Examining Algebra I performance differences among at-risk Texas Hispanic high school boys: A multiyear investigation

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Abstract

This investigation examined the Algebra I End-of-Course exam performance of Hispanic boys who were at-risk and those who were not at-risk during the 2016-2017, 2017-2018, and 2018-2019 school years. Data for all students in Texas who took the Algebra I End-of-Course exam during these years were obtained from the Texas Education Agency. The analysis focused exclusively on Hispanic boys. Utilizing secondary data, a causal-comparative or ex post facto study was conducted. The inferential statistical procedures revealed statistically significant differences in performance for at-risk Hispanic boys across all three school years. In each of these years, a significantly lower percentage of at-risk Hispanic boys met the three grade-level standards (Approaches Grade Level, Meets Grade Level, and Masters Grade Level) compared to their not-at-risk peers. On average, at-risk Hispanic boys answered about 13 fewer items correctly than those who were not at-risk. These findings indicate that current instructional practices are not adequately meeting the needs of at-risk Hispanic boys. Policymakers and educational leaders are advised to review current programs and implement necessary changes to better support these students.

Introduction

Academic achievement in schools throughout the United States can be predicted by income, race/ethnicity, gender ratio, and other student demographic variables (De Clercq et al., 2021). Student demographic variables are important to note because state assessment scores, college entrance exams, dropout rates, and other important academic indicators have used the aforementioned demographic factors to identify which student groups are more likely to be successful (De Clercq et al., 2021; Uline & Cline, 2005). In particular, and the focus of this article, Hispanic students experience barriers that increase their chances of falling into a widened achievement gap (Davis-Kean & Jager, 2014).

The Hispanic population in the United States has been more than 50% of the overall population growth in the last 10 years (U.S. Census Bureau, 2017). The growth of the Hispanic population has resulted in the doubling of Hispanic student enrollments in public schools in the past two decades. To address opportunity and achievement gaps documented for students of color, the No Child Left Behind Act of 2002 and the more-recent Every Student Succeeds Act of 2015 were passed by the federal government. Attention was specifically directed toward student

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demographic subgroups through the passing of the No Child Left Behind Act by quantifying achievement levels for each group (Lubienski & Crockett, 2007). Unfortunately, efforts initiated by the No Child Left Behind Act did not result in closing achievement gaps for Hispanic students. Hispanic students continue to perform substantially lower in core academic areas years after the passing of the legislation (Kotok, 2017). Succeeding the No Child Left Behind Act was the Every Student Succeeds Act in 2015. Each state was required in this act to submit data about the performance of public school students annually. According to the National Center for Education Statistics (2022a), however, achievement gaps for Hispanic students still have not improved.

With respect to gender, Hispanic boys in the United States are not closing the achievement gaps. Results from the 2019 administration of the National Assessment of Educational Progress, given every two years in Grades 4, 8, and 12, for Hispanic boys have decreased incrementally since 2013. Raw scores for Hispanic students were at the highest achievement level in 2013 since the assessment began in 1990, with Hispanic students having an average raw score of 285. This score, however, is below the cut score of the Proficient level. Since 2013, Hispanic students have performed lower (i.e., 282 in 2015, 283 in 2017, and 282 in 2019) than the high point raw score of 285. The performance of Hispanic boys on this assessment has decreased in the last four assessments (National Center for Education Statistics, 2022b). As such, the achievement gap in mathematics has widened for Hispanic boys.

With respect to the state of interest for this article, Texas, disparities in academic success for Hispanic students compared to White students have been documented beginning at the early elementary grade levels. In one such study, Rojas-Lebouef (2010) examined 16 years of data on Hispanic student performance on two Texas state-mandated Grade 5 mathematics assessments. In the time period examined, 1993-2009, the average mathematics passing percentage of Hispanic students was 82.44% compared to an average passing rate of 90.2% for White students. Rojas-Lebouef (2010) documented that achievement gaps were present in each of the 16 years of her investigation. As of 2010, Hispanic students had not narrowed the achievement gap as intended by the passing of the No Child Left Behind Act in 2002.

In reference to Grade 8 mathematics performance on the Texas state-mandated exam, Craft (2011) analyzed statewide data for seven consecutive school years (i.e., 2003-2004 through 2009-2010). Craft (2011) established that Hispanic students performed lower than state expectations in all seven years. Of note was that the mathematics achievement gap widened from Grade 5 to Grade 8. The average passing rate of Hispanic students in Grade 8 was 66.3%, compared to an average passing rate of 81.11% for White students (Craft, 2011). These studies add to the research literature that the achievement gap for Hispanic students increases by grade level compared to White students. The reason that this statistic is important is because Grade 8 is the year that is predictive of future college readiness as demonstrated in high school (Fuller et al., 2010).

With respect to the previous Texas state-mandated assessment in mathematics, Alford-Stephens (2016) analyzed the degree to which differences were present in mathematics achievement for the 2004-2005 through the 2011-2012 school years by student ethnicity/race. Results from her multiyear investigation are relevant to this article because the Texas state-mandated mathematics assessment was aligned to the Algebra I End-of-Course exam, as they are both state exit graduation requirements for mathematics. In her multiyear investigation,

Alford-Stephens (2016) established the presence of statistically significant mathematics achievement gaps by student ethnicity/race. Hispanic boys were statistically significantly outperformed by both Asian and White boys. The gaps that Alford-Stephens (2016) documented remained consistent across the eight years of data that she analyzed.

