Postsecondary Access, Persistence, and Completion of Houston-Area Youth

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Chapter One

Introduction

"America's global rank in college completion among young adults is slipping…The United States has fallen from 12th [in 2009] to 16th [in 2011] in the share of adults' age 25 to 34 holding degrees."

The above quotation (de Vise, 2011, p. 1) highlights what many educational observers fear is occurring in the context of the ever-strengthening forces of globalization; the United States is losing ground in the global knowledge economy race. This is particularly concerning given the fact that the majority of new jobs being added to the US economy require some type of postsecondary education (Carnevale, Smith, & Strohl, 2010). The problem is not that lower percentages of today's high school graduates go on to complete some type of postsecondary degree than their peers from the past. In fact, since 1998 the postsecondary attainment rate for American youth has increased by approximately 7% (de Vise, 2011). The problem is that the gains in postsecondary attainment for other nations have increased at a significantly faster rate than those in the US.

Given these trends and the rapidly changing nature of the global economy, there is growing consensus among policymakers, the business community, and educational leaders that postsecondary entrance and completion is the key to future economic and societal prosperity in the United States. As a result, the nation is seeing an increased focus on adequately preparing high school graduates to be successful in postsecondary education, whether it is a technical certificate or a 2- or 4-year college degree.

The State of Texas has recently implemented several initiatives designed to strengthen the college readiness of its high school graduates and increase the number of postsecondary degrees awarded in the state. In October of 2000, the Texas Higher Education Coordinating Board (THECB) published a report arguing that stagnant college attendance and completion rates would soon produce an under-educated workforce unable to support a growing state economy. The THECB thus adopted an ambitious plan called *Closing the Gaps*. By the 2015 deadline, the initiative proposes to expand postsecondary enrollment in Texas by 630,000, increase the number of postsecondary degrees awarded by 210,000, and significantly reduce the racial disparities in these outcomes.

Moreover, in 2006 the Texas P-16 Council recommended a college success and readiness plan to the commissioners of the Texas Education Agency (TEA) and the THECB. The P-16 College and Career Readiness and Success (CCRS) plan, as it is called, seeks to ensure that all students, upon high school graduation, have the skills necessary to succeed in a postsecondary institution (TEA P-16 Council, 2006). In the same year, in response to an executive order from Governor Perry, the TEA implemented a college readiness indicator system designed to evaluate the college readiness of Texas high school graduates (TEA, 2006). Innovations under the CCRS plan are large in scope; they cover teacher preparation, student achievement, college preparedness, and community college transition among other reforms.

In total, the goals set by Texas' *Closing the Gaps* and implemented under various CCRS programming represent a huge step in ensuring an adequately educated Texas workforce in the future. The goals of these reforms hold the potential to ensure the continued growth of the Texas economy through maintaining a supply of highly qualified workers capable of meeting the demands of the 21st Century labor market. Indeed, in a recent study estimating the potential economic benefits *Closing the Gaps* reforms could have on the state, the Perryman Group concluded that the economic gains associated with a more educated work force amount to $200 billion per year in incremental gross product and more than 1 million additional jobs (Perryman Group, 2007).

Outline of Current Study

In light of the increasing importance of postsecondary education and the significant steps being taken at the policy level to strengthen the college and career readiness of public high school graduates, the Houston Endowment INC, a philanthropic organization serving the greater Houston area, commissioned The University of Texas at Austin Education Research Center (TERC) to conduct a longitudinal study of the postsecondary outcomes of state and Houston area public school students.

The primary purpose of the current report is to investigate the relationship between the district that a student attends during high school and his or her chances of gaining access to, persisting through, and earning a degree or certificate from a postsecondary institution. The report will focus primarily on students from Houston Independent School District (HISD) but will also analyze the performance of a number of other districts in Region IV (the educational region in which HISD is located), Region IV as a whole, and the state. To better isolate the influence of districts on postsecondary outcomes we will also control for a number of student-level variables, from demographic characteristics to academic aptitudes.

