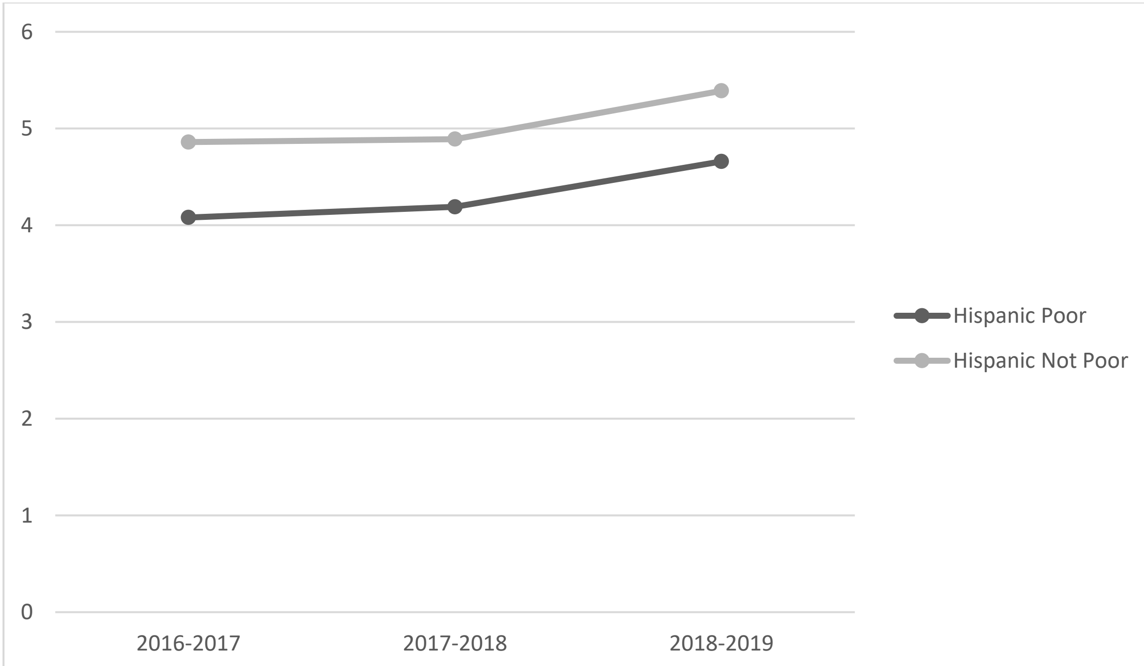

Figure 4.3. Average scores by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Reporting Category 3 for the 2016-2017, 2017-2018, and 2018-2019 school years.

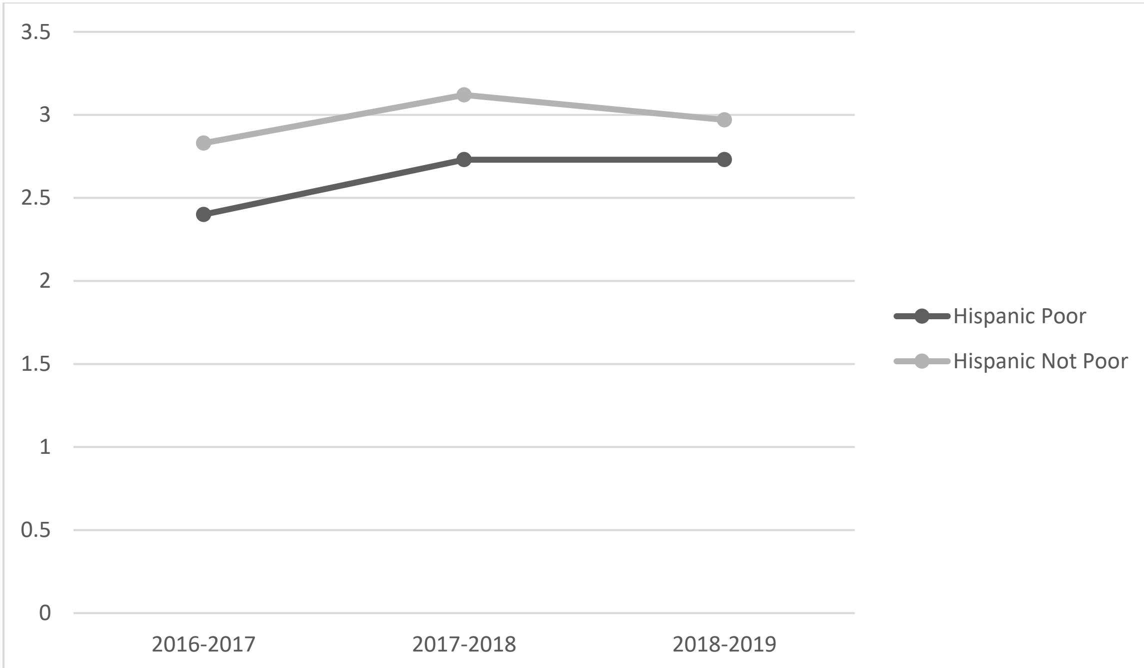

Figure 4.4. Average scores by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Reporting Category 4 for the 2016-2017, 2017-2018, and 2018-2019 school years.

