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Advanced Placement/International Baccalaureate Completion Rates by Student Gender, Ethnicity/Race, and Economic Status: A Multiyear, Statewide Investigation

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Abstract

In this multiyear investigation, the degree to which differences were present in the percentages of students who met criterion on Advanced Placement/International Baccalaureate examinations as a function of their ethnicity/race and economic status was addressed for the 2016-2017 through the 2019-2020 school years. Statistically significant differences were present in the met criterion rates for Advanced Placement/International Baccalaureate examinations across all four years. Black students had the lowest percentages of any ethnic/racial group who met criterion on Advanced Placement/International examinations, and the percentage of Asian students were over six times higher than the percentages for Hispanic and White students. Students who were economically disadvantaged had lower percentages who met criterion on Advanced Placement/International examinations than their peers.

Keywords: Advanced Placement, Asian, Black, economically disadvantaged, ethnicity/race, Hispanic, International Baccalaureate, White

1. Introduction

High school students across the United States have participated and continue to participate in Advanced Placement courses and examinations. Such participation has allowed and continues to allow high school students to experience college-level coursework prior to high school graduation. Students who have Advanced Placement exam scores of 3 or higher have been eligible to receive college credit upon admission into college (College Board, 2014). Of note is that students who took Advanced Placement courses and scored a 3 or higher on an Advanced Placement exam were more likely to earn higher GPAs while in college, to graduate college in 5 years or less, and to have higher degree attainment than students who did not take Advanced Placement courses with a 3 or higher score on the Advanced Placement examinations (Morgan et al., 2007). With positive benefits related to Advanced Placement coursework, the number of high school students who have participated in the program has continued to increase over the years. For example, in the class of 2013, College Board had 1,003,430 students who took at least one of the 3,153,014 Advanced Placement examinations (College Board, 2014) while in the class of 2020, College Board had 2,642,530 students who took at least one of the 4,751,957 Advanced Placement examinations (College Board, 2020).

With many students choosing to take Advanced Placement courses as a way to earn college credit, Shaw et al. (2013) investigated how college admission officers might use Advanced Placement variables as a predictor of students' first-year college GPA. The sample size for the study was 74,501 students from over 125 colleges across the United States. Regarding race/ethnicity, Asian students were more likely to have the highest performance on Advanced Placement exam scores whereas Black students were more likely to have the lowest Advanced Placement exam scores (Shaw et al., 2013). The strongest Advanced Placement predictor that was

related to first-year college GPA was the average Advanced Placement exam score. When the average Advanced Placement exam score increased, the first-year college GPA also increased (Shaw et al., 2013).

With increased participation in Advanced Placement coursework and examinations over the years along with added benefits of college-level rigor, researchers have focused on demographic characteristics of students who have taken Advanced Placement courses and examinations. In one such investigation, Moore and Slate (2008) analyzed data from the State of Texas for the 2004-2005 and 2005-2006 school years to investigate student participation and student performance in Advanced Placement courses by ethnicity/race and gender. In both years, student participation for Advanced Placement courses was almost 19% for White students, a little more than 10% for Black students, and a little less than 12% for Hispanic students while approximately 17% of girls participated in an Advanced Placement course compared to about 13% of boys. For both years, Hispanic students had the highest percentage of students who scored at or above the criterion on Advanced Placement examinations when compared to White students or Black students. Moreover, boys had a slighter higher percentage who scored at or above the criterion on Advanced Placement examinations than did girls (Moore & Slate, 2008).

With a more narrow focus, Koch et al. (2016) analyzed archival Advanced Placement exam data between 1997 and 2012 from the States of Arizona, California, and Texas for Hispanic students who took two specific examinations: (a) Advanced Placement English Language and Composition and (b) Advanced Placement English Literature and Composition. Throughout the 16 years, the number of Hispanic students taking both examinations increased from 20 to 1,242 students in Arizona, from 832 to 15,581 students in California, and from 1,321 to 11,404 in Texas. Although the numbers of students increased, the overall average performance decreased across all three states (Koch et al., 2016). Regarding the Advanced Placement English Language and Composition exam percentages for students earning an exam score of 3 or higher over the 16-year time span, Arizona had the highest percentage at 34%, California had the next highest at 31%, and Texas had the lowest percentage at 24%. The Advanced Placement English Literature and Composition exam scores followed a similar pattern with Arizona had the highest percentage at 34%, California had the next highest at 33% and Texas had the lowest percentage at 27% (Koch et al., 2016). Overall, many Hispanic students in all three states did not score high enough on either test to earn college credit.

Although data on Hispanic students across three states were present in the previous study, Moore et al. (2010) examined the overall performance of Asian students in Advanced Placement examinations compared to the overall performance of White students in Advanced Placement examinations across the United States from 1997 through 2008. For all 12 years, the Advanced Placement examination scores by Asian students were statistically significantly higher than the average exam scores of White students. Differences in the average Advanced Placement examination score increased from the 1997 test administration to the 2008 test administration. In 2008, Asian students had almost 6% more of the highest Advanced Placement score of 5 than did White students (Moore et al., 2010).