With respect to the current Texas state-mandated assessments, the Texas Academic Performance Report indicated that 33% of Hispanic students did not meet any of the three grade level performance standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) on the Algebra I End-of-Course exam in the 2020-2021 school year. In the spring of 2021, 67% of Hispanic students met the Approaches Grade Level standard; 33% of Hispanic students met the Meets Grade Level standard; and only 16% of Hispanic students met the Masters Grade Level standard (Texas Education Agency, 2021). These results were in comparison to the 73% of all students who met the Approaches Grade Level standard; 41% of all students who met the Meets Grade Level standard; and 23% of students who met the Masters Grade Level standard. Regarding student gender and Algebra I End-of-Course exams, the Texas Education Agency reported in the spring of 2019 that 80% of boys met the Approaches Grade Level standard; 56% of boys met the Meets Grade Level standard; and 35% of boys met the Masters Grade Level standard.

Achievement gaps exist for Hispanic students based on their at-risk status. The Texas Education Agency defines a student at-risk if that student meets one or more of the 13 categories that make that student more likely to drop out of school. The 13 categories of the at-risk label for students in Texas are present on the Texas Education Agency Website. The at-risk categories that are directly related to academic performance are: (a) unsatisfactory performance on readiness assessments in Grades 1, 2, or 3, (b) failed credit in two or more subjects in Grades 7-12, (c) not advanced to the next grade level for one or more school years, and (d) unsatisfactory performance in same content assessment instruments for two or more consecutive school years (Texas Education Agency, 2022). Students who were labeled at-risk scored below the state average on the Algebra I End-of-Course exam. The Texas Education Agency reported in the spring of 2019 that 73% of students who were at-risk met the Approaches Grade Level standard; 43% of students who were at-risk met the Meets Grade Level standard; and 20% of students who were at-risk met the Masters Grade Level standard.

Achievement gaps, opportunity gaps, and higher at-risk status for Hispanic boys than other subgroups are well documented by researchers (Kent et al., 2017; Kim et al., 2015). After an intensive review of the existing research literature, no published articles could be located regarding Algebra I End-of-Course exam performance for Hispanic students who were labeled at-risk. Findings from this multiyear empirical analysis will help fill the existing gap in the research literature.

Statement of the Problem

Closing the achievement gap has been a priority in the United States for decades. The No Child Left Behind Act, followed by the Every Student Succeeds Act, was legislation designed to ensure equity in academics for all students. According to the U.S. Census Bureau (2017), the Hispanic population has substantially increased since 1990. Texas and many other states that border Mexico have had the largest Hispanic population influx (U.S. Census Bureau, 2017). The Hispanic student population increase has mirrored the growth of the United States population in regard to the rate of increase (Texas Education Agency, 2019). The increase in

population has created more challenges for school districts to close the achievement gap for Hispanic students. Several researchers (e.g., Anderson et al., 2007; David & Marchant, 2015; Rojas-LeBouef & Slate, 2012) have documented the existence of achievement gaps for Hispanic students. Addressed in this investigation will be the performance of Hispanic boys by their at-risk status on the Texas state-mandated Algebra I End-of-Course exam.

Purpose and Significance of the Study

The purpose of this article was to determine the degree to which the at-risk status of Hispanic boys was related to their performance on the Texas state-mandated Algebra I End-of-Course exam. Specifically examined was the degree to which the at-risk status of Hispanic boys was related to their performance on three grade level standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) and raw score. Results of the Algebra I End-of-Course exam for Hispanic boys for three consecutive school years (i.e., 2016-2017, 2017-2018, 2018-2019) were analyzed. Following analysis of data from each school year, the extent to which trends were present was addressed.

The results of this study will be added to the existing research literature available on the achievement gap for Hispanic students. Specifically, this study was conducted to add to the existing literature available on the extent to which differences might be present in the Algebra I End-of-Course exam performance between Hispanic boys who were labeled at-risk and Hispanic boys who were not labeled at-risk. Findings from this investigation will provide a potential baseline for analysis of data before the 2020 Pandemic.

Research Questions

The following overarching research question was addressed in this study: What is the effect of the at-risk status of Hispanic boys on their Algebra I End-of-Course exam performance? Sub-questions under this overarching research question were: (a) What is the effect of the at-risk status of Hispanic boys on their Algebra I End-of-Course Approaches Grade Level performance; (b) What is the effect of the at-risk status of Hispanic boys on their Algebra I End-of-Course Meets Grade Level performance?; (c) What is the effect of the at-risk status of Hispanic boys on their Algebra I End-of-Course Masters Grade Level performance?; (d) What is the effect of the at-risk status of Hispanic boys on their Algebra I End-of-Course exam raw score?; and (e) What trend is present in the performance of Hispanic boys on the Algebra I End-of-Course grade level standards over a three year period? The first four questions were addressed separately for three school years: 2016-2017, 2017-2018, and 2018-2019, and the fifth research question involved all three school years.

