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DIFFERENCES IN COLLEGE READINESS FOR ASIAN BOYS AND GIRLS IN TEXAS HIGH SCHOOLS

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ABSTRACT

The extent to which differences might be present in the reading and mathematics college readiness rates of Asian boys and girls in the state of Texas for the 2009-2010 school year were analyzed. Individual statewide data on Asian students (n = 12,536) who were enrolled in traditionally configured high schools for the 2009-2010 school year were obtained and analyzed for gender and for economic differences. Statistically significant differences were present between Asian boys and girls in their college readiness in reading and mathematics, with Asian girls performing better in reading and Asian boys performing better in mathematics. Both Asian boys and girls who were economically disadvantaged had statistically significantly lower college readiness rates in both reading and mathematics than their more advantaged counterparts. Implications of these findings are provided.

INTRODUCTION

Pugh, Pawan, and Antommarchi (2000) stated,

> It is a truism to say that the 21st century is bringing more to read, more ways to read it, and more reasons to be an effective reader than ever before…In short, reading is the platform for which critical thinking, problem solving, and effective expression are launched. (p. 25)

In a similar vein, Kirsch, Braun, Yamamoto, and Sum (2007) reported that many United States youth are not sufficiently prepared in literature or in numeracy skills to participate fully in the nation's competitive workforce. Further, Davies (2006) proclaimed that achievement in education within the United States has declined over the past 20 years. Younger adults (i.e., ages 25 to 34) have lower educational attainment levels compared to older adults (i.e., 35 to 64), and the United States ranked 16th out of 27 countries on the proportion of students who completed degree programs or college certificates (Davies, 2006).

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According to Dohm and Shniper (2007), occupations that require a bachelor's degree are expected to increase 15.3% between 2006 and 2016. Furthermore, 73% of the fastest growing career options for the same timeframe will involve some form of higher education (Dohm & Shniper, 2007). For all ethnic groups in 2012, the U.S. Census Bureau reported that the average financial earnings for male high school graduates were $35,468 compared to $69,479 for males with a bachelor's degree. The average financial earnings for females were $24,304 for high school graduates and $43,589 for females with a bachelor's degree. As depicted, financial earnings are related to higher education.

In the last two decades college readiness has captured the interest of researchers (e.g., Barnes & Slate, 2010, 2011, 2013; Barnes, Slate, & Rojas-LeBouef, 2010; Conley, 2011) and remains a top priority for the U.S. Department of Education (Castro, 2013). As a result, a leading expert in college readiness, Conley (2007) defined college readiness as "the level of preparation a student needs to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program" (p. 5). Further, the American College Testing (ACT) similarly defined college readiness as, "the level of preparation a student needs to be ready to enroll and succeed without remediation—in a credit-bearing course at a two-year institution, trade school, or technical school…we have evidence that college readiness also means workforce readiness" (2007, p. 5).

Nationally, only 22% of all students taking the ACT were considered college ready in all four subjects. Of the 22% of students who were college ready, more males were prepared for higher education than females (ACT, 2008). In a similar report, the ACT (2009) stated that only 22% of all students in Texas were college ready in all four subjects. Furthermore, the ACT (2009) reported that 66% and 76% of Asian boys and girls were college ready in reading and mathematics.

In Texas, the Texas Higher Education Coordinating Board (THECB) in conjunction with the Texas Education Agency (TEA) established college readiness standards with the Higher Education Readiness Component (HERC) for the Texas Assessment of Knowledge and Skills (TAKS). The standard was set with a scale score of 2200 for English Language Arts (ELA) and Mathematics, with a minimum score of three on the ELA composition assessment (Pearson Educational Measurement, 2006). The THECB and the TEA positioned that a score of 2200 on the TAKS exam for ELA and Mathematics was a similar measure to college readiness benchmarks for the ACT or SAT. Key college ready indicators for the TAKS, ACT, and SAT, are delineated in Table 1.

For purposes of this particular investigation, students deemed to be college ready will have met the HERC standard in reading and in mathematics.

Table 1. Texas College-Readiness Scale Scores Congruent to SAT and ACT College Ready Benchmarks

Subject	College-Readiness TAKS Score	SAT	ACT
ELA	≥ 2200 scale score and ≥ 3 essay	≥ 500 on critical reading and ≥ 1070 total	≥ 19 on English and ≥23 composite
Mathematics	≥ 2200 scale score	≥ 500 on mathematics and ≥ 1070 total	≥ 19 on Mathematics and ≥23 composite

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Texas is one of 16 rapidly growing states with a smaller proportion of young adults who have completed an associate degree or higher, compared to older adults (Davies, 2006). In lieu of the aforementioned data reported by Davis (2006), the THECB (2009) revised the Texas Higher Education Core Curriculum to prepare students for the global culture of the new century. The core curriculum requires intellectual competencies in critical thinking, reading, and writing. Critical thinking skills are mandated in all component areas, accompanied by empirical and quantitative skills required in three of the nine component areas. Thus, high school students must prepare early for the rigors of higher education and demands of the workplace.