Though the prior researchers examined data across three states, Kettler and Hurst (2017) collected data from 117 suburban high schools in the State of Texas from the 2000-2001 and the 2010-2011 school years on student participation in Advanced Placement/International examinations for Grade 11 and Grade 12. Over the 10-year period, the Advanced Placement/International Baccalaureate examination rate increased for all three ethnic/racial groups (i.e., Black, Hispanic, and White). During both years, the Advanced Placement/International Baccalaureate examination rate for White students was higher than Black and Hispanic students (Kettler & Hurst, 2017). Further, the ethnicity gap between Black students and White students was larger than the ethnicity gap between Hispanic students and White students (Kettler & Hurst, 2017).

The studies discussed above were just a few of the investigations in which researchers analyzed Advanced Placement score performance based on ethnicity/race. With respect to gender, Moore et al. (2012) investigated differences on Advanced Placement examinations between boys and girls for the 2007 and 2011 test administrations. In 2007 and 2011, boys had a higher percentage of overall Advanced Placement examination scores than girls, and the percentages of boys earning a score of 5 or higher on Advanced Placement examinations (i.e., 16.19% and 16.81%) were higher when compared to the percentages of girls (i.e., 11.59% and 12.44%). Further, after identification of the 12 most popular Advanced Placement examinations for boys and girls for 2007 and 2011, boys scored higher than girls on 10 out 12 of the Advanced Placement examinations whereas girls scored higher than boys on Advanced Placement Literature & Composition and Spanish Language (Moore et al., 2012).

In another study involving gender, Morris and Slate (2012) analyzed College Board data on student performance on Advanced Placement Calculus AB, Calculus BC, and Statistics examinations from across the United States for the 2000, 2005, and 2010 test administrations. From 2000 to 2010, the overall number of students participating in the Advanced Placement mathematics examinations increased each year and the highest number

of students took the Advanced Placement Calculus examination. For all three years, the relationships between gender and performance on the Advanced Placement examinations for all three tests were statistically significant. Higher percentages of boys than girls earned a score of 3 or higher on the Advanced Placement mathematics examinations (Morris & Slate, 2012).

In a different study with a smaller sample size, Clark et al. (2012) investigated demographic characteristics of students who were enrolled in Advanced Placement courses within a Texas urban school district for the 2005-2006 and 2006-2007 school years. For both years, girls had a higher percentage of enrollment in Advanced Placement courses than boys and White students had the highest enrollment percentage of Advanced Placement courses compared to other ethnic/racial groups (Clark et al., 2012). White students had the highest percentage of students with an Advanced Placement scores of a 3 or higher whereas Black students had the lowest percentage of Advanced Placement scores of a 3 or higher (Clark et al., 2012).

In a different study in which the combination of ethnicity/race and economic status was addressed, Colgren and Sappington (2015) examined Advanced Placement and ACT data on 145,560 high school students who were eligible to take the ACT during the 2012-2013 school year in the State of Illinois. Black, Hispanic, and White students who participated in Advanced Placement courses had higher mean averages on the ACT than Black, Hispanic, and White students who had not participated in Advanced Placement courses. Also, White students who participated in Advanced Placement courses had higher mean ACT averages than Black and Hispanic students who participated in Advanced Placement courses, which depicted the continued existence of an equity gap between the three ethnic/racial groups of students (Colgren & Sappington, 2015). Regarding economic status, students who were economically disadvantaged and participated in Advanced Placement courses had lower average ACT scores than students who were not economically disadvantaged and who had participated in Advanced Placement courses (Colgren & Sappington, 2015).

In another study, Phillips and Lane (2021) investigated college outcomes for 11,190 students who had participated in an Advanced Placement exam and graduated from a high school, between the 2008-2009 and 2012-2013 school years. Asian, White, and students who were not economically disadvantaged had better college matriculation and persistence rates than Black, Hispanic, and students who were economically disadvantaged (Phillips & Lane, 2021). Also compared were the results of their initial database, which was described above, to the results for the Massachusetts's students who graduated in the 2010-2011 school year. College outcomes for students who participated in the Advanced Placement STEM & English program were better than the college outcomes for all students in the State of Massachusetts (Phillips & Lane, 2021). Regarding Black, Hispanic, and students who were economically disadvantaged, students who had participated in the Advanced Placement STEM & English program were 18.37 to 29.56 percentage points higher in rates of college matriculation, persistence, and graduation than the Massachusetts students with similar racial and economic factors (Phillips & Lane, 2021).

Although several investigations exist regarding Advanced Placement, Perna et al. (2015) analyzed the availability and the enrollment of students in an International Baccalaureate Diploma Programme by ethnicity/race and economic status from the combination of the Common Core of Data from the National Center for Education Statistics and the International Baccalaureate database between 2006 and 2009. In the study, enrollment in an International Baccalaureate Diploma Programme for Black and Hispanic students increased slightly over the 4-year period. Further, the number of students who were economically disadvantaged and who participated in an International Baccalaureate Diploma Programme increased from 13% in 2006 to 17%, even though the availability of International Baccalaureate Diploma Programme at high schools also increased during that time period for students who were economically disadvantaged (Perna et al., 2015).

1.1 Statement of the Problem

With the passage of House Bill 3 in the 86th Texas Legislature, high school campuses in the State of Texas have a renewed interest in the improvement of college, career, and military readiness. Also, with the high school allotment fund being repealed, House Bill 3 provides a new form of funding for school districts, which is called a college, career, and military readiness outcomes bonus (Texas Education Agency, 2019). Another portion of House Bill 3 focuses on increasing funding for college prep exams such as the ACT, the SAT, and the Texas Success Initiative Assessment TSIA, for industry-based certifications, and career and technical education courses (Texas Education Agency, 2019).