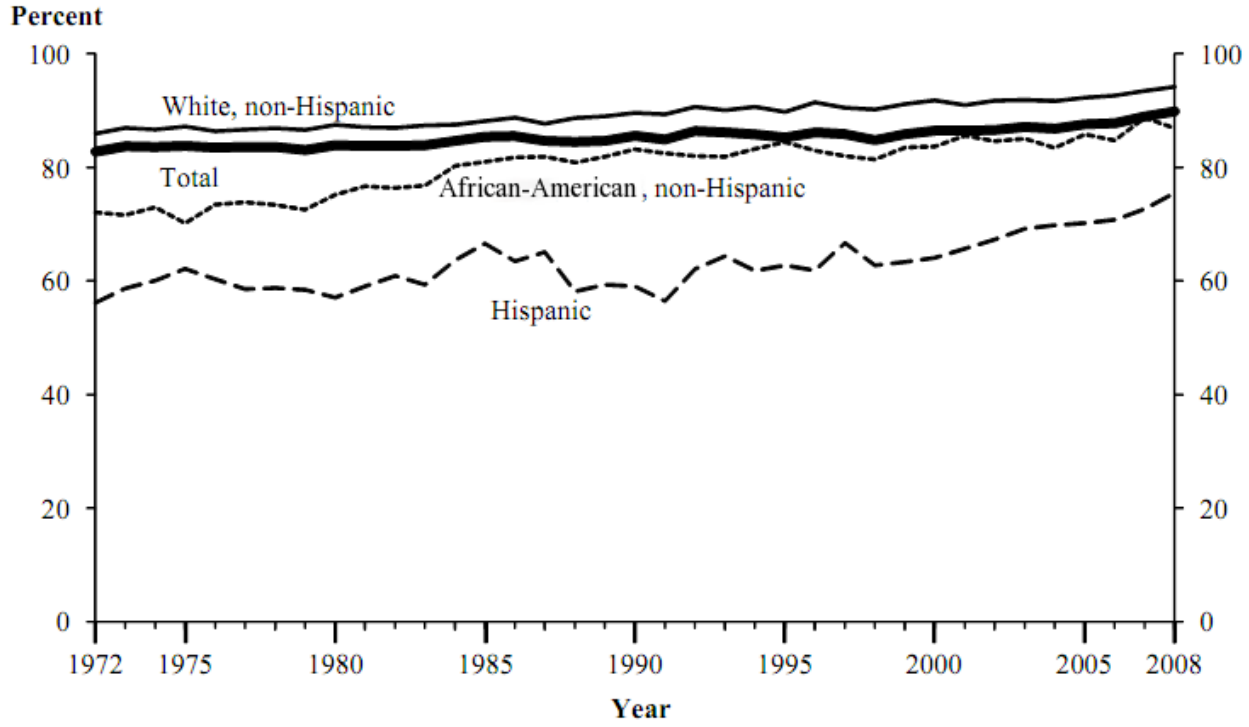
The outline of the report is as follows. We will first briefly review some of the trends related to postsecondary transition and success, both at the national level and for Texas. We will then review the literature on predictors of postsecondary outcomes. Next, we will analyze four stages of educational progress for the cohorts in our study: high school persistence and completion, postsecondary access, postsecondary persistence, and postsecondary completion. We will conclude by highlighting common themes and findings across the analyses, discussing the implications of the results, and identifying some of the primary limitations of the study.

Chapter Two

Trends in High School Persistence and Completion

At the national level, much attention has been paid to the issues of high school persistence and completion and how these rates have changed over time. Figure 1 below presents the status completion rates[1] for different racial/ethnic subgroups from 1972 to 2008 (NCES, 2010, p. 25). On a positive note, this figure shows that there has been an improvement in the percentage of students that hold a high school diploma or equivalent for every racial subgroup over the past three and a half decades. While only slightly more than 80% of 18- to 24-year-olds held a high school diploma or equivalent in 1972, by 2008 about 90% of students held such a credential. Additionally, the gap in high school completion rates between African-American and Hispanic students on the one hand and white students on the other has closed over time. However, significant gaps still exist between different racial subgroups. Hispanics were the least likely to hold a diploma or equivalent in 2008 with a rate of about 75.5%, still approximately 20% lower than whites and Asians.

Figure 1: National Status Completion Rates by Race/Ethnicity, 1972-2008



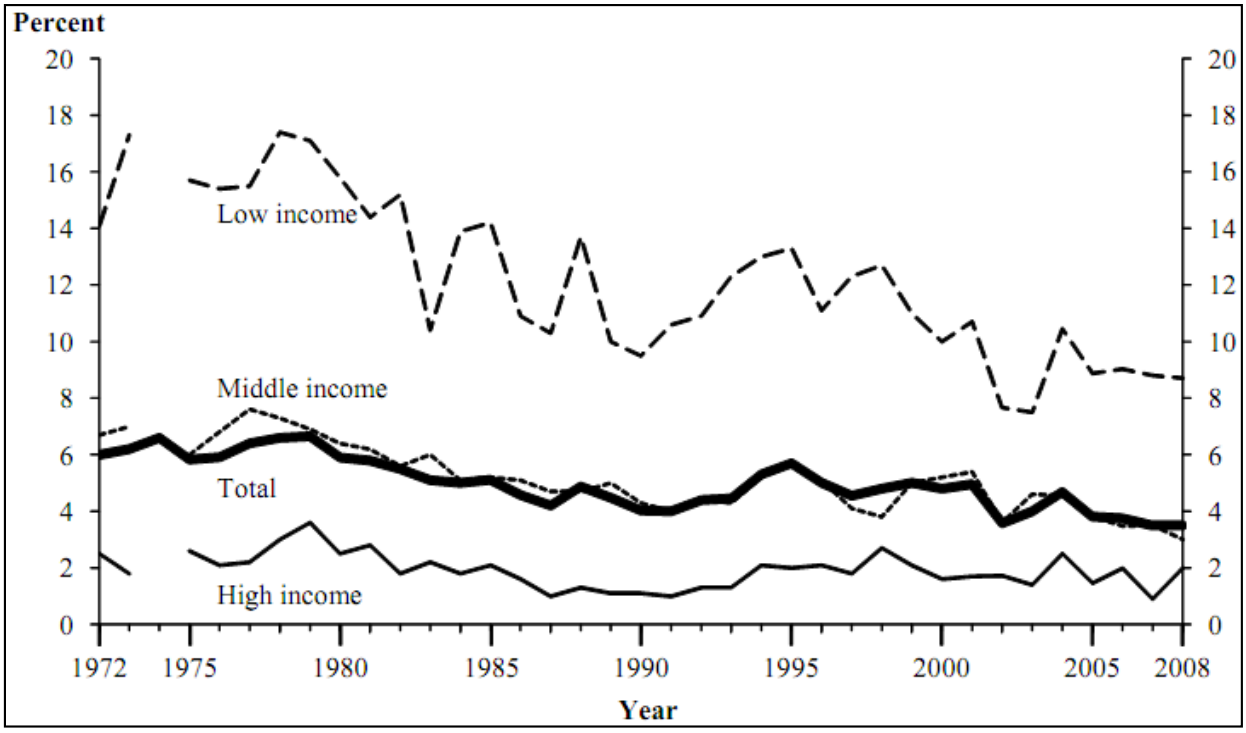
Similar trends are evident when students are disaggregated by their families' level of income. Figure 2 below presents the trends in event dropout rates[2] for students of different income levels