Method

Research Design

A causal-comparative research design (Johnson & Christensen, 2020) was present in this multi-year analysis. In this study, the independent variable was the at-risk status of Hispanic boys in the State of Texas. Dependent variables were the performance of Hispanic boys on the Algebra I End-of-Course exam: (a) Approaches Grade Level standard, (b) Meets Grade Level standard, (c) Masters Grade Level standard, and (d) raw score for the 2016-2017, 2017-2018,

and 2018-2019 school years. In a causal-comparative research design, pre-existing data are analyzed. These data were obtained from the Texas Education Agency Public Education Information Management System (PEIMS Data Standards, 2018).

Participants and Instrumentation

Participants in this study were Hispanic boys in Texas who took the Algebra I End-of-Course exam in the 2016-2017, 2017-2018, and 2018-2019 school years. The data that were analyzed herein had been previously obtained from the Texas Education Agency Public Education Information Management System database for the Algebra I End-of-Course exam that was administered during the 2016-2017, 2017-2018, and 2018-2019 school years. A Public Information Request was previously submitted to and was fulfilled by the Texas Education Agency to obtain the data. The datasets requested and obtained were for (a) ethnicity/race, (b) gender, (c) Grade Level, (d) Algebra I End-of-Course Performance Level Standards, (e) raw score, and (d) at-risk indicator. Upon receipt, the data were then imported into the Statistical Package for Social Sciences software program (SPSS) for analysis (Field, 2009).

Performance on the STAAR Phase-in standards was examined by at-risk status. Assessed by the Algebra I End-of-Course exam, there are three categories for performance. In the Approaches Grade Level Category: Performance in this category indicates that students are likely to succeed in the next grade or course (Texas Education Agency, 2019). In the Meets Grade Level Category: Performance in this category indicates students have a high probability of academic success in the next grade or course (Texas Education Agency, 2019). Students may still need some type of short-term and targeted academic intervention. Performance in the Masters Grade Level Category indicates that students are expected to succeed in the next grade or course. Students who perform at this level need very little to no academic intervention (Texas Education Agency, 2019). Students in this category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar (Texas Education Agency, 2022). Raw score performance demonstrates the number of items answered correctly, as the items represent specific content objectives (Texas Education Agency, 2022).

Data Analysis

To ascertain whether differences were present in the Algebra I End-of-Course exam performance (i.e., Did Not Meet, Met) at the Approaches Grade Level standard, Meets Grade Level standard, Masters Grade Level standards, and raw score between Hispanic boys who were not labeled at-risk and Hispanic boys who were labeled at-risk, Pearson chi-square analyses were conducted. Pearson chi-square procedures are the most appropriate statistical procedure to use when the independent variable and dependent variables are dichotomous. Accordingly, chi-squares are the statistical procedure of choice when both variables are categorical (Slate, 2023). Prior to calculating Pearson chi-square procedures, its underlying assumptions were checked. Given the large sample size and data independence, these assumptions were met.

Results

Approaches Grade Level Results

With respect to the first research question about the Algebra I End-of-Course Approaches Grade Level standard for the 2016-2017 school year, the result was statistically significant, $\chi^2(1)$ = 9,992.62, p < .001. The effect size for this finding, Cramer's V, was moderate, .36 (Cohen, 1988). As revealed in Table 1, a statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Approaches Grade Level standard than Hispanic boys who were not at-risk. Almost six times the percentage of Hispanic boys who were at-risk did not meet this grade level standard than Hispanic boys who were not at-risk.

Table 1. Frequencies and percentages of the Algebra I end-of-course approach grade level standard of Hispanic boys by their at-risk status

School Year and At-Risk Status	Did Not Meet *n* and %age of Total	Met *n* and %age of Total
2016-2017		
At-Risk	(*n* = 25,031) 45.1%	(*n* = 30,523) 54.9%
Not At-Risk	(*n* = 1,786) 7.8%	(*n* = 21,091) 92.2%
2017-2018		
At-Risk	(*n* = 26,573) 41.5%	(*n* =37,400) 58.5%
Not At-Risk	(*n* = 2,097) 9.0%	(*n* = 21,205) 91.0%
2018-2019		
At-Risk	(*n* = 23,190) 39.1%	(*n* = 36,177) 60.9%
Not At-Risk	(*n* = 2,427) 12%	(*n* = 17,749) 88%

Regarding the Approaches Grade Level standard for the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(1)$ = 8,198.14, p < .001. The effect size for this finding, Cramer's V, was moderate, .31 (Cohen, 1988). A statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Approaches Grade Level standard than Hispanic boys who were not at-risk. Similar to the previous school year, the percentage of Hispanic boys who were at-risk and who did not meet the grade level standard was almost four and one half times more than the percentage of Hispanic boys who were not at-risk and who did not meet this grade level standard. Table 1 contains the descriptive statistics for this analysis.

Concerning the Approaches Grade Level standard for the 2018-2019 school year, a statistically significant difference was revealed, $\chi^2(1)$ = 5,040.14, p < .0, 01, Cramer's V of .25, a small effect size (Cohen, 1988). A statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Approaches Grade Level standard than Hispanic boys who were not at-risk. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was more than three times the percentage of Hispanic boys who were not at-risk and who did not meet this standard. Delineated in Table 1 are the descriptive statistics for this school year.