College, career, and military readiness also affect school districts in another way. Under the Texas public school accountability system, school districts are awarded distinction designations for outstanding achievement in specific areas, which include college, career, and military readiness standards in several areas. Further, high school students who meet criterion in scores on their Advanced Placement/International examinations can increase a high school campus's state accountability rating (Texas Education Agency, 2020). With the importance placed on college, career, and military readiness on school district funding and state accountability

ratings, Texas school board members, school educators, and community stakeholders continue to seek a higher number of students who score at or above the criterion on Advanced Placement/International examinations.

1.2 Purpose of the Study

The purpose of this study was to determine the degree to which differences were present in the percentages of students who met criteria on Advanced Placement/International Baccalaureate examinations as a function of their ethnicity/race (i.e., Asian, Black, Hispanic, and White) and economic status (i.e., not poor and poor). At the time of the study, the percentages for all four groups of students were compared for four school years (i.e., 2016-2017, 2017-2018, 2018-2019, and 2019-2020) of Texas statewide data. These four years of high school data represented the most recent data available. With the recent COVID-19 pandemic, all school campuses and school districts received a label of Not Rated: Declared State of Disaster for the 2019-2020 school year, which affected the availability of data for that year. As a result, data related to Advanced Placement/International Baccalaureate examinations were not available.

1.3 Significance of the Study

With the need for employees to have postsecondary education in today's workplace, high school students will benefit from college credit opportunities such as Advanced Placement/International examinations. In the body of literature on Advanced Placement, many positive outcomes for students participating in Advanced Placement coursework occur such as earning a higher GPA while in college, graduating college in 5 years or less, and reaching higher degree attainment (Morgan et al., 2007). In other studies, researchers examined the equitable participation in Advanced Placement courses across student demographic characteristics such as ethnicity/race and economic status (Clark et al., 2012; Koch et al., 2016; Moore & Slate, 2008). One part of this article was on the degree to which differences might be present in the percentages of students who scored at or above the criterion for Advanced Placement/International Baccalaureate examinations for high school students in the State of Texas. This analysis was conducted for a 4-year time period as a function of student ethnicity/race and economic status. Another aspect of this article was an analysis of any trends present in the differences in the percentages of students who have scores at or above the criterion for Advanced Placement/International Baccalaureate examinations by their ethnicity/race and economic status. With the change in state accountability ratings and in school district funding, college readiness constitutes an important topic for high school students, school board members, community stakeholders, parents, college admission officers, and state legislature representatives. The results from this study will add to the existing body of literature on the subject of Advanced Placement and International Baccalaureate coursework.

1.4 Research Questions

The following research questions were addressed: (a) What is the difference in percentage of students who met criteria on Advanced Placement/International Baccalaureate examinations as a function of their ethnicity/race? (b) What is the difference in percentage of students who met criteria on Advanced Placement/International Baccalaureate examinations as a function of their economic status? (c) What trend exists in the percentage of students who met criteria on Advanced Placement/International Baccalaureate examinations as a function of their ethnicity/race status from the 2016-2017 through the 2019-2020 school years? and (d) What trend exists in the percentage of students who met criteria on Advanced Placement/International Baccalaureate examinations as a function of their economic status from the 2016-2017 through the 2019-2020 school years? The first two research questions were repeated for the 2017-2018, 2018-2019, and 2019-2020 school years and the last two research questions involved all four school years to determine a possible trend in the data. As a result, this study was comprised of 10 research questions.

2. Method

2.1 Research Design

For this investigation, a non-experimental causal-comparative research design was used (Creswell & Creswell, 2018). Archival data were downloaded from the Texas Academic Performance Reports for the 2016-2017 through the 2019-2020 school years. Specifically, data obtained were the percentage of students who met criteria on Advanced Placement/International Baccalaureate examinations. Because all variables reflect past events, neither the independent variable nor the dependent variables can be changed or manipulated (Johnson & Christensen, 2019). Independent variables in this study were ethnicity/race (i.e., Asian, Black, Hispanic, and White) and economic status (i.e., economically disadvantaged and not economically disadvantaged). The dependent variable was the percentage of students who met criteria on the Advanced Placement/International Baccalaureate examinations. The assumption was made herein that, because the Texas Education Agency conducts audits of the data with which they are provided, the archival data analyzed were accurate and free of errors (Texas Education Agency, 2021a).

2.2 Participants and Instrumentation

For the purpose of this study, participants were high school students who had taken Advanced Placement/International Baccalaureate examinations or who were high school students who had taken an Advanced Placement/International Baccalaureate examination. Archival data were obtained from the Texas Education Agency, which has data on students who had taken Advanced Placement/International Baccalaureate examinations. The Texas Academic Performance Reports contained data from the 2016-2017 school year through the 2019-2020 school year for high school students in the State of Texas (Texas Education Agency, 2021b). These reports are publicly available to any users who want information on high school students in the State of Texas (Texas Education Agency, 2021b).