[1] The NCES defines status completion rates as "the percentage of 18- through 24-year-olds who are not enrolled in high school and who also hold a high school diploma or equivalent credential, such as a General Educational Development (GED) certificate" (NCES, 2010, p. 25).

[2] The NCES defines event dropout rates as "the percentage of youth ages 15 through 24 who dropped out of grades 10-12 between one October and the next. Dropping out is defined as leaving school without a high school diploma or equivalent credential" (NCES, 2010, p. 22).

from 1972-2008 (NCES, 2010, p. 22). Once again, it is promising that dropout rates have declined for all students overall and for every income subgroup over the past thirty-six years. Also promising is the decrease in the dropout rate of low-income students over this time period of more than five percentage points, the largest decrease out of the three income groups. However, even with this improvement in the dropout rate for low-income students, a significant disparity exists between these students and their more affluent peers. Only 2% of high-income students drop out each year as of 2008, whereas low-income students are four times more likely to drop out at over 8. Additionally, when the dropout rates of low-income and middle-income students are compared over time we see that their proportional difference has actually worsened since the early 1970s. The low-income dropout rate was approximately twice as high as the middle-income rate in 1972, but by 2008 the low-income rate was nearly three times as high as that of middle-income students.

Figure 2: National Event Dropout Rates of 15- to 24-year olds by Family Income, 1972-2008



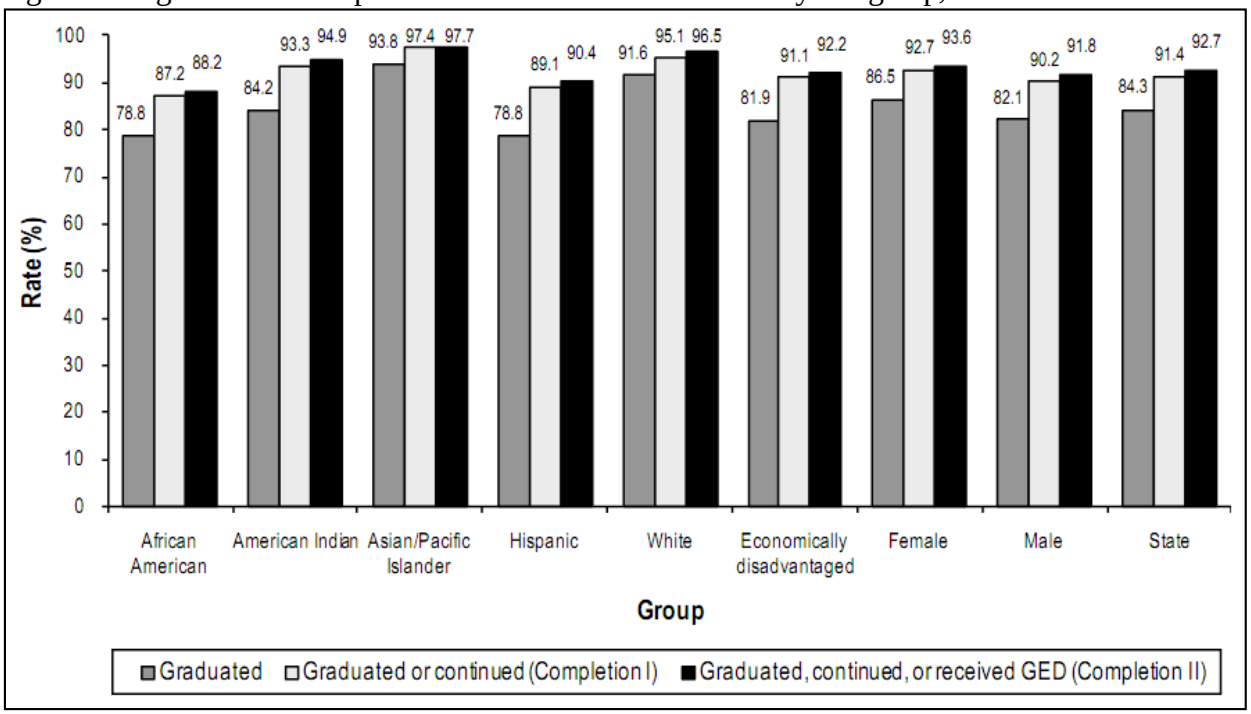
While the NCES estimates of national dropout and completion rates are often regarded as accurate and reliable, there is more controversy surrounding the way in which Texas has historically calculated its rates. The NCES estimated that Texas' averaged freshman graduation rate[3] for the 2007-08 cohort was approximately 73%, about 2% lower than the national average (NCES, 2010, p. 27). However, TEA's estimate of the high school graduation rate for this same cohort was 79.1%, 6% higher than the NCES estimate (TEA, 2011).