Meets Grade Level Results

With respect to the second research question about the Algebra I End-of-Course Meets Grade Level standard for the 2016-2017 school year, the result was statistically significant, $\chi^2(1)$ = 16,115.79, $p < .001$. The effect size for this finding, Cramer's V, was moderate, .45 (Cohen, 1988). As delineated in Table 2, a statistically significantly higher percentage of Hispanic boys who were at-risk, over 48 percentage points higher, failed to meet this grade level standard. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was almost three times the percentage of Hispanic boys who were not at-risk and who did not meet this standard.

Table 2. Frequencies and percentages of the Algebra I end-of-course meet grade level standard of Hispanic boys by their at-risk status

School Year and At-Risk Status	Did Not Meet n and %age of Total	Met n and %age of Total
2016-2017		
At-Risk	(n = 41,930) 75.5%	(n = 13,624) 24.5%
Not At-Risk	(n = 6,155) 26.9%	(n = 16,722) 73.1%
2017-2018		
At-Risk	(n = 46,891) 73.3%	(n = 17,082) 26.7%
Not At-Risk	(n = 5,977) 25.7%	(n = 17,325) 74.3%
2018-2019		
At-Risk	(n = 39,737) 66.9%	(n = 19,630) 33.1%
Not At-Risk	(n = 5,082) 25.2%	(n = 15,094) 74.8%

Regarding the Meets Grade Level standard for the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(1)$ = 16,237.85, $p < .001$. The effect size for this finding, Cramer's V, was moderate, .43 (Cohen, 1988). A statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Meets Grade Level standard than Hispanic boys who were not at-risk. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was almost three times the percentage of Hispanic boys who were not at-risk and who did not meet this standard. Table 2 contains the descriptive statistics for this analysis.

Concerning the Meets Grade Level standard for the 2018-2019 school year, a statistically significant difference was revealed, $\chi^2(1)$ = 10,668.98, $p < .001$, Cramer's V of .37, a moderate effect size (Cohen, 1988). A statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Meets Grade Level standard than Hispanic boys who were not at-risk. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was more than two and one half times the percentage of Hispanic boys who were not at-risk and who did not meet this standard. Table 2 contains the descriptive statistics for this school year.

Masters Grade Level Results

With respect to the third research question about the Algebra I End-of-Course Masters Grade Level standard for the 2016-2017 school year, the result was statistically significant, $\chi^2(1) = 15,035.84$, $p < .001$. The effect size for this finding, Cramer's V, was moderate, .44 (Cohen, 1988). As revealed in Table 3, a statistically significantly higher percentage of Hispanic boys who were at-risk, 36 percentage points higher, failed to meet this grade level standard than Hispanic boys who were not at-risk. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was more than seven times lower than Hispanic students who were not at-risk and who did not meet this standard.

Table 3. Frequencies and percentages of the algebra I end-of-course masters grade level standard of Hispanic boys by their at-risk status

School Year and At-Risk Status	Did Not Meet n and %age of Total	Met n and %age of Total
2016-2017		
At-Risk	(n = 52,026) 93.6%	(n = 3,528) 6.4%
Not At-Risk	(n = 13,171) 57.6%	(n = 9,706) 42.4%
2017-2018		
At-Risk	(n = 57,605) 90.0%	(n = 6,368) 10.0%
Not At-Risk	(n = 11,855) 50.9%	(n = 11,447) 49.1%
2018-2019		
At-Risk	(n = 50,961) 85.8%	(n = 8,406) 14.2%
Not At-Risk	(n = 9,469) 46.9%	(n = 10,707) 53.1%

Regarding the Masters Grade Level standard for the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(1) = 16,131.47$, $p < .001$. The effect size for this finding, Cramer's V, was moderate, .43 (Cohen, 1988). A statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Masters Grade Level standard than Hispanic boys who were not at-risk. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was almost five times higher than the percentage of Hispanic boys who were not at-risk and who did not meet this standard. Table 3 contains the descriptive statistics for this analysis.

Concerning the Masters Grade Level standard for the 2018-2019 school year, a statistically significant difference was revealed, $\chi^2(1) = 12,487.98$, $p < .001$, Cramer's V of .40, a moderate effect size (Cohen, 1988). A statistically significantly higher percentage of Hispanic boys who were at-risk failed to meet the Masters Grade Level standard than Hispanic boys who were not at-risk. The percentage of Hispanic boys who were at-risk and who did not meet this grade level standard was almost four times higher than the percentage of Hispanic boys who were not at-risk and who did not meet this standard. Delineated in Table 4 are the descriptive statistics for this school year.

Raw Score Comparisons

For the fourth research question regarding raw score performance on the Algebra I End-of-Course exam for the 2016-2017 school year, the parametric independent samples *t*-test revealed a statistically significant difference, $t(78,429) = 163.82$, $p < .001$. This difference represented a large effect size (Cohen's *d*) of 1.30 (Cohen, 1988). Hispanic boys who were at-risk answered more than 14 items correctly, on average, than were answered by Hispanic boys who were not at-risk. Descriptive statistics for this analysis are delineated in Table 4.