In the state of Texas, Combs et al. (2010) conducted a study to determine whether gender differences were present in college readiness for Texas students. Combs et al. (2010) determined that 51.01% of girls were college ready in reading compared to 38.76% for boys, a statistically significant difference of 12.25%, moderate effect size. Furthermore, Combs et al. (2010) established that 52.57% of boys were college ready in mathematics compared to 44.12% for girls, a statistically significant difference of 8.45%, moderate effect size. The results of Combs et al. (2010) are congruent with previous researchers (e.g., Halpern & Wright, 1996; Olszweski-Kubilius & Turner, 2002) in that gender disparities exist between reading and mathematics for girls and boys.

In a similar study to Combs et al. (2010), Moore, Joyner, Martinez-Garcia, and Slate (2011) investigated differences in Texas college-ready graduates between Asian students and White students. Archival data were again downloaded from the TEA Academic Excellence Indicator System (AEIS) website. Data were disaggregated by ethnicity; yet still aggregated by school campus. In their study, Asian students had statistically significantly higher mathematics college readiness skills than White students for three consecutive years (i.e., 2006 to 2008). Furthermore, a statistically significant difference was present in reading college-readiness rates between Asian students and White students for the 2007-2008 and 2008-2009 school years. Moore et al. (2011) positioned that this study could serve as a baseline for future studies in which Asian college readiness was analyzed. The authors also suggested the need for further research in which the college readiness rates of other ethnic groups were examined.

Barnes and Slate (2011) also investigated college readiness rates for the State of Texas to determine if college readiness rates for reading, mathematics, and both subjects had narrowed, widened, or remained stable among three ethnic groups (i.e., Black, Hispanic, and White) from the 2006 through the 2008 school year. Aggregated AEIS data were downloaded from the TEA for traditional public high schools in Texas. Barnes and Slate (2011) documented that only 39% of students satisfied the TEA college readiness indicators, which was an improvement of 8% from 2006 to 2008; yet, the authors also observed the "stair step of academic achievement" (p. 17) congruent with Carpenter, Ramirez, and Severn (2006) in that White students performed higher than Hispanic students who performed higher than Black students in mathematics. College readiness disparities between ethnic groups continue to persist. Barnes and Slate (2011) supported the position of previous researchers (e.g., Balfanz, 2009) in that students who were economically advantaged had higher test scores than students who were economically disadvantaged. Barnes and Slate (2011) suggested that future research in college readiness should be conducted using student level data.

Much attention has been directed toward improving the college readiness skills for all students. In this literature review all data to date have been analyzed at the high school

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campus or at the school district level. No empirical investigations were located in which college readiness as a function of ethnicity and gender, using data at the student level, were analyzed.

Significance of the Study

College readiness has been associated with entry-level success in credit bearing courses in higher education (Pearson Educational Measurement, 2006). Furthermore, educational attainment has been shown to influence financial earnings. A paucity of research exists in the literature for college readiness and Asian students. No investigations were located in which individual student data were analyzed to determine any differences between Asian boys and girls related to college readiness. Knowing if Asian boys and girls differ will provide knowledge to reduce gender gaps and improve student preparation for higher education.

Purpose Statement

The purpose of this investigation was to examine the college readiness rates of Asian boys and girls at the individual level in the state of Texas. Gender differences in reading and mathematics were investigated using individual student data scores. A second purpose was to investigate differences in individual college ready rates for Asian boys and girls as a function of their economic status.

Research Questions

The following research questions guided the investigation of this study: (a) What are the college-ready rates in reading for Asian boys and girls in Texas high schools?; (b) What are the college-ready rates in mathematics for Asian boys and girls in Texas high schools?; (c) What is the difference in reading college-ready rates between Asian boys and girls in Texas high schools?; (d) What is the difference in mathematics college-ready rates between Asian boys and girls in Texas high schools?; (e) What is the difference in reading and mathematics college readiness rates for Asian boys as a function of their economic status?; and (f) What is the difference in reading and mathematics college readiness rates for Asian girls as a function of their economic status?

METHOD

Participants

Data from public high schools in the state of Texas for the 2009-2010 school year were utilized in this study. Public Education Information Management System (PEIMS) data were obtained from the TEA through a Public Information Request form. Student data from charter schools and any other non-traditional high school campus were eliminated from this analysis.