Additionally, the rate that is often presented in policy discussions in Texas is not a graduation rate but a completion or continuation rate. Figure 3 below present's estimates for different

[3] The NCES defines the averaged freshman graduation rate as "an estimate of the percentage of an entering freshman class graduating in 4 years" (NCES, 2010, p. 27).

graduation and completion rate calculations for Texas students disaggregated by demographic group (TEA, 2011, p. 70). The left bar for each subgroup represents the percentage of the ninth grade cohort that graduated from high school and received a diploma within four years, the middle bar indicates the percentage of each cohort that either graduated or continued in school, and the right bar also includes all GED recipients in the calculation of completion. If this more liberal definition of high school completion is used, the disparities between groups seem much less severe; no two groups have a double-digit difference in completion rates. However, if completion is defined as only students who graduated on time and received a high school diploma, the completion rate for Asian students, the top-performing student subgroup, is 15% greater than the rates for African-American and Hispanic students.

Figure 3: High School Completion Rates for Texas Students by Subgroup, 2007-10 Cohort

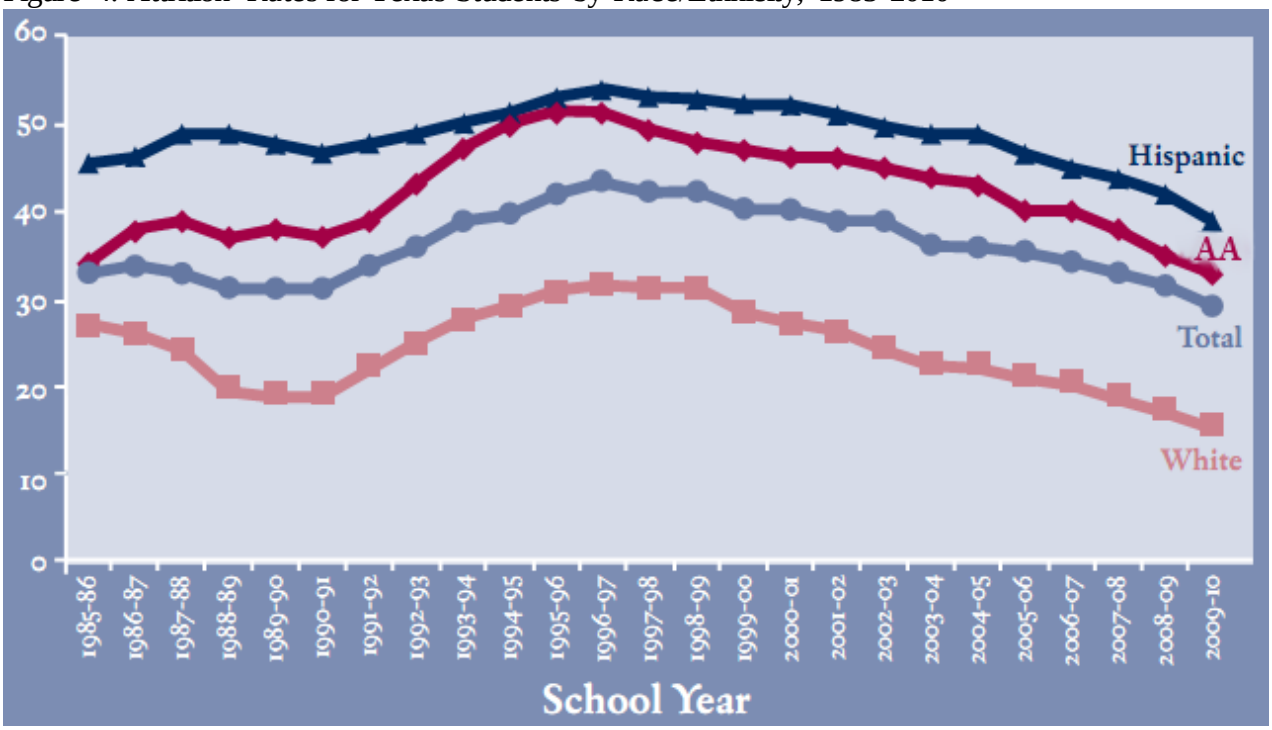


While there is a discrepancy between the NCES completion rate estimate for Texas students and TEA's calculated rate, other researchers in Texas have proposed completely different methodologies for estimating high school completion that result in even larger discrepancies. The Intercultural Development Research Association (IDRA) is one such organization whose estimates of high school completion are significantly lower than the TEA estimates. Figure 4 presents IDRA's calculation of attrition[4] rates for all Texas students from the 1985-86 school year through 2009-10 (IDRA, 2010, p. 3). Using IDRA's methodology, it is estimated that only 71% of the entering ninth grade cohort even made it to the twelfth grade in 2009-10, and it is therefore likely that the percentage of the cohort that actually graduated on time and received a high school diploma is even lower. As shown in Figure 3, TEA estimated that 84.3% of the 2009-10 cohort not only made it to twelfth grade but also received a diploma, evidence of a significant difference between these organizations' estimates. While the attrition rate for white

[4] IDRA calculates attrition by dividing the total number of twelfth graders that are still present from a given cohort over the number of students that were *predicted* to be enrolled in twelfth grade that year.

students in 2009-10 was 15%, the rates for African-American and Hispanic students were 33% and 39%, respectively, by IDRA's calculation. IDRA even claims that "the gaps between the attrition rates of White students and rates of Hispanic students and African-American students are dramatically higher [today] than 25 years ago" (IDRA, 2010, p. 1).