Table 4. Descriptive statistics for the Algebra I end-of-course raw score performance of Hispanic boys by their at-risk status

School Year and At-Risk Status	*n*	*M*	*SD*
2016-2018			
At-Risk	55,554	23.51	11.58
Not At-Risk	22,877	37.93	10.25
2017-2018			
At-Risk	63,973	24.08	12.21
Not At-Risk	23,302	37.65	12.34
2018-2019			
At-Risk	59,367	25.30	13.17
Not At-Risk	20,176	37.37	14.07

Regarding raw score performance on the Algebra I End-of-Course exam for the 2017-2018 school year, the parametric independent samples *t* yielded a statistically significant difference, $t(87,273) = 144.88$, $p < .001$. This difference represented a large effect size (Cohen's *d*) of 1.12 (Cohen, 1988). Hispanic boys who were at-risk answered more than 13 items less correctly, on average, than were answered by Hispanic boys who were not at-risk. Table 4 contains the descriptive statistics for this analysis. Concerning raw score performance on the Algebra I End-of-Course exam for the 2018-2019 school year, the parametric independent samples *t*-test revealed a statistically significant difference, $t(79,541) = 110.56$, $p < .001$. This difference represented a large effect size (Cohen's *d*) of 0.92 (Cohen, 1988). Hispanic boys who were at-risk answered more than 12 items less correctly, on average, than were answered by Hispanic boys who were not at-risk. Table 4 delineates the descriptive statistics for this school year.

Discussion

In this multiyear investigation, data on the Algebra I End-of-Course exam performance were compared between Hispanic boys who were at-risk and Hispanic boys who were not at-risk. End-of-Course exam performance was comprised of three grade level standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) and one raw score. Data were obtained for the three school years prior to the COVID-19 pandemic. Inferential statistical procedures yielded statistically significant differences in all three school years for Hispanic boys who were at-risk. In all three school years, Hispanic boys who were at-risk failed to meet all three grade level standards at statistically significantly lower rates than Hispanic boys who were not at-risk. Figure 1 shows the average percentages for the Approaches Grade Level Standard for all three school years.
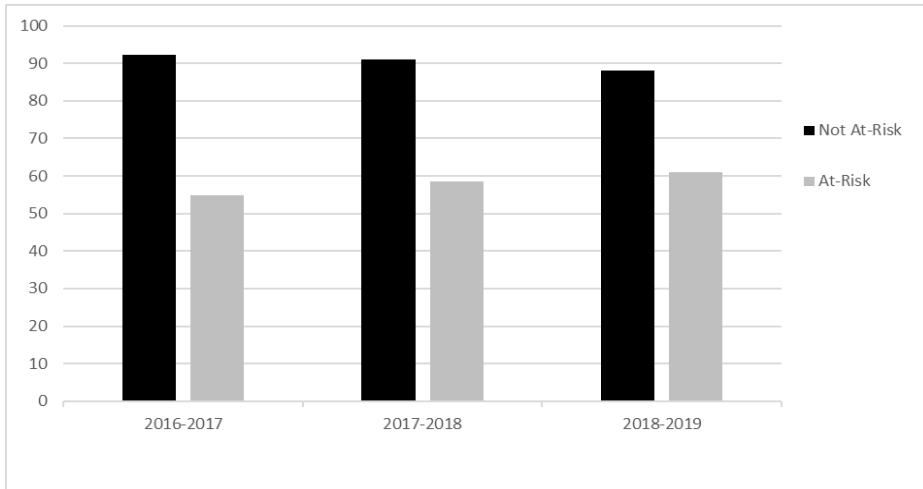
Figure 1. Average percentages of Hispanic boys who met the approaches grade level standard by their at-risk status

Results showed higher percentages of at-risk Hispanic boys failed to meet all three grade level standards in all three school years. For performance on the Approaches Grade Level Standard in the 2016-2017 school year, Hispanic boys who were at-risk failed to meet the standard at a rate of more than 45% compared to less than 8% of Hispanic boys who were not at-risk who failed to meet the standard. In the 2017-2018 school year, Hispanic boys who were at-risk failed to meet the Approaches Grade Level standard at a rate of almost 42% compared to 9% for Hispanic boys who were not at-risk. For the 2018-2019 school year, Hispanic boys who were at-risk failed to meet the standard at a rate of over 39% compared to 12% for Hispanic boys who were not at-risk. he percentages of Hispanic boys who met this standard increased each year, while the percentages of not-at-risk Hispanic boys who met the standard decreased. For the three years investigated, the achievement gap in Algebra I narrowed for the Approaches Grade Level Standard. Figure 2 depicts the average percentages for the three school years.
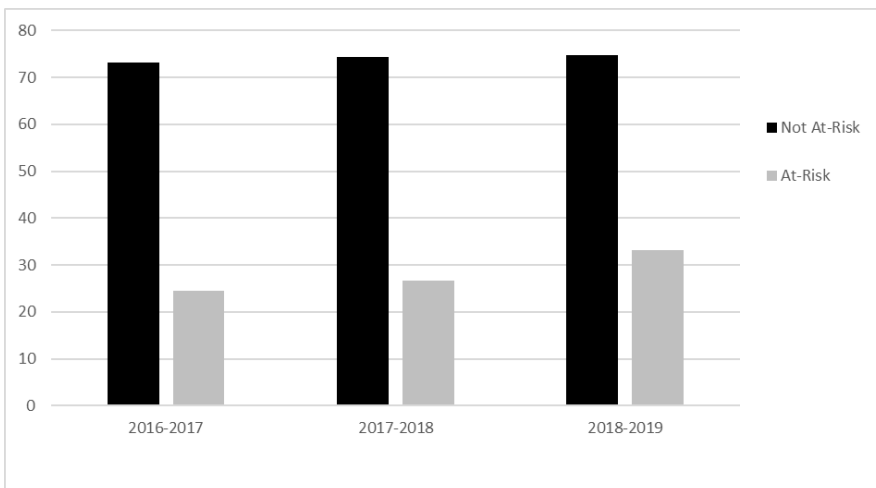