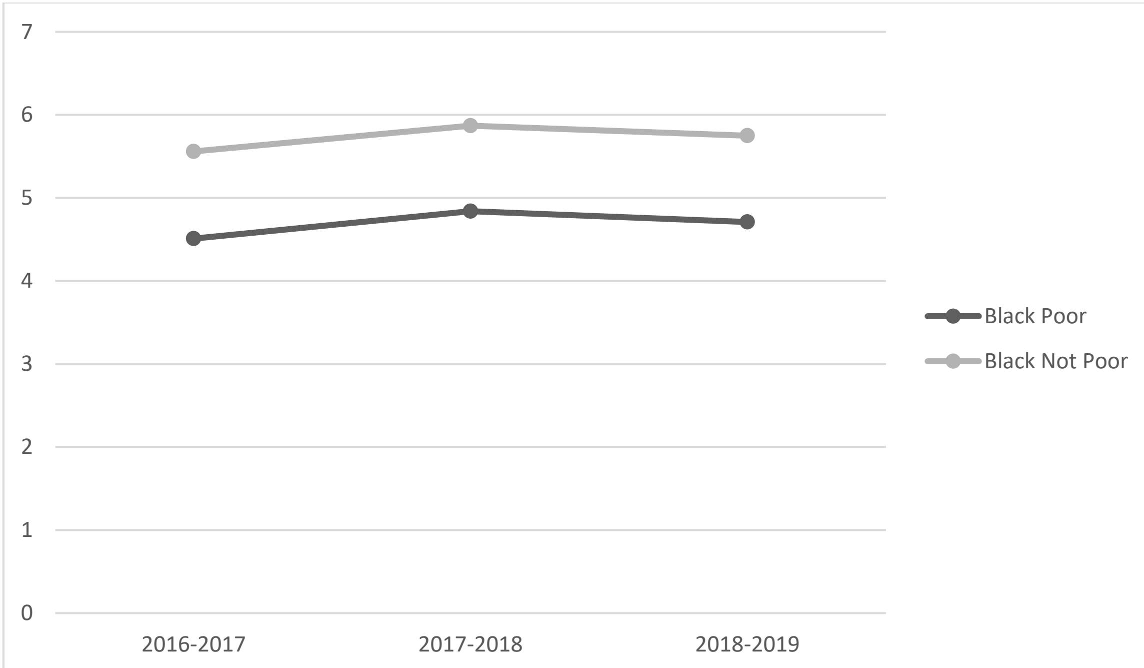

Figure 4.5. Average scores by the economic status of Black girls for the STAAR Grade 3 Mathematics Reporting Category 1 for the 2016-2017, 2017-2018, and 2018-2019 school years.

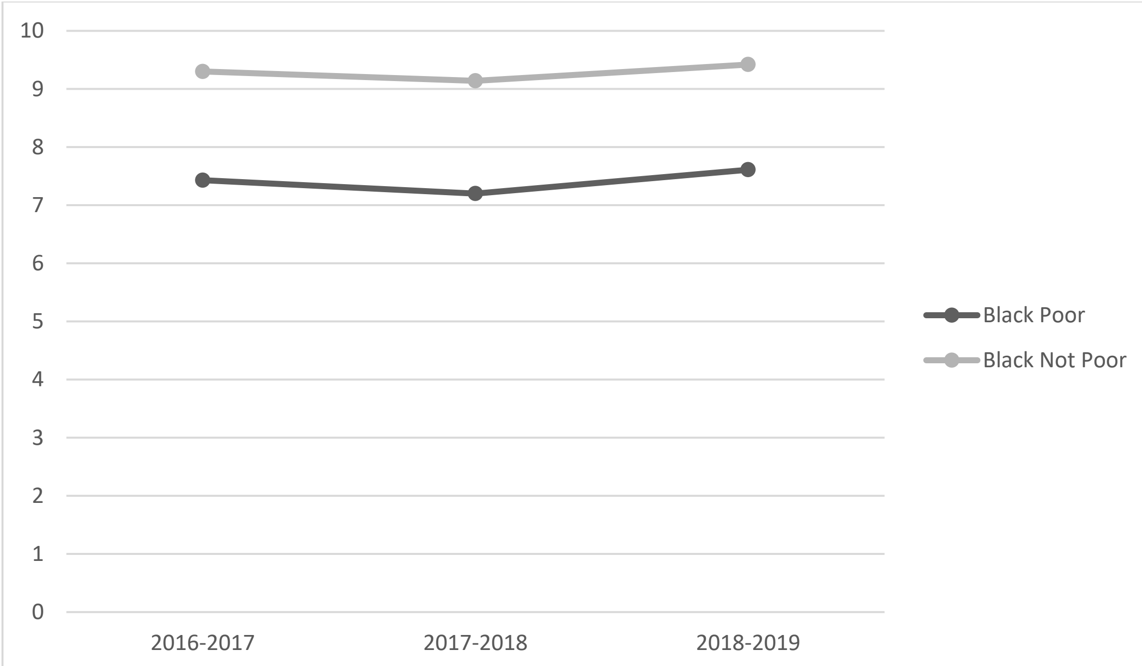

Figure 4.6. Average scores by the economic status of Black girls for the STAAR Grade 3 Mathematics Reporting Category 2 for the 2016-2017, 2017-2018, and 2018-2019 school years.