Figure 4: Attrition Rates for Texas Students by Race/Ethnicity, 1985-2010



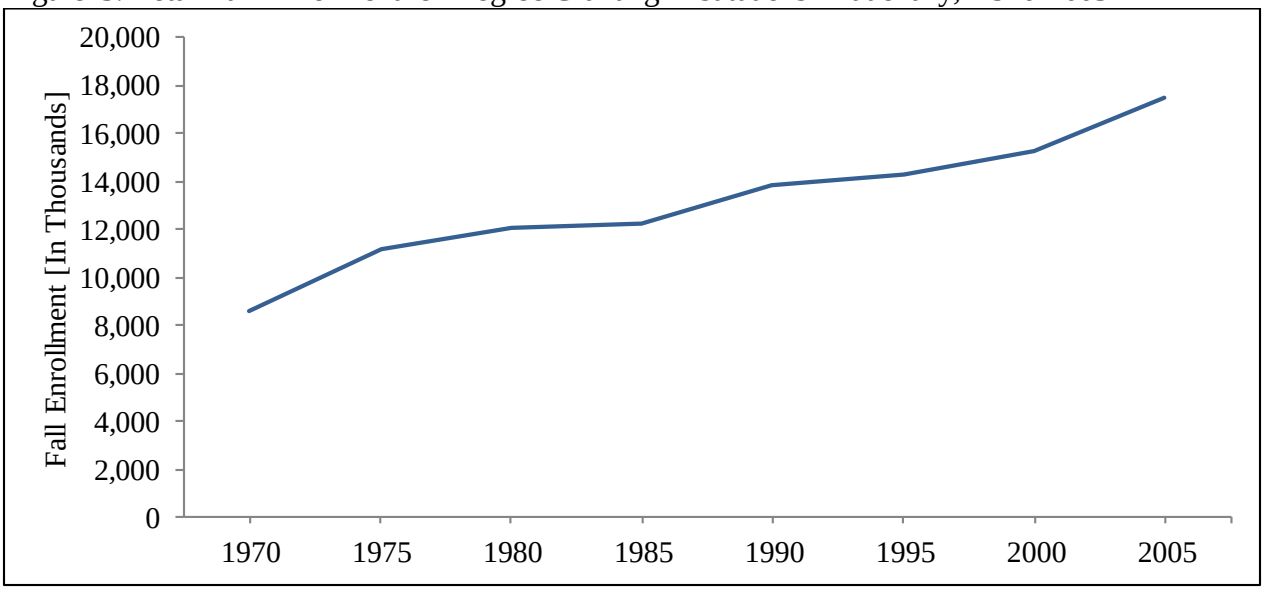
The specific estimates of dropout, completion, and graduation rates for Texas are both difficult to determine and quite contested, but there appear to be a few common threads among all the organizations and their estimates. First, IDRA, TEA, and the NCES do all agree that Texas' completion rate has been rising over the past decade. This is a promising sign given the increasing importance of holding a high school diploma or equivalent at minimum in order to successfully enter the job market. Second, in each organization's analysis at least 15% of the entering ninth grade cohort failed to earn a high school diploma within four years, indicating the continued need to focus on high school persistence and completion. Finally, each analysis also highlighted the persistent disparities between students that come from historically disadvantaged groups, such as racial minorities and low-income students, and their more advantaged peers. Given the growing diversification of the Texas population overall and the student body in particular, this finding supports the premise that it is not enough to increase the overall graduation rate of Texas students. Special attention must be paid to the rates of completion for disadvantaged groups, specifically racial minorities and low-income students.

Chapter Three

Trends in Postsecondary Access

Many of the trends in high school completion are reflected in the changes in postsecondary access rates over time. Nationally, the number of high school graduates enrolling in postsecondary education has steadily increased over the past several decades. As Figure 5 demonstrates, between 1970 and 2005, enrollment in degree granting institutions[5] rose from just over 8 million to nearly 20 million, an increase of 104% (NCES, 2005c). There is evidence, however, that the rate of growth in postsecondary enrollment is slowing. For example, from 1970 to 1980, postsecondary enrollment increased by 41%. In the following decade, enrollment increased by only 14%. Similarly, growth remained low in the 1990s, increasing by only 11% over that decade. Enrollment rates have risen somewhat between 2000 and 2005, returning to what they were in the 1980s.