Figure 2. Average percentages of Hispanic boys who met the meets grade level standard by their at-risk status

Results of the Meets Grade Level Standard performance on the Algebra I exam for all three school years were similar to the results of the Approaches Grade Level Standard. In the 2016-2017 school year, Hispanic boys who were at-risk failed to meet the Meets Grade Level Standard at a rate of over 75% compared to a rate of about 27% for Hispanic boys who were not at-risk. Hispanic boys who were at-risk failed to meet the Meets Grade Level Standard at a rate of over 73% compared to almost 26% for Hispanic boys who were not at-risk in the 2017-2018 school year. In the 2018-2019 school year, Hispanic boys who were at-risk failed to meet the standard in Meets Grade Level Standard at a rate of almost 67% compared to a rate of over 25% for Hispanic boys who were not at-risk. For these three years, the percentages of Hispanic boys who were at-risk and who did not meet this standard decreased. The incremental decrease was more for Hispanic boys who were at-risk, narrowing the Algebra I achievement gap between Hispanic boys who were at-risk and Hispanic boys who were not at-risk during this time frame. Depicted in Figure 3 are the average percentages for Hispanic boys for all three years on the Masters Grade Level Standard.
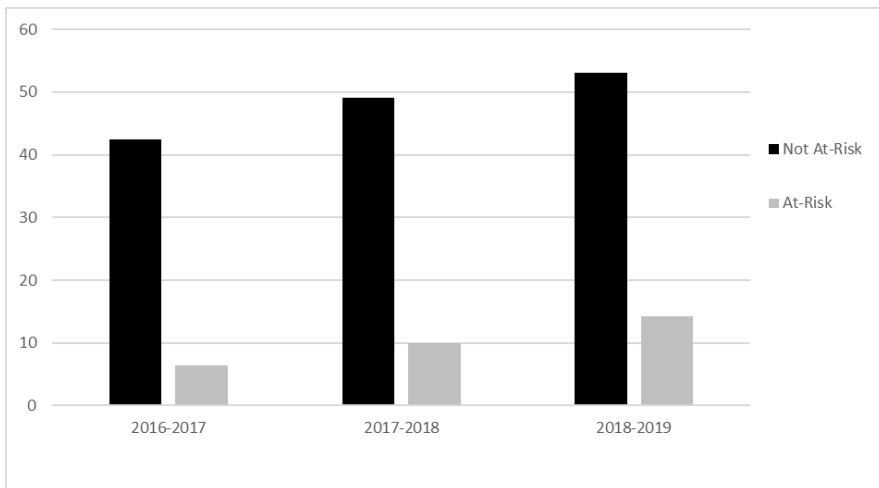

Figure 3. Average percentages of Hispanic boys who met the masters grade level standard by their at-risk status

In regard to the Masters Grade Level Standard performance on the Algebra I End-of-Course exam in all three years, the rate of failure to meet the standard decreased. In the 2016-2017 school year, Hispanic boys who were at-risk failed to meet the Masters Grade Level Standard at a rate of almost 94% compared to a rate of almost 58% for Hispanic boys who were not at-risk. In the following year, Hispanic boys who were at-risk failed to meet the standard at a rate of 90%, and Hispanic boys who were not at-risk failed to meet the standard at a rate of almost 51%. In the 2018-2019 school year, Hispanic boys who were at-risk failed to meet the Masters Grade Level Standard at almost 86% compared to almost 47% for Hispanic boys who were not at-risk. The incremental decrease in the rate of failure to meet the Masters Grade Level Standard was less for Hispanic boys who were at-risk. From 2016-2017 to the 2018-2019 school years, the achievement gap between Hispanic boys who were at-risk and Hispanic boys who were not at-risk increased. The average raw score comparisons for all three years are shown in Figure 4.
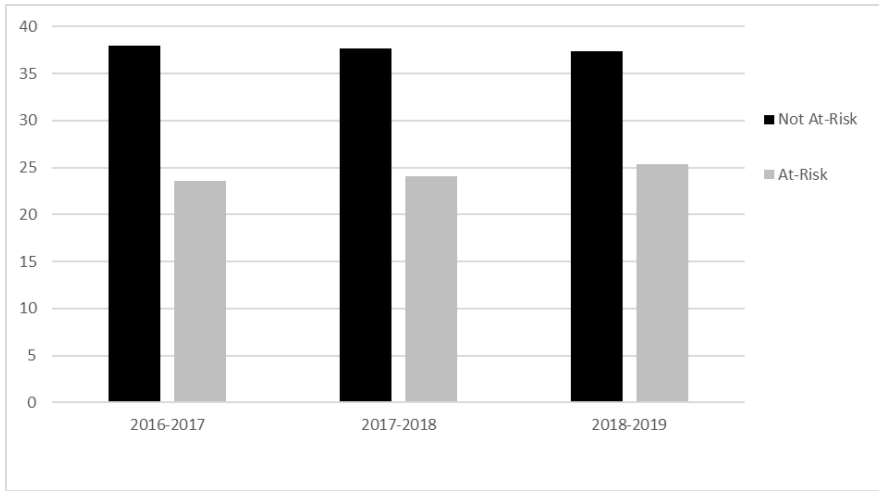
Figure 4. Average Algebra I end-of-course exam raw scores of Hispanic boys by their at-risk status