For this article, two terms need to be defined: (a) Advanced Placement/International Baccalaureate examination score at or above criterion on and (b) economically disadvantaged. Students who take at least one Advanced Placement/International Baccalaureate examination and who have valid Advanced Placement scores in the range of 1 to a 5 or who have valid International Baccalaureate scores in the range of 1 to a 7 are considered to be an examinee for that calendar year. For an examinee to score at or above the criterion, the student must earn a 3 or higher on an Advanced Placement examination or a 4 or higher on an International Baccalaureate examination (Texas Education Agency, 2020). As defined by the Texas Education Agency (2020), economically disadvantaged is a student "who is eligible for free or reduced-price meals under the National School Lunch and Child Nutrition Program" (p. 1).

3. Results

Prior to conducting inferential statistics to determine whether statistically significant differences were present in the percentages of students who met criterion on Advanced Placement/International Baccalaureate examinations as function of their ethnicity/race and economic status, checks for normalcy were conducted. Though all of the assumptions were not met, Field (2018) contends that the parametric independent samples *t*-test procedure is sufficiently robust to withstand violations of its underlying assumptions. Therefore, parametric independent samples *t*-tests were calculated to answer the previous research questions concerning Advanced Placement/International Baccalaureate examinations.

3.1 Results for Met Criterion Rates for Advanced Placement/International Baccalaureate Examinations by Ethnicity/Race for the 2016-2017 Through the 2019-2020 School Years

In this section, results for students who met criterion rates for Advanced Placement/International Baccalaureate examinations will be presented by school year and by ethnicity/race. The findings will be discussed for six different pairs: (a) Asian and Black; (b) Asian and Hispanic; (c) Asian and White; (d) Black and Hispanic; (e) Black and White; and (f) Hispanic and White. With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison between Asian and Black students in the 2016-2017 school year, a statistically significant difference was present, $t(308) = 28.27$, $p < .001$. This difference was a large effect size, Cohen's d of 1.61 (Cohen, 1988). As delineated in Table 1, the percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost six times higher than the percentage of Black students. Readers should note the very low percentage of Black students who met criterion on Advanced Placement/International Baccalaureate examinations.

Table 1. Descriptive Statistics for the Percentages of Asian and Black Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Asian	335	46.06	24.73
Black	656	7.95	12.27
2017-2018			
Asian	342	45.41	24.83
Black	674	7.96	12.07
2018-2019			
Asian	371	45.24	24.90
Black	699	7.92	12.47
2019-2020			
Asian	368	46.56	24.54

Black	697	8.53	13.30

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $t(318) = 29.21$, $p < .001$. This difference was a large effect size, Cohen's d of 1.64 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost six times higher than the percentage of Black students. Readers should note the very low percentage of Black students who met criterion on Advanced Placement/International examinations.

Regarding the 2018-2019 school year, a statistically significant difference was yielded, $t(345) = 29.68$, $p < .001$. This difference was a large effect size, Cohen's d of 1.60 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost six times higher than the percentage of Black students. Readers should again note the very low percentage of Black students who met criterion on Advanced Placement/International examinations.

In the 2019-2020 school year, a statistically significant difference was present, $t(342) = 32.78$, $p < .001$. This difference represented a large effect size, Cohen's d of 1.77 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was five and a half times higher than the percentage of Black students. Readers again should note the very low percentage of Black students who met criterion on Advanced Placement/International examinations. Descriptive statistics for these analyses are delineated in Table 1.

With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison between Asian and Hispanic students in the 2016-2017 school year, a statistically significant difference was revealed, $t(334) = 20.99$, $p < .001$. This difference was a large effect size, Cohen's d of 1.15 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost three and a half times higher than the percentage of Hispanic students. Table 2 contains the descriptive statistics for this analysis.

Table 2. Descriptive Statistics for the Percentages of Asian and Hispanic Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Asian	335	46.06	24.73
Hispanic	1,079	13.49	15.60
2017-2018			
Asian	342	45.41	24.83
Hispanic	1,108	13.56	15.89
2018-2019			
Asian	371	45.24	24.90
Hispanic	1,123	14.66	16.38
2019-2020			
Asian	368	46.56	24.54
Hispanic	1,145	14.28	16.38

Concerning the 2017-2018 school year, a statistically significant difference was yielded, $t(341) = 21.01$, $p < .001$. This difference was a large effect size, Cohen's d of 1.14 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately three times higher than the percentage of Hispanic students. Regarding the 2018-2019 school year, a statistically significant difference was present, $t(370) = 21.37$, $p < .001$. This difference was a large effect size, Cohen's d of 1.11 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was three times higher than the percentage of Hispanic students. In the 2019-2020 school year, a statistically significant difference was revealed, $t(367) = 24.09$, $p < .001$. This difference was a large effect size, Cohen's d of 1.26 (Cohen, 1988). The percentage of Asian students who met criterion on

Advanced Placement/International Baccalaureate examinations was approximately three times higher than the percentage of Hispanic students. Descriptive statistics for these analyses are presented in Table 2.

With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison between Asian and White students in the 2016-2017 school year, a statistically significant difference was yielded, $t(327) = 16.72$, $p < .001$. This difference was a large effect size, Cohen's d of 0.92 (Cohen, 1988). As delineated in Table 3, the percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost three times higher than the percentage of White students.