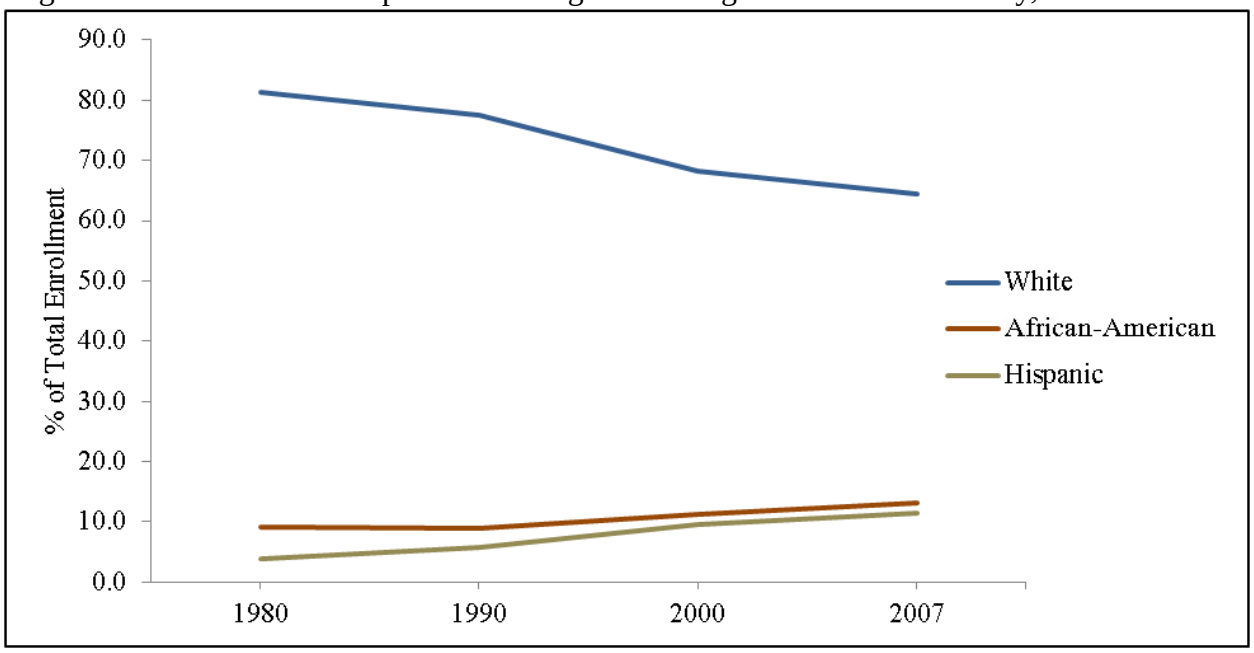
Figure 5: Total Fall Enrollment of Degree Granting Institutions Nationally, 1970-2005



When overall trends in postsecondary enrollment are broken down by the race/ethnicity of students, significant inequities are revealed. As shown in Figure 6, while African-American and Hispanic representation in higher education has increased since the 1980s, a significant gap between non-white and white students remains. Specifically, African-American and Hispanic students accounted for only 13% of the total enrollment in degree-granting institutions in 1980. By 2007, African-American and Hispanic students represented nearly a quarter of total postsecondary enrollment, an increase of 90%. Despite these gains, white students continue to account for the bulk of postsecondary enrollment, as 64% of those enrolled in degree-granting institutions were white in 2007.

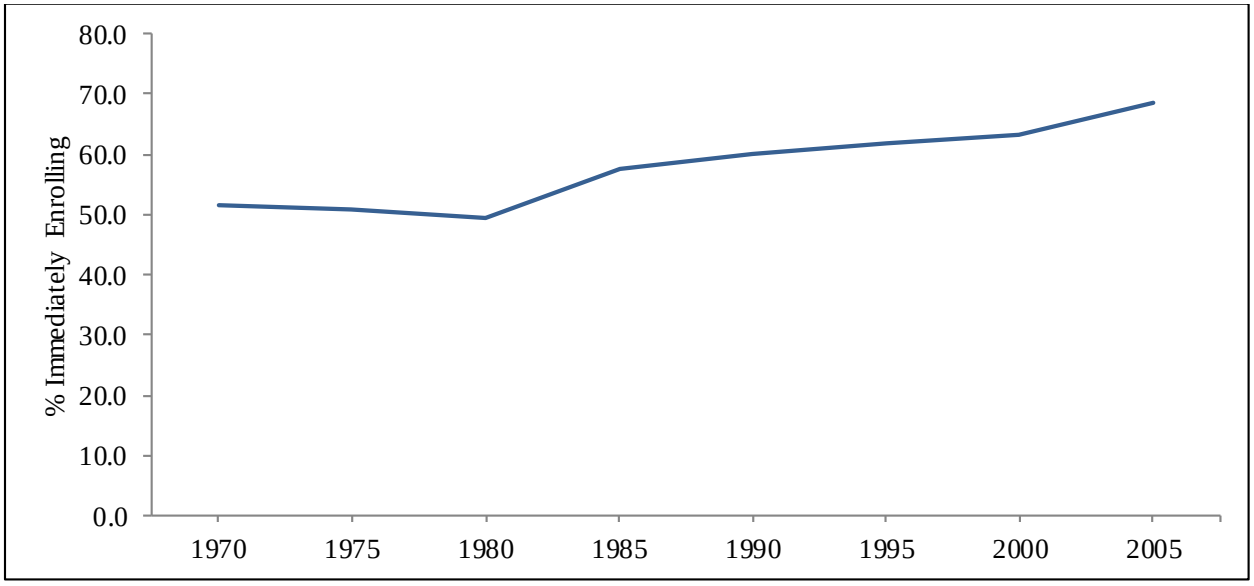
[5] The National Center for Education Statistics defines degree-granting institutions as institutions that offer associates or higher degrees and also participate in the Federal Title IV financial aid program.

Figure 6: Racial/Ethnic Composition of Degree Granting Institutions Nationally, 1980-2007



Along with an overall growth in postsecondary enrollment, students are increasingly likely to enroll in postsecondary institutions immediately upon graduating from high school. As Figure 7 demonstrates, 52% of those who graduated from high school in 1970 were enrolled in college the October after graduation. By 2005, the number of students immediately enrolling in degree-granting institutions upon graduating from high school had increased to 69% (NCES, 2005c).