In raw score comparisons on the Algebra I End-of-Course exam for all three school years examined, Hispanic boys who were at-risk answered, on average, about 13 items less correctly than Hispanic boys who were not at-risk. In the 2016-2017 school year, Hispanic boys who were at-risk answered an average of more than 14 items less correctly than Hispanic boys who were not at-risk. Hispanic boys who were at-risk answered over 13 items less correctly, on average, than Hispanic boys who were not at-risk in the 2017-2018 school year. In the 2018-2019 school year, Hispanic boys who were at-risk answered over 12 items less correctly, on average, than Hispanic boys who were not at-risk. The average number of items answered correctly for Hispanic boys who were at-risk increased incrementally each year.

Discussion

In this multiyear, statewide investigation, the Algebra I End-of-Course exam performance of Hispanic boys was compared by their at-risk status. Higher percentages of Hispanic boys who were at-risk failed to meet all three grade level standards than Hispanic boys who were not at-risk for all three school years. These findings are congruent with the existing research literature. Achievement gaps in mathematics education were established at the national level for Hispanic students from 2017 to 2019 (National Center for Education Statistics, 2022b). Furthermore, the National Center for Education Statistics (2022b) established that the achievement gap was growing during those three school years.

Regarding Texas, 16 consecutive school years (i.e., 1993-2009) of mathematics achievement gaps in Grade 5 were established for Hispanic students by Rojas-Lebouef (2010). In Grade 8 mathematics, Craft (2011) determined that Hispanic students performed lower than state expectations on state-mandated exams for seven consecutive school years (i.e., 2003-2004 through 2009-2010). Alford-Stephens (2016) established achievement gaps in mathematics for Hispanic boys compared to their White and Asian peers. Researchers have documented achievement gaps and higher at-risk status for Hispanic boys and other subgroups (Kent et al., 2017; Kim et al., 2015). These achievement gaps for Hispanic boys were documented after the No Child Left Behind Act and its replacement, the Every Student Succeeds Act.

Implications for Policy and for Practice

Implications for policy and practice can be supported by the findings of this investigation. Policymakers could use the findings in this investigation to implement further safeguards for Hispanic students as the largest and fastest growing population in the state. Algebra I in Texas high schools represents the mathematics foundation for high school students and is an ideal place to identify and address gaps in mastering objectives. Mathematics instruction can be refined in high schools to benefit individual learners based on achievement gaps determined in this study.

School and district administrators can use the findings in this study to identify achievement gaps on their campus by disaggregating the data by race/ethnicity, gender, and at-risk status. The greatest transformations of learning occur in the classroom and leaders need to have the data to support instructors to identify and differentiate students who contribute to the achievement gap due to falling behind in objective mastery. Algebra I achievement gaps identified in this study can be used as a model for high schools to identify trends in student performance in the three grade level standards. High schools have a variety of gaps in each grade level, and focus should be prioritized based on the highest need.

Recommendations for Future Research

The achievement gap and related trends established in this investigation are concerns for Texas school administrators. Future research is necessary to identify the existence of additional achievement gaps. First, future researchers should analyze data from Algebra I End-of-Course exam performance in school years following the COVID-19 Pandemic. Identified in this study were achievement gaps in the last three full school years before schools adjusted their instructional policies due to the COVID-19 Pandemic. Data from this study can be used as a baseline for future research studies in this regard. Second, researchers are encouraged to analyze End-of-Course exam data in one or more of the additional four subjects tested in Texas. Biology, English I, English II, and United States History are all measured for state accountability. Researchers could identify potential achievement gaps in those subjects. Third, future researchers are encouraged to analyze mathematics data from other states to identify possible achievement gaps in other states or at the national level. Finally, future researchers should consider examining additional student subgroups. Presented in this study were data from Hispanic boys and Hispanic boys who were at-risk. Additional studies should examine White, Black, and Asian student performance by gender. Furthermore, analysis of performance data for students in poverty, students who are in special education programs, and Emergent Bilingual students is encouraged.

Conclusion

In this multiyear investigation, the Algebra I End-of-Course exam performance was compared for Hispanic boys by their at-risk status. Data were obtained from the Texas Education Agency for all students who took this exam in the aforementioned school years. Then, only data on Hispanic boys were analyzed. Specifically examined were the percentages of Hispanic boys who met the Approaches Grade Level Standard, Meets Grade Level Standard, Masters Grade Level Standard, and raw score in three consecutive school years (i.e. 2016-2017, 2017-2018, and 2018-2019). Across all three school years, higher percentages of Hispanic boys who were at-risk failed to meet any of the three grade level standards than Hispanic boys who were not at-

risk. Clearly, their instructional needs in mathematics were not being met. Given that these findings are based on the three school years prior to the Covid-19 pandemic, further research studies are warranted to determine the degree to which additional academic losses may have occurred.

Declarations

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References

Alford-Stephens, T. (2016). *Differences in mathematics skills of Texas high school boys as a function of ethnicity/race and economic status: A multiyear statewide study* (Unpublished doctoral dissertation). Sam Houston State University, Huntsville, TX.