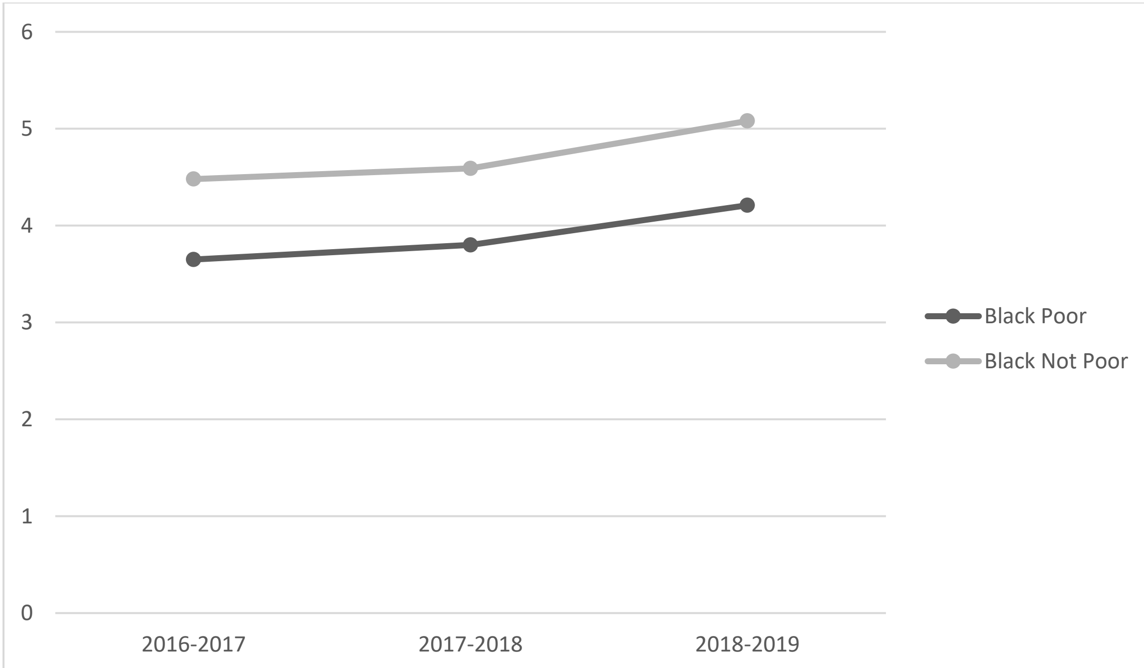

Figure 4.7. Average scores by the economic status of Black girls for the STAAR Grade 3 Mathematics Reporting Category 3 for the 2016-2017, 2017-2018, and 2018-2019 school years.

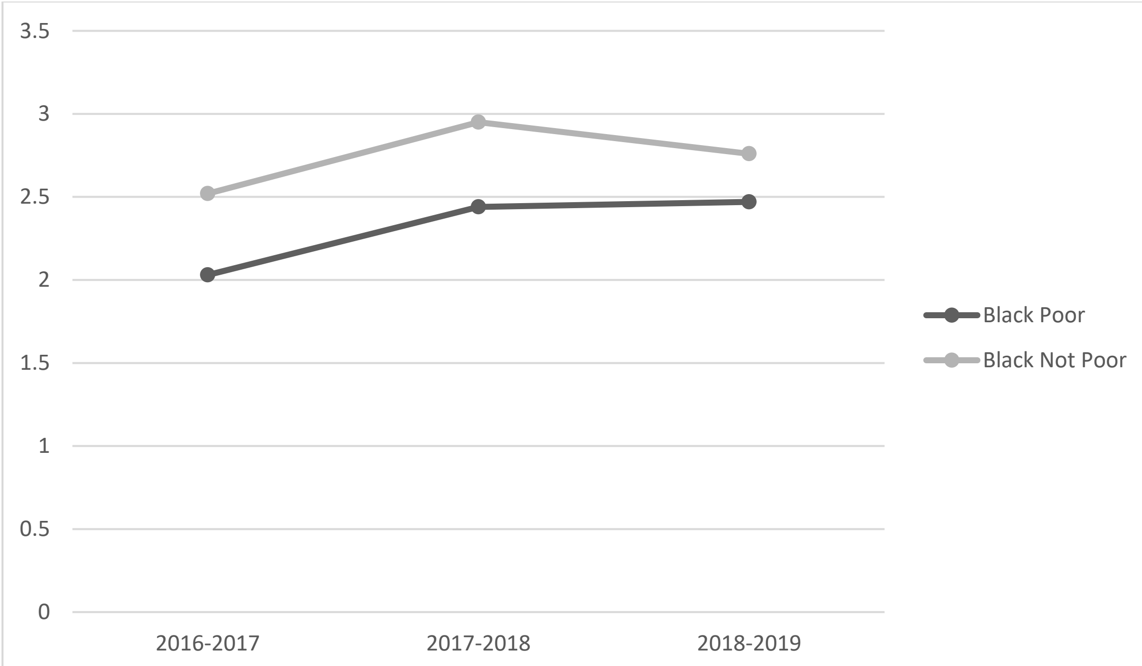

Figure 4.8. Average scores by the economic status of Black girls for the STAAR Grade 3 Mathematics Reporting Category 4 for the 2016-2017, 2017-2018, and 2018-2019 school years.