Table 3. Descriptive Statistics for the Percentages of Asian and White Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Asian	335	46.06	24.73
White	962	16.31	17.71
2017-2018			
Asian	342	45.41	24.83
White	987	16.48	18.09
2018-2019			
Asian	371	45.24	24.90
White	992	17.19	18.81
2019-2020			
Asian	368	46.56	24.54
White	1,001	16.40	18.28

Concerning the 2017-2018 school year, a statistically significant difference was present, $t(332) = 15.17$, $p < .001$. This difference was a large effect size, Cohen's d of 0.83 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost three times higher than the percentage of White students. Regarding the 2018-2019 school year, a statistically significant difference was revealed, $t(360) = 15.40$, $p < .001$. This difference was a large effect size, Cohen's d of 0.81 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately two and a half times higher than the percentage of White students. In the 2019-2020 school year, a statistically significant difference was yielded, $t(359) = 18.74$, $p < .001$. This difference was a large effect size, Cohen's d of 0.99 (Cohen, 1988). The percentage of Asian students who met criterion on Advanced Placement/International Baccalaureate examinations was almost three times higher than the percentage of White students. Descriptive statistics for these analyses are delineated in Table 3.

With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison between Black and Hispanic students in the 2016-2017 school year, a statistically significant difference was present, $t(639) = 20.88$, $p < .001$, large effect size, Cohen's d of 0.82 (Cohen, 1988). As presented in Table 4, the percentage of Hispanic students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately one and a half times higher than the percentage of Black students.

Table 4. Descriptive Statistics for the Percentages of Black and Hispanic Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Black	656	7.95	12.27
Hispanic	1,079	13.49	15.60
2017-2018			

Black	674	7.96	12.07
Hispanic	1,108	13.56	15.89
2018-2019			
Black	699	7.92	12.47
Hispanic	1,123	14.66	16.38
2019-2020			
Black	697	8.53	13.30
Hispanic	1,145	14.28	16.38

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $t(635) = 21.64$, $p < .001$. This difference was a large effect size, Cohen's d of 0.84 (Cohen, 1988). The percentage of Hispanic students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately one and a half times higher than the percentage of Black students. Regarding the 2018-2019 school year, a statistically significant difference was yielded, $t(687) = 23.27$, $p < .001$. This difference was a large effect size, Cohen's d of 0.89 (Cohen, 1988). The percentage of Hispanic students who met criterion on Advanced Placement/International Baccalaureate examinations was almost two times higher than the percentage of Black students. In the 2019-2020 school year, a statistically significant difference was present, $t(685) = 22.01$, $p < .001$. This difference was a large effect size, Cohen's d of 0.84 (Cohen, 1988). The percentage of Hispanic students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately one and a half times higher than the percentage of Black students. Descriptive statistics for these analyses are presented in Table 4.

With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison between Black and White students in the 2016-2017 school year, a statistically significant difference was revealed, $t(589) = 26.16$, $p < .001$. This difference was a large effect size, Cohen's d of 1.08 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately two times higher than the percentage of Black students as presented in Table 5.

Table 5. Descriptive Statistics for the Percentages of Black and White Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Black	656	7.95	12.27
White	962	16.31	17.71
2017-2018			
Black	674	7.96	12.07
White	987	16.48	18.09
2018-2019			
Black	699	7.92	12.47
White	992	17.19	18.81
2019-2020			
Black	697	8.53	13.30
White	1,001	16.40	18.28

Concerning the 2017-2018 school year, a statistically significant difference was yielded, $t(615) = 26.10$, $p < .001$. This difference was a large effect size, Cohen's d of 1.05 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately two times higher than the percentage of Black students. Regarding the 2018-2019 school year, a statistically significant difference was present, $t(631) = 25.92$, $p < .001$, large effect size, Cohen's d of 1.03 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was almost two times higher than the percentage of Black students. In the 2019-2020 school year,

a statistically significant difference was revealed, $t(631) = 25.51$, $p < .001$. This difference was a large effect size, Cohen's d of 1.02 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was almost two times higher than the percentage of Black students. Descriptive statistics for these analyses are revealed in Table 5.

With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison between Hispanic and White students in the 2016-2017 school year, a statistically significant difference was yielded, $t(910) = 13.17$, $p < .001$. This difference was a small effect size, Cohen's d of 0.44 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was almost three percentage points higher than the percentage of Hispanic students. Table 6 contains the descriptive statistics for this analysis.

Table 6. Descriptive Statistics for the Percentages of Hispanic and White Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Hispanic	1,079	13.49	15.60
White	962	16.31	17.71
2017-2018			
Hispanic	1,108	13.56	15.89
White	987	16.48	18.09
2018-2019			
Hispanic	1,123	14.66	16.38
White	992	17.19	18.81
2019-2020			
Hispanic	1,145	14.28	16.38
White	1,001	16.40	18.28

Concerning the 2017-2018 school year, a statistically significant difference was present, $t(945) = 13.03$, $p < .001$. This difference was a small effect size, Cohen's d of 0.42 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was almost three percentage points higher than the percentage of Hispanic students. Regarding the 2018-2019 school year, a statistically significant difference was revealed, $t(951) = 11.01$, $p < .001$. This difference was a small effect size, Cohen's d of 0.36 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately two and a half percentage points higher than the percentage of Hispanic students. In the 2019-2020 school year, a statistically significant difference was yielded, $t(966) = 10.44$, $p < .001$. This difference was a small effect size, Cohen's d of 0.34 (Cohen, 1988). The percentage of White students who met criterion on Advanced Placement/International Baccalaureate examinations was approximately two percentage points higher than the percentage of Hispanic students. Descriptive statistics for these analyses are presented in Table 6.