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Data were disaggregated for ethnicity to include only Asian students (n = 12,536) in this study. Cases with missing data were removed from the analysis (42.5%) and resulted in Asian boys (n = 3,640) and Asian girls (n = 3,563) for reading, and Asian boys (n = 3,653) and Asian girls (n = 3,555) for mathematics, which were then disaggregated for economic status. Asian boys who were economically disadvantaged constituted a sample size of 683 for reading and a sample size of 687 for mathematics. The sample size for Asian girls who were economically disadvantaged was 705 for reading and 700 for mathematics.

Instrumentation and Procedures

In 2006 Texas legislators passed a statute mandating all Texas high schools and school districts to report on the following six indicators of college readiness: (a) Advanced Placement exam scores; (b) dual credit course reenrollment; (c) SAT critical reading and mathematics scores; (d) ACT English and mathematics scores; (e) TAKS ELA and mathematics results; (f) advanced coursework in science, mathematics, and foreign languages; (g) scores from state college-readiness assessments; and (h) percentage of college-ready graduates in each high school and district as determined by the first four indicators (TEA, 2009). Further, PEIMS data are reported to the TEA four times each year as required by Texas Education Code (TEC) §42.006. Specific variables on which the TEA was asked to provide information through use of the PEIMS were ethnicity, gender, economic status, college readiness in reading, and college readiness in mathematics.

RESULTS

To determine the relationship between Asian boys and girls and college readiness rates in reading and mathematics, and the relationship between Asian boys' and girls' college readiness rates in reading and mathematics as a function of economic status, a Pearson chi-square was conducted. This statistical analysis was the ideal statistical procedure because categorical data were present for gender, college readiness rates (i.e., Yes/No), and economic status (Field, 2009). Chi-squares are the statistical procedure of choice when independent variables are categorical. Furthermore, the sample size was large and the available sample size per cell was greater than five. The assumptions for the chi-square procedure were met.

Table 2. Percent and frequencies of asian boys and girls who met college readiness rates for reading and mathematics

	Reading		Mathematics	
Gender	%age	*n*	%age	*n*
Boys	76.0%	3,640	91.0%	3,653
Girls	83.6%	3,563	89.5%	3,555

The first research question in which the focus was on Asian boys' and girls' college readiness rates in reading, revealed that 76.0% of boys and 83.6% of girls were college ready in reading, as depicted in Table 2. A statistically significant difference in reading college

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readiness rates, asked in the third research question, was present between Asian boys and girls, $\chi^2(1) = 64.33$, $p < .001$, Cramer's V of .10, small (Cohen, 1988). College readiness reading rates were 7.6% higher for Asian girls than for Asian boys.

The second research question in which the emphasis was on the college readiness rates in mathematics of Asian boys and girls revealed that 91.0% of boys and 89.5% of girls were college ready in mathematics, as reported in Table 2. With respect to the fourth research question regarding differences in college readiness rates, a statistically significant difference was observed, $\chi^2(1) = 4.52$, $p = .03$, Cramer's $V = .02$, trivial effect size (Cohen, 1988). Asian boys had college readiness mathematics rates that were 1.5% higher than the mathematics college readiness rates of Asian girls.

Next, the percentage of Asian boys who were economically advantaged and who met the college-readiness reading standard was 80.4% compared to only 57.0% of Asian boys who were economically disadvantaged and who met the college-readiness reading standard. This difference, addressed in the fifth research question, was statistically significant, $\chi^2(1) = 167.56$, $p < .001$, Cramer's $V = .22$, moderate effect size (Cohen, 1988). Asian boys who were economically advantaged had a 23.4% higher college readiness rate in reading compared to Asian boys who were economically disadvantaged. With respect to mathematics college readiness rates, the percentage of Asian boys who were economically advantaged and who met the college-readiness mathematics standard was 94.1%, compared to 77.6% for Asian boys who were economically disadvantaged and who met the college-readiness mathematics standard. Regarding this difference, also addressed in the fifth research question, a statistically significant difference was present, $\chi^2(1) = 184.40$, $p < .001$, Cramer's $V = .22$, moderate effect size (Cohen, 1988). The percentage of Asian boys who were economically disadvantaged and who were college ready in mathematics was 16.5% higher than the percentage of Asian boys who were economically disadvantaged and college ready in mathematics. These percentages are delineated are reported in Table 3.