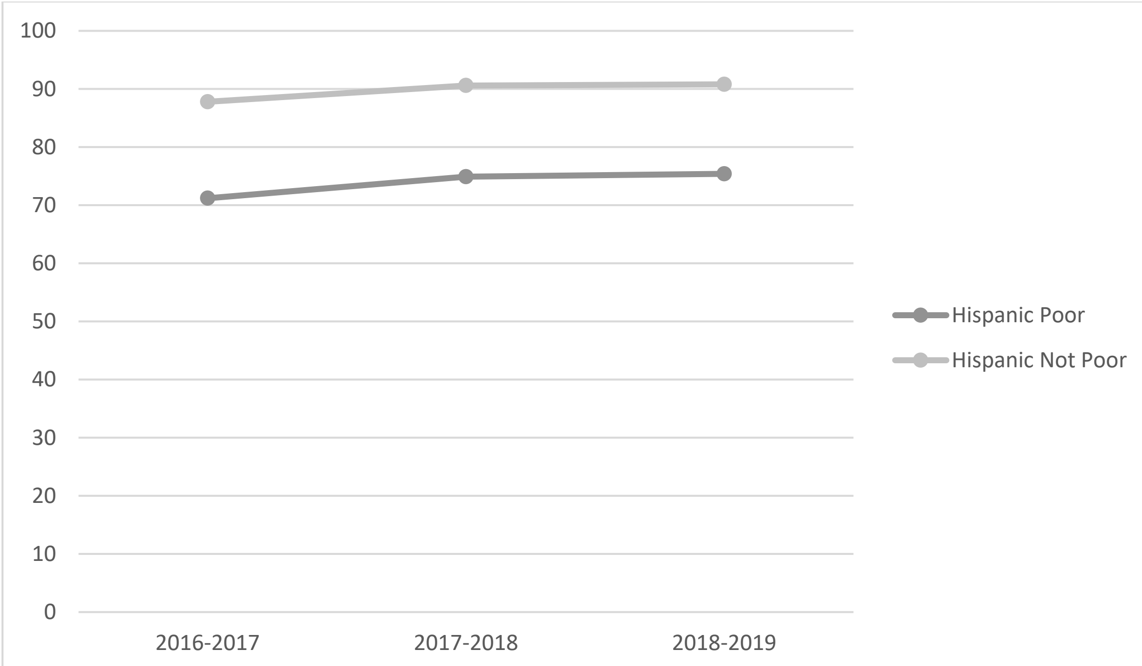

Figure 4.9. Average percentages by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Approaches Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

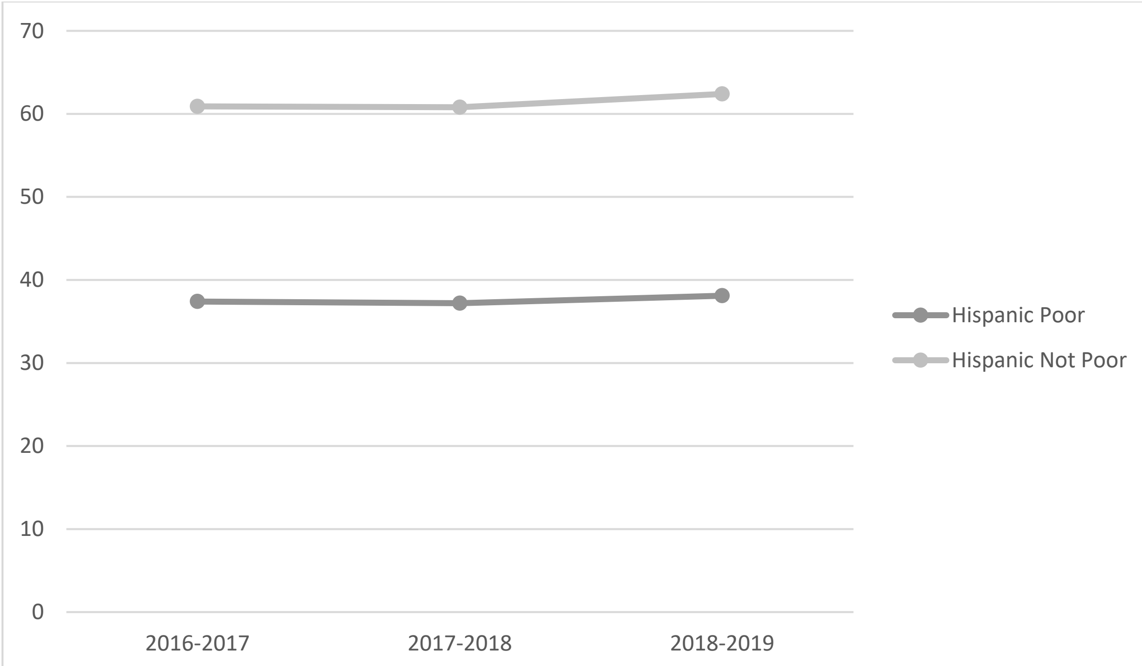

Figure 4.10. Average percentages by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Meets Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

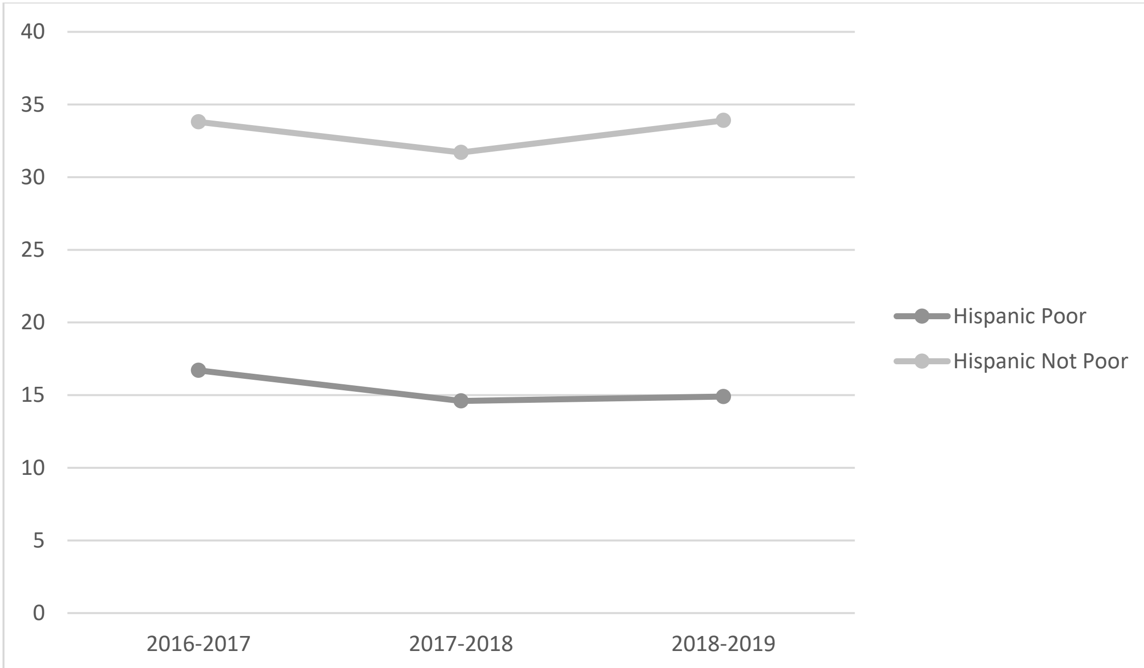

Figure 4.11. Average percentages by the economic status of Hispanic girls for the STAAR Grade 3 Mathematics Masters Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