Figure 7: Percentage of High School Completers Enrolled in College the October Immediately Following Graduation Nationally, 1985-2005

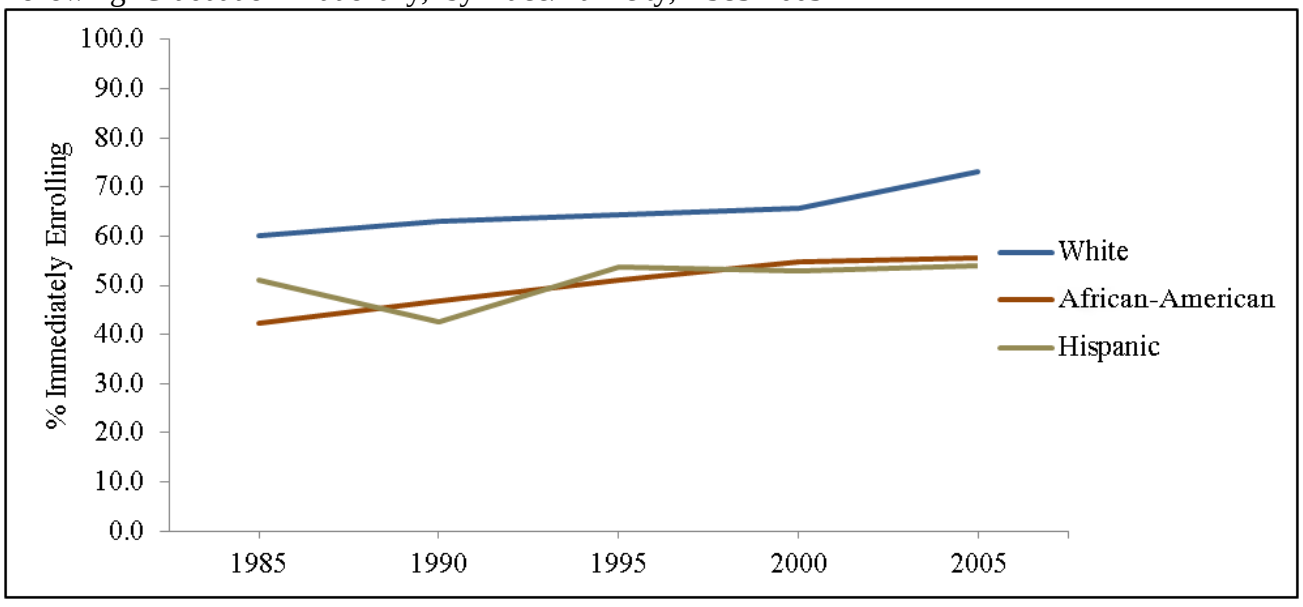


However, disaggregating the data by student race/ethnicity and family income reveals persistent disparities in college transitions over time. As Figure 8 reveals, African-American, Hispanic, and

white subgroups exhibit different trends in the proportion of students immediately enrolling in college upon high school graduation. Between 1985 and 2000, the proportion of white students immediately enrolling in college showed a steady increase of about 10% over the 15 year period. In the five years to follow (2000-2005), whites experienced another 10% increase in the proportion of students immediately enrolling in degree-granting institutions, representing an escalating trend.

While white students have immediately transitioned to college at increasingly higher rates since 2000, available data suggest that growth in the immediate transition rate for African-American students has slowed since 2000. For example, the rate at which African-American students were immediately transitioning to postsecondary institutions grew by 30% between 1985 and 2000. Between 2000 and 2005, however, that growth rate slowed to just 2%.[6] Hispanic students have demonstrated the slowest growth in rates of immediate postsecondary transition. Between 1985 and 2000, the number of Hispanic students immediately enrolling in degree-granting institutions upon high school graduation grew by 4%. Between 2000 and 2005, growth in the transition rate for Hispanics also slowed to just 2%.[7] As a result of the different rates of growth in the proportion of students immediately transitioning into degree-granting institutions upon high school graduation, gaps in the transition rate between white and non-white students have remained relatively stable since 1985. For example, the gap in immediate transition rates between white and African-American students was 17.9 percentage points in 1985. By 2005 the gap was 17.5, a decrease of only 0.4 percentage points.

Figure 8: Percentage High School Completers Enrolled in College the October Immediately Following Graduation Nationally, by Race/Ethnicity, 1985-2005