Table 3. Percent and frequencies of asian boys and girls who met college readiness rates for reading and mathematics as a function of economic status

	Reading		Mathematics	
Gender and Economic Status	%age	*n*	%age	*n*
Boys				
Advantaged	80.4%	2,957	94.1%	2,966
Disadvantaged	57.0%	683	77.6%	687
Girls				
Advantaged	87.9%	2,858	91.9%	2,855
Disadvantaged	66.2%	705	79.7%	700

Finally, the percentage of Asian girls who were economically advantaged and who met the college-readiness reading standard was 87.9% compared to only 66.2% of Asian girls who were economically disadvantaged and who met the college-readiness reading standard. A statistically significant difference was present, $\chi^2(1) = 193.46$, $p < .001$, Cramer's $V = .23$, moderate effect size (Cohen, 1988). The percentage of Asian girls who were economically advantaged and who were college ready in reading was 21.7% higher than for Asian girls who were economically disadvantaged and who were college ready in reading. The percentage of

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Asian girls who were economically advantaged and who met the college-readiness mathematics standard was 91.9%, compared to 79.7% for Asian girls who were economically disadvantaged and who met the college-readiness mathematics standard. A statistically significant difference was present, $\chi^2(1) = 88.30$, $p < .001$, Cramer's $V = .16$, small effect size (Cohen, 1988). The percentage of Asian girls who were economically advantaged and who were college ready in mathematics was 12.2% higher than for Asian girls who were economically disadvantaged and college ready in mathematics. These percentages are revealed in Table 3.

DISCUSSION

For this research study, college readiness rates at the individual level for Asian boys and girls in reading and mathematics were analyzed using PEIMS data from the TEA for the 2009-2010 academic school year. College readiness rates were also analyzed at the individual level for Asian boys and girls as a function of economic status. Asian boys had higher college readiness rates in mathematics than Asian girls; however, Asian girls had higher reading college readiness rates than Asian boys. Asian boys and girls who were economically advantaged had much higher college readiness rates in both reading and mathematics than Asian boys and girls who were economically disadvantaged. Readers should note, however, that we were not able to disaggregate by various cultures that might be considered Asian. As such, the extent to which our findings are generalizable to any specific Asian group is not known.

The results of this study exceed the college readiness rate reported by the ACT (2009) for Texas. In this study Texas Asian boys (76%) and girls (83.6%) exceeded the Texas ACT (2009) report for college readiness in reading for all Asian students (66%). Similar findings were also present for mathematics. The college readiness rates of Asian boys (91%) and Asian girls (89.5%) were higher than the Texas ACT (2009) mathematics report (76%) for all Asian students.

The findings of this study are congruent with the conclusions of Combs et al. (2010) in that disparities existed in college readiness rates in reading and mathematics between boys and girls. Combs et al. (2010) reported a 12.25% difference between girls and boys in their reading college readiness compared to a 7.6% difference for Asian girls and boys in this study. Also, Combs et al. (2010) documented an 8.45% difference between boys and girls in mathematics college readiness compared to a 1.5% difference for Asian boys and girls in this study. One possible explanation for this difference in percentages is the use of aggregated school campus data, as was present in the Combs et al. (2010) investigation. The TEA masks data in cases where 100% of the students from an ethnic group pass an exam or where fewer than 30 students from an ethnic group are present in a school. In schools where 100% of Asian students met the college readiness standard, the TEA could not have reported those data because doing so would have been a violation of the Family Educational Rights and Privacy Act. In the case of this research investigation, the individual student data that were provided by the TEA were themselves masked so that the individual student could not be identified. As such, findings from this investigation are more accurate and precise than is possible with aggregated school campus data. Further investigation of ethnic college readiness rates at the individual level for boys and girls is warranted.

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The outcomes of this study are also congruent with findings of Barnes and Slate (2011) and Balfanz (2009) because Asian boys and girls who were economically advantaged had higher pass rates than Asian boys and girls who were economically disadvantaged. Asian students are high achievers when compared to other ethnicities (Moore et al., 2011). However, often stereotypical views may accompany Asian students' high academic achievement (Moore et al., 2011). The Model Minority is an example of this stereotypical view (Lee, 1996). Although Asian boys and girls may achieve higher pass rates, economic disadvantage is a limitation to college readiness rates for Asian boys and girls, and school leaders and teachers are advised to keep this fact in mind when working with Asian boys and girls.

Legislative and school administrative personnel, responsible for policy that may impact economically disadvantaged minority students in Texas, should consider the findings of this study. Economic disadvantage for Asian students persists as shown in this study, and is a contributor to Texas Asian students under preparation for college. Students who are not college ready are required to take remedial courses, which may thwart degree completion (Bettinger & Long, 2004). In turn, limited opportunities may exit for employment with financial stability.

Key personnel for policy at the state, college, and school level are also encouraged to consider the position of Barnes and Slate (2013) in that standardized and homogenous curriculum with stringent accountability measures have not reduced the achievement gap or improved college readiness. As depicted in this study, college readiness for Asian boys and girls is still an issue, with economic status contributing to the setback. Barnes and Slate (2013) recommended offering clearly defined and well developed career paths interconnected with college and university majors. Career paths would allow students options that harness their talents and potentially improve student persistence by reducing pitfalls that prevent high school or college completion (Barnes & Slate, 2013). Further investigations of college readiness at the individual level for other ethnicities are needed. Investigation of economic status on college ready rates for all ethnicities is also warranted.

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