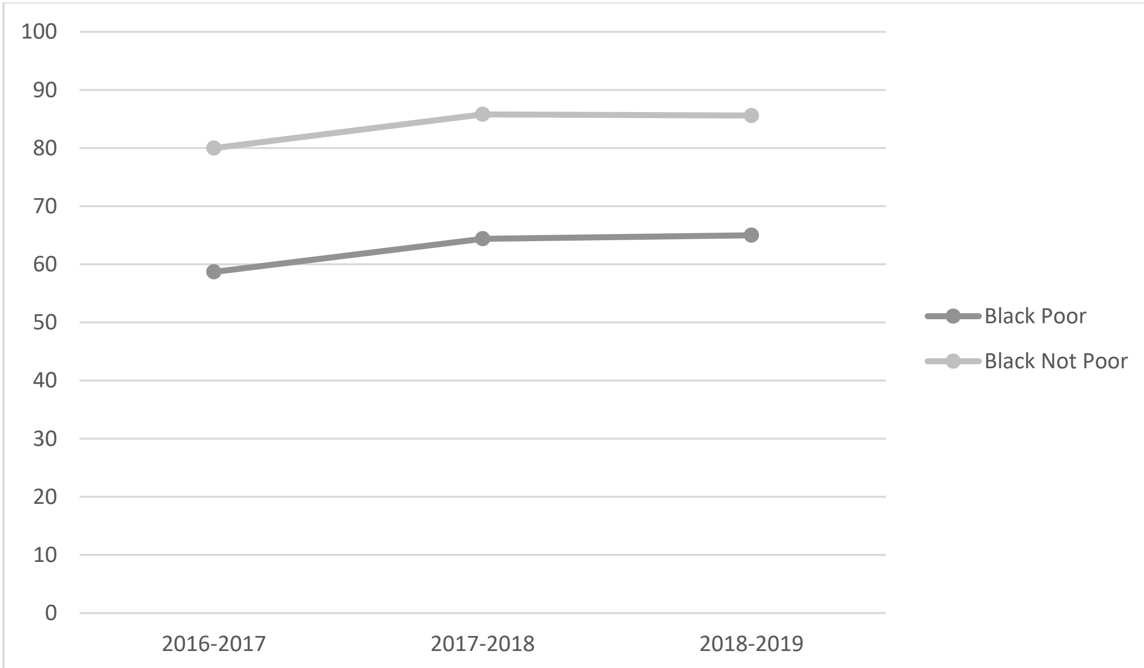

Figure 4.12. Average percentages by the economic status of Black girls for the STAAR Grade 3 Mathematics Approaches Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

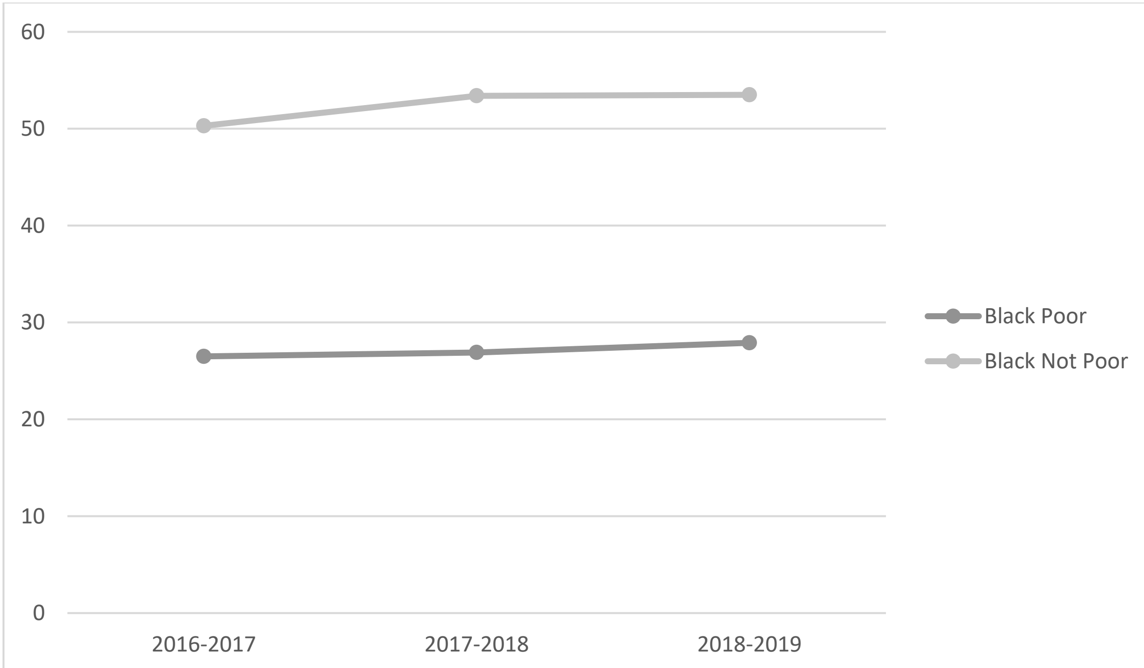

Figure 4.13. Average percentages by the economic status of Black girls for the STAAR Grade 3 Mathematics Meets Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