Anderson, S., Medrich, E., & Fowler, D. (2007). Which achievement gap?. *Phi Delta Kappan, 88*(7), 547-550. https://doi.org/10.1177/003172170708800716

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum.

Craft, K. F. (2011) *Academic performance differences among Texas Grade 8 students who are White, Hispanic, or Limited English Proficient* (Unpublished doctoral dissertation). Sam Houston State University, Huntsville, TX.

David, K., & Marchant, G. (2015). Achievement gaps in the United States: Race, poverty, and interactions over ten years. *The International Journal of Assessment and Evaluation, 22*(4), 1-15. https://doi.org/10.18848/23277920/cgp/v22i04/48378

Davis-Kean, P., & Jager, J. (2014). Trajectories of achievement within Race/Ethnicity: "Catching Up" in achievement across time. *Journal of Educational Research, 107*(3), 197-208. https://doi.org/10.1080/00220671.2013.807493

De Clercq, M., Galand, B., Hospel, V., & Frenay, M. (2021). Bridging contextual and individual factors of academic achievement: A multi-level analysis of diversity in the transition to higher education. *Frontline Learning Research*, *9*(2), 96-120. https://doi.org/10.14786/flr.v9i2.671

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Sage.

Fuller, E., Springel, M., & Fuller, G. (2010). *Supporting college readiness: Preparing middle school students for high school success in Texas*. Texas Business and Education Coalition.

Johnson, R. B., & Christensen, L. (2020). *Educational research: Quantitative, qualitative, and mixed methods approaches* (7th ed.). Sage.

Kent, J., Jones, D., Mundy, M. A., & Isaacson, C. (2017). Exploring contributing factors leading to the decision to drop out of school by Hispanic males. *Research in Higher Education Journal*, *32*, 1-19.

Kim, S., Chang, M., Singh, K., & Allen, K. R. (2015). Patterns and factors of high school dropout risks of racial and linguistic groups. *Journal of Education for Students Placed at Risk*, *20*(4), 336-351. https://doi.org/10.1080/10824669.2015.1047019

Kotok, S. (2017). Unfulfilled potential: High-achieving minority students and the high school achievement gap in math. *The High School Journal*, *100*(3), 183-202.

Lubienski, S. T., & Crockett, M. (2007). NAEP mathematics achievement and race/ ethnicity. In P. Kloosterman, & F. Lester (Eds.), *Results from the ninth mathematics assessment of NAEP* (pp. 227-260). NCTM.

National Center for Education Statistics. (2022a). *Racial/Ethnic enrollment in public schools*. Retrieved 9 December, 2023 from https://nces.ed.gov/programs/coe/indicator/cge/racial-ethnic-enrollment

National Center for Education Statistics. (2022b). *Annual reports and information staff: Mathematics performance.* Retrieved 9 December, 2023 from https://nces.ed.gov/programs/coe/indicator/cnc/mathematics-performance

PEIMS Data Standards. (2018). *Public Education Information Management System Overview.* Retrieved 20 November, 2023 from https://tea.texas.gov/Reports_and_Data/Data_Submission/PEIMS/PEIMS_-_Overview/

Rojas-LeBouef, A. M. (2010). *Differences in the reading and math achievement among students who are Hispanic, Limited English Proficient, or White: A multi-year study* (Unpublished doctoral dissertation). Sam Houston State University, Huntsville, TX.

Rojas-LeBouef, A., & Slate, J. R. (2012). The achievement gap between White and non-White students. *International Journal of Educational Leadership Preparation, 7*(1), 1-61.

Slate, J. R. (2023). *Communicating your statistical findings in a formal and scholarly way: A guide for graduate students, faculty, and educational leaders.* ICPEL Publications. International Council of Professors of Educational Leadership. Retrieved 14 November, 2023 from https://www.lulu.com/shop/john-slate/communicating-your-statistical-findings-in-a-formal-and-scholarly-way-a-guide-for-graduate-students-faculty-and-educational/paperback/product-vprd8v.html

Texas Education Agency. (2019). *STAAR End-of-Course (EOC) assessments interpretive guide.* Retrieved 4 December, 2023 from https://tea.texas.gov/sites/default/files/2018_STAAR_Interpretive_Guide_EOC_final_tagged.pdf

Texas Education Agency. (2021). *Texas academic performance report.* Retrieved 4 December, 2023 from https://rptsvr1.tea.texas.gov/cgi/sas/broker?_service=marykay&_program=perfrept.perfmast.sas&_debug=0&ccyy=2021&lev=S&prgopt=reports%2Ftapr%2Fpaper_tapr.sas

Texas Education Agency. (2022). *Texas Student Data System: Texas Education Data Standards.* Retrieved 17 December, 2023 from https://texasstudentdatasystem.org/TSDS/TEDS/TEDS_Latest_Release

U.S. Census Bureau. (2017). *Number of Hispanic students more than double in 20 years: Big increase in college enrollment.* Retrieved 14 November, 2023 from https://www.census.gov/library/stories/2017/10/hispanic-enrollment.html

Uline, C. L., & Johnson, J. F. (2005). Closing achievement gaps: What will it take? *Theory Into Practice, 44*(1), 1-3. https://doi.org/10.1207/s15430421tip4401_1