3.2 Results for Met Criterion Rates for Advanced Placement/International Baccalaureate Examinations by Economic Status for the 2016-2017 Through the 2019-2020 School Years

In this section, the results for the Advanced Placement/International Baccalaureate examination met criterion rates will be presented by school year and economic status. Findings will be discussed for students who were economically disadvantaged and for all students that met criterion on Advanced Placement/International Baccalaureate examinations. The Texas Academic Performance Reports do not provide a separate variable for students who were not economically disadvantaged. As such, the all student rate variable includes students in poverty. Therefore, any differences present in this study will constitute an underestimate of any real differences that are present regarding Advanced Placement/International Baccalaureate examination performance.

With respect to the Advanced Placement/International Baccalaureate examination met criterion rate comparison for students who were economically disadvantaged and all students for the 2016-2017 school year, a statistically significant difference was present, $t(1125) = 17.80$, $p < .001$. This difference represented a moderate effect size,

Cohen's *d* of 0.53 (Cohen, 1988). As delineated in Table 7, the percentage of all students who had met criterion on Advanced Placement/International Baccalaureate examinations was approximately three percentage points higher than the percentage of students who were economically disadvantaged.

Table 7. Descriptive Statistics for the Percentages of Students who Were Economically Disadvantaged and All Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations for the 2016-2017 Through the 2019-2020 School Years

School Year and Comparison	*n* of schools	*M%*	*SD%*
2016-2017			
Economically Disadvantaged	1,126	10.91	14.21
All Students	1,133	14.03	16.04
2017-2018			
Economically Disadvantaged	1,140	11.08	14.32
All Students	1,149	14.36	16.38
2018-2019			
Economically Disadvantaged	1,160	11.83	14.74
All Students	1,164	15.05	16.74
2019-2020			
Economically Disadvantaged	1,175	11.73	14.72
All Students	1,179	14.98	16.84

Concerning the 2017-2018 school year, a statistically significant difference was revealed, $t(1139) = 21.32$, $p < .001$. This difference represented a moderate effect size, Cohen's *d* of 0.63 (Cohen, 1988). The percentage of all students who had met criterion on Advanced Placement/International Baccalaureate examinations was approximately three percentage points higher than the percentage of students who were economically disadvantaged. Regarding the 2018-2019 school year, a statistically significant difference was yielded, $t(1159) = 17.86$, $p < .001$. This difference represented a moderate effect size, Cohen's *d* of 0.52 (Cohen, 1988). The percentage of all students who had met criterion on Advanced Placement/International Baccalaureate examinations was approximately three percentage points higher than the percentage of students who were economically disadvantaged.

In the 2019-2020 school year, a statistically significant difference was present, $t(1174) = 17.88$, $p < .001$. This difference represented a moderate effect size, Cohen's *d* of 0.52 (Cohen, 1988). The percentage of all students who had met criterion on Advanced Placement/International Baccalaureate examination was approximately three percentage points higher than the percentage of students who were economically disadvantaged. Descriptive statistics for these analyses are delineated in Table 7.

4. Discussion

In this multiyear, statewide investigation, the extent to which differences were present in the percentages of students who met criterion on Advanced Placement/International Baccalaureate examinations as a function of their ethnicity/race and economic status was addressed for the 2016-2017, 2017-2018, 2018-2019, and 2019-2020 school years. The Advanced Placement/International Baccalaureate variables were introduced in the 2016-2017 school year in the Texas Academic Performance Reports as the new College, Career, and Military Ready indicators due to the recent changes in the State of Texas Accountability. In previous years, the Advanced Placement/International Baccalaureate variables only included an all subjects indicator and core subject indicators (i.e., English Language Arts, mathematics, science and social studies). These variables represented the percentages for participation and for met criterion rates on any Advanced Placement/International Baccalaureate examinations. Thus, the results from this study contained the only four years of data available for these new Advanced Placement/International Baccalaureate variables connected with college readiness standards for the State of Texas.

With respect to all four school years, Black students had the lowest percentage of any ethnic/racial group who met criterion on Advanced Placement/International Baccalaureate examinations. These statistics are depicted in Figure 1. Asian students had the highest percentages of any ethnic/racial group who met criterion on Advanced Placement/International Baccalaureate examinations. For all four years, the percentages of Asian students who

met criterion on Advanced Placement/International Baccalaureate examinations were almost six times higher than the percentages of Black students and over three times higher than the percentages of Hispanic and White students. Regarding Hispanic and White students who had met criterion on the Advanced Placement/International Baccalaureate examinations, these two groups of students had the closest average percentages across all four years and for each year, they had a difference of less than three percentage points.