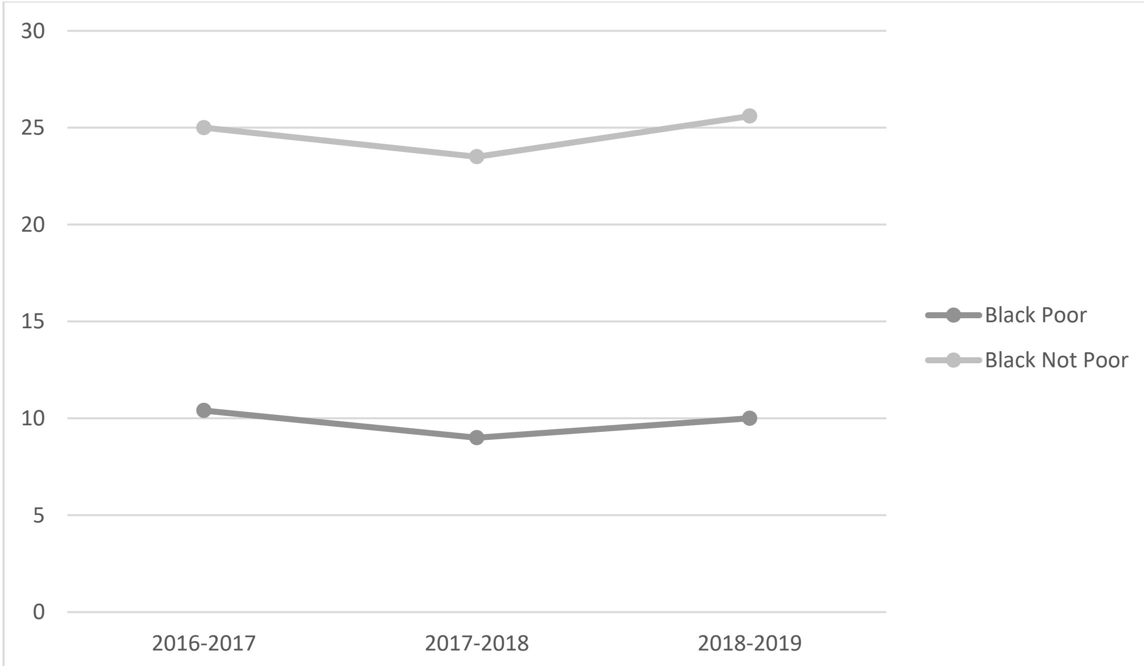

Figure 4.14. Average percentages by the economic status of Black girls for the STAAR Grade 3 Mathematics Masters Grade Level Standard for the 2016-2017, 2017-2018, and 2018-2019 school years.

CHAPTER V

DISCUSSION

The purpose of this journal-ready dissertation was to determine the extent to which ethnicity/race and economic status differences were present in the mathematics achievement of Texas Grade 3 students. In the first article, the degree to which ethnicity/race (i.e., Asian, White, Hispanic, Black) differences were present in the mathematics achievement of Texas Grade 3 students was examined. In the second article, the degree to which economic status (i.e., Poor and Not Poor) differences were present in the mathematics achievement of Texas Grade 3 Hispanic and Black boys was examined. In the third article, the degree to which economic status (i.e., Poor and Not Poor) differences were present in the mathematics achievement of Texas Grade 3 Hispanic and Black girls was examined. In this chapter, all findings are discussed and summarized for all three studies in this journal-ready dissertation.

Discussion of Results based on Ethnicity/Race

Summarized in Table 5.1 are the results of the statistical analyses of Texas Grade 3 students who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. In all three school years, statistically significant differences were present in the mathematics achievement by student ethnicity/race. For the first three STAAR Mathematics Reporting Categories, moderate effect sizes were present in all three school years. For the STAAR Mathematics Reporting Category 4, the effect size was small in all three school years. A stair-step effect (Carpenter et al., 2006) was clearly present in that Asian students had higher mathematics test scores than White, Hispanic, and Black students; White students had higher mathematics test scores than

Hispanic and Black students; Hispanic students had higher mathematics test scores than Black students. In all three school years, Black students were the lowest performing group.

Table 5.1

Summary of Mathematics Results for the STAAR Mathematics Reporting Categories by the Ethnicity/Race of Grade 3 Students for the 2016-2017 School Year through the 2018-2019 School Year

School Year and Performance Level Standard	Statistically Significant	Effect Size	Lowest Performing Group
2016-2017			
Reporting Category 1	Yes	Moderate	Black
Reporting Category 2	Yes	Moderate	Black
Reporting Category 3	Yes	Moderate	Black
Reporting Category 4	Yes	Small	Black
2017-2018			
Reporting Category 1	Yes	Moderate	Black
Reporting Category 2	Yes	Moderate	Black
Reporting Category 3	Yes	Moderate	Black
Reporting Category 4	Yes	Small	Black
2018-2019			
Reporting Category 1	Yes	Moderate	Black
Reporting Category 2	Yes	Moderate	Black
Reporting Category 3	Yes	Moderate	Black
Reporting Category 4	Yes	Small	Black

Delineated in Table 5.2 is a summary of the results of the statistical analyses of Texas Grade 3 students who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. Analyses revealed that in all three school years and across all three STAAR Performance Level Standards, a clear stair-step effect (Carpenter et al., 2006) was present. Asian students had the highest percentage of students to meet each STAAR Performance Level Standard, followed by White, Hispanic, and Black students. Black students had the lowest percentage of students to meet each STAAR Performance Level Standard. Effect sizes were comprised of six small effect sizes and three moderate effect sizes.

Table 5.2

Summary of Mathematics Results for the STAAR Mathematics Performance Level Standards by the Ethnicity/Race of Grade 3 Students for the 2016-2017 School Year through the 2018-2019 School Year

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

Discussion of Results based on Economic Status

Presented in Table 5.3 are the results of the statistical analyses of Texas Grade 3 Hispanic boys who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. In all three school years, statistically significant differences were present in the mathematics achievement by economic status. For all four STAAR Mathematics Reporting Categories, small effect sizes were present in all three school years. In each of the STAAR Mathematics Reporting Categories and in all three school years examined, Hispanic boys who were Poor had statistically significantly lower mathematics scores than Hispanic boys who were Not Poor.

Table 5.3

Summary of Mathematics Results for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Hispanic Boys for the 2016-2017 School Year through the 2018-2019 School Year

School Year and Performance Level Standard	Statistically Significant	Effect Size	Lowest Performing Group
2016-2017			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2017-2018			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2018-2019			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor

Delineated in Table 5.4 is a summary of the results of the statistical analyses of Texas Grade 3 Hispanic boys who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. Analyses revealed that in all three school years and across all three STAAR Performance Level Standards, Hispanic boys who were Poor had lower percentages of students who met each STAAR Performance Level Standard than Hispanic boys who were Not Poor. Effect sizes for all three performance level standards and in all three school years were small.

Table 5.4

Summary of Mathematics Results for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Hispanic Boys for the 2016-2017 School Year through the 2018-2019 School Year

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

Summarized in Table 5.5 are the results of the statistical analyses of Texas Grade 3 Black boys who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. In all three school years, statistically significant differences were present in the mathematics achievement by economic status. For STAAR Mathematics Reporting Categories 1, 3, and 4, small effect sizes were present in all three school years. For STAAR Mathematics Reporting Category 2, the effect size was small for the 2016-2017 and 2018-2019 school years and the effect size was moderate for the 2017-2018 school year. In each of the STAAR Mathematics Reporting Categories and in all three school years examined, Black boys who were Poor had statistically significantly lower mathematics scores than Black boys who were Not Poor.

Table 5.5

Summary of Mathematics Results for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Black Boys for the 2016-2017 School Year through the 2018-2019 School Year

School Year and Performance Level Standard	Statistically Significant	Effect Size	Lowest Performing Group
2016-2017			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2017-2018			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Moderate	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2018-2019			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor

Presented in Table 5.6 is a summary of the results of the statistical analyses of Texas Grade 3 Black boys who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. Analyses revealed that in all three school years and across all three STAAR Performance Level Standards, Hispanic boys who were Poor had lower percentages of students who met each STAAR Performance Level Standard than Hispanic boys who were Not Poor. Effect sizes for all three performance level standards and in all three school years were small.

Table 5.6

Summary of Mathematics Results for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Black Boys for the 2016-2017 School Year through the 2018-2019 School Year

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

Delineated in Table 5.7 are the results of the statistical analyses of Texas Grade 3 Hispanic girls who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. In all three school years, statistically significant differences were present in the mathematics achievement by economic status. For all four STAAR Mathematics Reporting Categories, small effect sizes were present in all three school years. In each of the STAAR Mathematics Reporting Categories and in all three school years examined, Hispanic girls who were Poor had statistically significantly lower mathematics scores than Hispanic girls who were Not Poor.

Table 5.7

Summary of Mathematics Results for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Hispanic Girls for the 2016-2017 School Year through the 2018-2019 School Year

School Year and Performance Level Standard	Statistically Significant	Effect Size	Lowest Performing Group
2016-2017			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2017-2018			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2018-2019			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor

Presented in Table 5.8 is a summary of the results of the statistical analyses of Texas Grade 3 Hispanic girls who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. Analyses revealed that in all three school years and across all three STAAR Performance Level Standards, Hispanic girls who were Poor had lower percentages who met each STAAR Performance Level Standard than Hispanic girls who were Not Poor. Effect sizes for all three performance level standards and in all three school years were small.

Table 5.8

Summary of Mathematics Results for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Hispanic Girls for the 2016-2017 School Year through the 2018-2019 School Year

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

Delineated in Table 5.9 are the results of the statistical analyses of Texas Grade 3 Black girls who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. In all three school years, statistically significant differences were present in the mathematics achievement by economic status. For all four STAAR Mathematics Reporting Categories, small effect sizes were present in all three school years. In each of the STAAR Mathematics Reporting Categories and in all three school years examined, Black girls who were Poor had statistically significantly lower mathematics scores than Black girls who were Not Poor.

Table 5.9

Summary of Mathematics Results for the STAAR Mathematics Reporting Categories by the Economic Status of Grade 3 Black Girls for the 2016-2017 School Year through the 2018-2019 School Year

School Year and Performance Level Standard	Statistically Significant	Effect Size	Lowest Performing Group
2016-2017			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2017-2018			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor
2018-2019			
Reporting Category 1	Yes	Small	Poor
Reporting Category 2	Yes	Small	Poor
Reporting Category 3	Yes	Small	Poor
Reporting Category 4	Yes	Small	Poor

Presented in Table 5.10 is a summary of the results of the statistical analyses of Texas Grade 3 Black girls who took the STAAR Mathematics assessment during the 2016-2017, 2017-2018, and 2018-2019 school years. Analyses revealed that in all three school years and across all three STAAR Performance Level Standards, Black girls who were Poor had lower percentages who met each STAAR Performance Level Standard than Black girls who were Not Poor. Effect sizes for all three performance level standards and in all three school years were small.

Table 5.10

Summary of Mathematics Results for the STAAR Mathematics Performance Level Standards by the Economic Status of Grade 3 Black Girls for the 2016-2017 School Year through the 2018-2019 School Year

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

Connections with Existing Literature

In this multi-year, statewide journal-ready dissertation, ethnicity/race (i.e., Asian, White, Hispanic, Black) was determined to have an effect on the mathematics achievement of Texas Grade 3 students. A clear stair-step effect (Carpenter et al., 2006) was present in that Asian students had the highest achievement scores followed by White, Hispanic, and Black students in each STAAR Mathematics Reporting Category and STAAR Mathematics Performance Level Standard. Results were consistent for all three school years. Finding in this study were congruent with the existing literature (e.g., Alford-Stephens, 2016; Harris, 2018; McGown, 2016) in which ethnic/racial disparities were established to be present in the academic achievement of students in Texas.