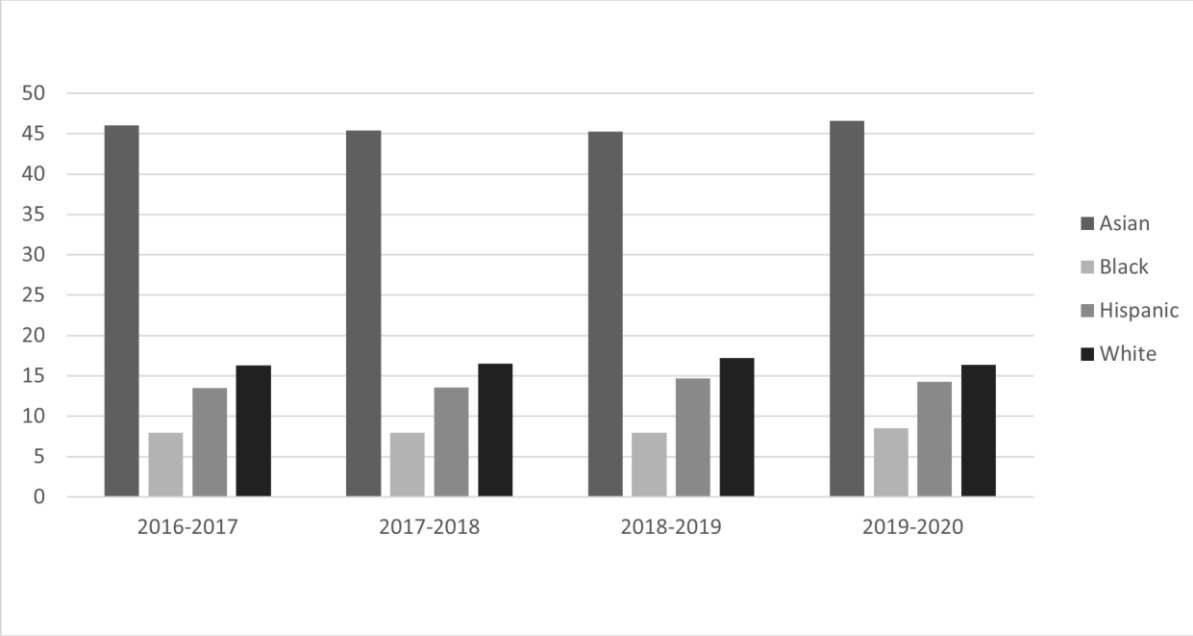

Figure 1. Mean Percentages of Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations by Ethnicity/race

Note: Asian students, Black students, Hispanic students, and White students for the 2016-2017 through the 2019-2020 school years.

For all four school years, the percentages of students who had met criterion on Advanced Placement/International Baccalaureate examinations across the four ethnic/racial groups were very consistent. The percentage of Asian students who had met criterion on Advanced Placement/International examinations had the largest change in percentages across all four years, which was 1.32 percentage points between the highest percentage and the lowest percentage. The percentage of Black students who had met criterion on Advanced Placement/International Baccalaureate examinations had the smallest change in percentages across all four years, which was 0.88 percentage points between the highest percentage and the lowest percentage.

With respect to all four school years, statistically significant differences were yielded in the met criterion comparison rates for Advanced Placement/International Baccalaureate examinations by student economic status. Students who were economically disadvantaged had lower percentages who met criterion on Advanced Placement/International Baccalaureate examinations than their peers. Shown in Figure 2 are the statistics for these analyses. All students had higher percentages for met criterion on Advanced Placement/International Baccalaureate examinations, over three percentage points higher, than students who were economically disadvantaged. Lastly, the percentages for students who were economically disadvantaged and for all students remained consistent across all four years and showed little variation over the four-year time span.

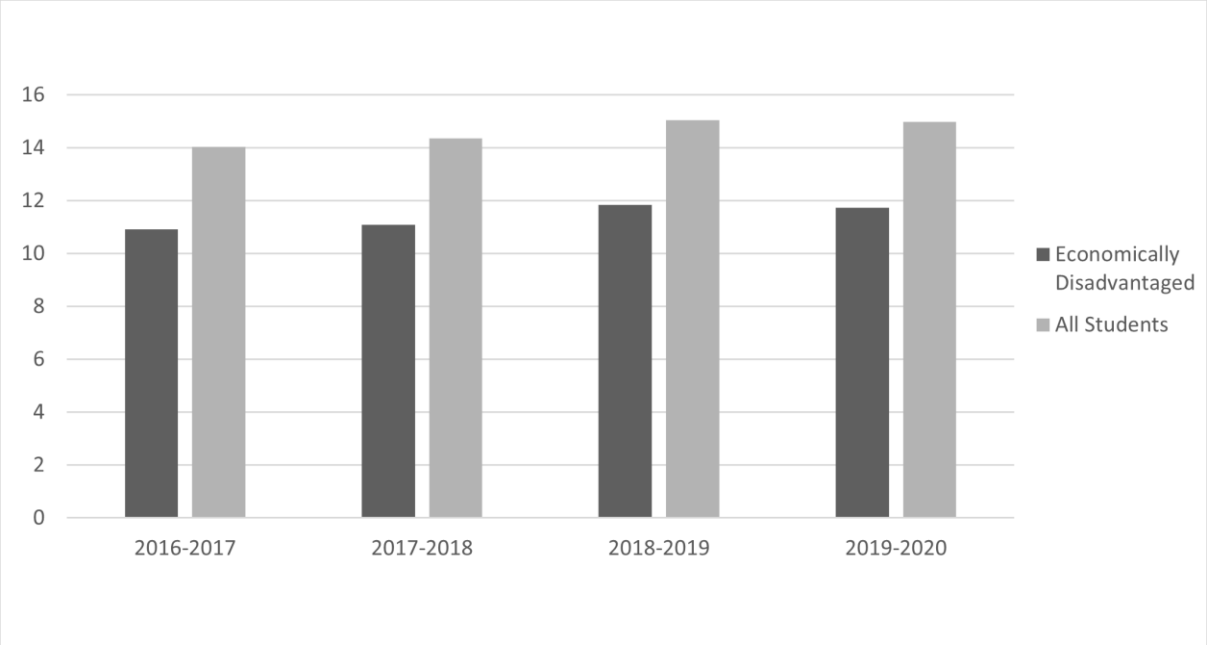

Figure 2. Mean percentages of Students who Met Criterion on Advanced Placement/International Baccalaureate Examinations by Economic Status

Note: All students and students who were economically disadvantaged for the 2016-2017 through the 2019-2020 school years.