With respect to economic status (i.e., Poor and Not Poor), Hispanic and Black boys and girls who were Poor had poorer mathematics performance than Hispanic and Black boys and girls who were Not Poor. Students from low-income families are at risk for many academic and social disadvantages (David & Marchant, 2015; Wang et al., 2013). Academic gaps for students in poverty are evident at school entry and continue to widen as students progress through school (Fryer & Levitt, 2006; Lee & Burkham, 2002; McDonough, 2015; Reardon, 2011). Results from this journal-ready dissertation are consistent previous researchers (e.g., Alford-Stephens, 2016, Anderson, 2016; Davenport & Slate, 2019; Hamilton & Slate, 2019) who have clearly established that poverty is adversely related to student academic achievement.

Implications for Policy and Practice

Based upon the results of this journal-ready dissertation, several implications for policy and practice can be recommended. With respect to policy, funds and resources should be allocated to communities who serve high populations of Hispanic and Black students, specifically Hispanic and Black students in poverty. These funds should be used to provide families with the necessary social, emotional, and mental support to help students when they enter school. Second, teacher preparations programs must include curricula to help aspiring teachers understand the complexities of educating students from different ethnic/racial and economic backgrounds. Finally, school district leadership should mandate professional development to keep teachers current on strategies demonstrated to help Hispanic and Black students in the area of mathematics.

Concerning practice implications, districts and schools must begin to employ early identification strategies to identify students who enter school with academic gaps in mathematics. With these data, district and campus leaders must provide students with the necessary interventions to minimize the disparities seen in mathematics achievement for Hispanic students, Black students, and students who are economically disadvantaged. Third, all interventions should be progress monitored to ensure they are effective in helping students from historically low-performing backgrounds. Finally, data from the Grade 3 STAAR Mathematics assessments should be used by school leaders when making future education decisions on curriculum, interventions, and remediations.

Conclusion

In this journal-ready dissertation, the degree to which differences were present in the mathematics achievement of Texas Grade 3 students as a function of their ethnicity/race and economic status was addressed. Regarding ethnicity/race, a stair-step effect (Carpenter et al., 2006) was present, with Asian students having higher mathematics test scores than White, Hispanic, and Black students. White students had higher mathematics test scores than Hispanic and Black students; and Hispanic students had higher mathematics test scores than Black students. Concerning economic status, Hispanic and Black boys who were Poor were outperformed by Hispanic and Black boys who were Not Poor. Similarly, Hispanic and Black girls who were Poor were outperformed by Hispanic and Black girls who were Not Poor. As such, results from all three investigations were commensurate with the extant literature.

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APPENDIX

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

Date: Sep 16, 2020 5:13 PM CDT

TO: Gaylon Davenport John Slate
FROM: SHSU IRB
PROJECT TITLE: Differences in Mathematics Achievement as a Function of Ethnicity/Race and Economic Status of Texas Grade 3 Students: A Multiyear, Statewide Investigation
PROTOCOL #: IRB-2020-234
SUBMISSION TYPE: Initial
ACTION: Exempt
DECISION DATE: September 16, 2020
EXEMPT REVIEW CATEGORY: Category 4. Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

(i) The identifiable private information or identifiable biospecimens are publicly available;

(ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;

(iii) The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b); or

(iv) The research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, if the research generates identifiable private information that is or will be maintained on information technology that is subject to and in compliance with section 208(b) of the E-Government Act of 2002, 44 U.S.C. 3501 note, if all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, 5 U.S.C. 552a, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 et seq.

Greetings,

Thank you for your submission of Initial Review materials for this project. The Sam Houston State University (SHSU) IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

*** What should investigators do when considering changes to an exempt study that could make it nonexempt?**

It is the PI's responsibility to consult with the IRB whenever questions arise about whether planned changes to an exempt study might make that study nonexempt human subjects research.

In this case, please make available sufficient information to the IRB so it can make a correct determination.

If you have any questions, please contact the IRB Office at 936-294-4875 or irb@shsu.edu. Please include your project title and protocol number in all correspondence with this committee.

Sincerely,

Chase Young, Ph.D.
Chair, IRB
Hannah R. Gerber, Ph.D.
Co-Chair, IRB

VITA

Gaylon Christopher Davenport

EDUCATIONAL HISTORY

Doctor of Education – Educational Leadership, (May, 2021)
Sam Houston State University, Huntsville, Texas
Dissertation: Differences in Mathematics Achievement of Texas Grade 3 Math Students as a Function of Economic Status and Ethnicity/Race: A Multiyear, Statewide Investigation

Master of Education in Education Administration, May 2017
Sam Houston State University, Huntsville, Texas

Bachelor of Business Administration in Management, May 2011
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PROFESSIONAL EXPERIENCE

Dean of Instruction, Foerster Elementary School, Houston ISD, August 2020 – Present

Mathematics Interventionist, Bammel Middle School, Spring ISD, January 2019 – August 2020

Assistant Principal, Hoyland Elementary School, Spring ISD, June 2018 – January 2019

Math Coach, Heritage Elementary School, Spring ISD, July 2017 – June 2018

Mathematics Teacher, Bammel Middle School, Spring ISD, August 2013 – July 2017

RECOGNITIONS

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PRESENTATIONS AND PUBLICATIONS

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Davenport, G., & Slate, J. R. (2019). Poverty and mathematics performance of Texas Grade 3 students: A cause for concern. *Bulletin of Education and Research, 41*(3), 1-10.