4.1 Connections with Existing Literature

Regarding students who met criterion on Advanced Placement examinations, many positive benefits exist such as higher first-year GPAs in college, higher degree attainment, and higher rates of college graduation in five years or less (Morgan et al., 2007). Of note is that over the past several years, the number of students taking Advanced Placement examinations rose from 1,003,430 in 2013 to 2,642,530 in 2017, and the number of Advanced Placement examinations has increased from 3,153,014 in 2013 to 4,751,957 in 2020 (College Board, 2020). Although the numbers of students and of examinations for Advanced Placement are rising, the percentages of students who had met criterion on Advanced Placement/International Baccalaureate examinations have remained almost stagnant for all groups of students across all four years of this multiyear, statewide study.

With respect to the 2016-2017 through the 2019-2020 school years, Asian students had the highest percentages of students who met criterion on Advanced Placement/International Baccalaureate examinations. These results are congruent with the findings of other researchers (Moore et al., 2010; Shaw et al., 2013). Black students had the lowest percentages of students who met criterion on Advanced Placement/International Baccalaureate examinations across all four years. These findings are also commensurate with the results of previous researchers (Clark et al., 2012; Kettler & Hurst, 2017; Moore & Slate, 2008; Shaw et al., 2013). The percentages of Hispanic and White students who had met criterion on Advanced Placement/International Baccalaureate were closer than the percentages for Hispanic and Black students. Therefore, the gap in percentages between Hispanic and White students was smaller than the gap in percentages between Hispanic and Black students. These findings are consistent with the results from other researchers (Kettler & Hurst, 2017).

4.2 Implications for Policy and for Practice

Based on the findings of this multiyear, statewide study, several implications for policy and practice can be suggested. Regarding implications for policy, high school principals and district-level administrators need to address the continuing equity gaps for the met criterion rates on Advanced Placement/International Baccalaureate examinations by student ethnicity/race and economic status. Within this study, Asian student percentages for met criterion rates on Advanced Placement/International examinations were far above the percentages of Black, Hispanic, and White students. To address this continuing disparity, high school principals and school leaders must improve current Advanced Placement/International Baccalaureate policies to support an increased need for diversity in the Advanced Placement/International Baccalaureate courses on high school campuses. Second, state legislators, high school campus administrations and district-level administrators need to mitigate any barriers such as cost of examinations or accessibility due to lack of qualified teachers that would keep students from enrolling in Advanced Placement/International Baccalaureate courses and taking Advanced

Placement/International Baccalaureate examinations.

With respect to implications for practice, administrators must strengthen the rigor of the preparatory levels of curriculum within their buildings to prepare and to support their students for Advanced Placement/International Baccalaureate courses and examinations. Further, teachers need to participate in targeted professional development in Advanced Placement/International Baccalaureate course content and instructional differentiation to assist them with the delivery of college-level curriculum to a diverse group of learners. Further, once students are enrolled in Advanced Placement/International Baccalaureate courses, administrators and teachers must maintain accessibility of rigorous study materials for all students who might not have access to costly supplemental Advanced Placement/International Baccalaureate study aides and/or preparatory courses.

4.3 Recommendations for Future Research

Based on the findings of this multiyear, statewide study, several recommendations can be made for future research. First, this study was restricted to only students in the State of Texas and researchers are recommended to expand this study to other states to ascertain the degree to which the results might be generalizable. Second, the variables within this study were initiated in the 2016-2017 school year due to recent state accountability changes related to the College, Career, and Military Ready standards within the State of Texas. Researchers are encouraged to replicate this study to include future years in this analysis, which could potentially include the years immediately following the worldwide COVID pandemic in the spring of 2020. Third, the only demographic variables that were used in this study were associated with ethnicity/race and economic status. Future researchers are recommended to include in their study other demographic groups such as English Learners, students enrolled in special education, and students in Section 504. Fourth, with the new focus on College, Career, and Military Ready standards within the State of Texas, researchers might expand their study to include other variables such as completion of an On Ramps course or completion of an Industry Based Certification as well as met criterion scores for ACT, SAT, and the TSIA examinations.

5. Conclusion

The purpose of this article was to determine the degree to which differences were present in the percentages of students who had met criterion on Advanced Placement/International Baccalaureate examinations as a function of their ethnicity/race and economic status. For the 2016-2017 through the 2019-2020 school years, statistically significant differences were revealed. Black students had the lowest percentages of students who had met criterion on Advanced Placement/International Baccalaureate examinations whereas Asian students had the highest percentages of students who had met criterion on Advanced Placement/International Baccalaureate examinations. Asian students who had met criterion on Advanced Placement/International Baccalaureate examinations were over three times higher than the percentages for Hispanic and White students. Students who were economically disadvantaged had lower percentages of met criterion on Advanced Placement/International Baccalaureate examinations than their peers. When observing the trends across all four years of this study, equity gaps still persist across ethnic/racial and economically disadvantaged groups.

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