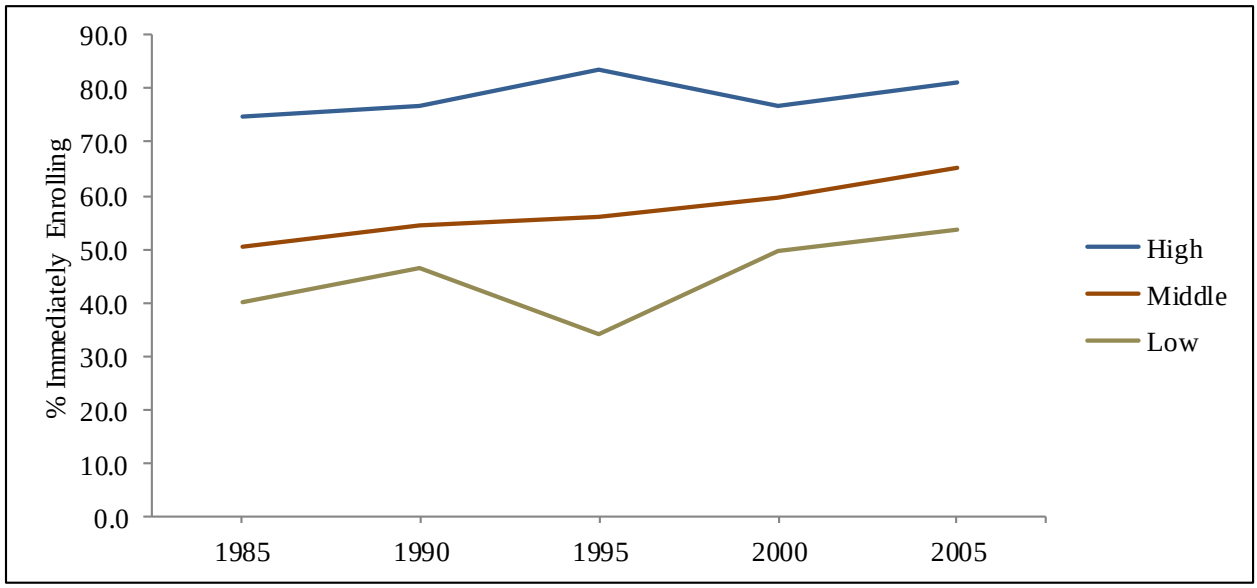


When examining immediate transition rates disaggregated by family income, similar patterns emerge. As Figure 9 reveals, students from high-income families showed the lowest increase in

[6] Due to small sample sizes, the Nation Center for Education Statistics recommends caution when interpreting transition data for African-American and Hispanic students.
[7] *Ibid*.

immediate transition rates between 1985 and 2005. But despite the fact that low-income and middle-income students experienced larger gains in their immediate postsecondary transition rate, gaps in immediate transition rates remain large. For example, in 1985, the gap in immediate transition rates between students from high-income and low-income families was 34.4 points. Twenty years later, the gap was 27.7 points, a decrease of only 6.7 percentage points.

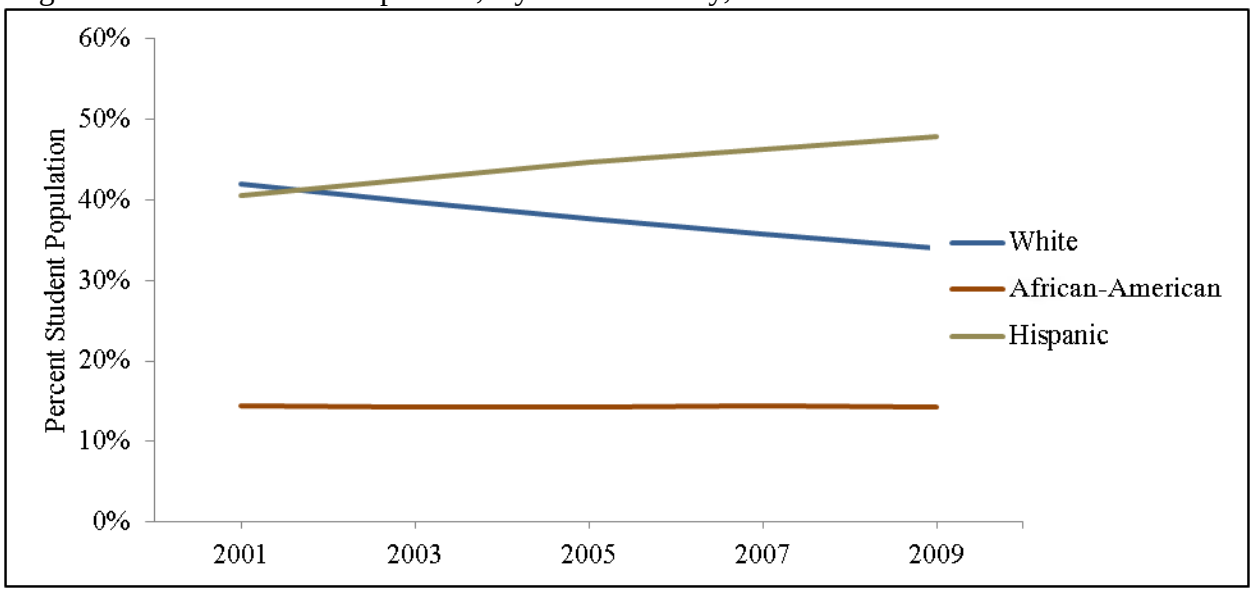
Figure 9: Percentage High School Completers Enrolled in College the October Immediately Following Graduation Nationally, by Family Income, 1985-2005



As previously mentioned, the Texas Higher Education Coordinating Board (THECB) adopted a state plan called *Closing the Gaps* in October of 2000. This higher education plan outlines the goals of closing the gaps in higher education participation and success. The ambitious plan proposes to significantly overhaul higher education in Texas by 2015. By the 2015 deadline, the initiative proposes to expand postsecondary enrollment in Texas by 630,000 and increase the number of postsecondary degrees awarded by 210,000. *Closing the Gaps* represents an overhaul to the Texas education system with a broad set of goals geared towards increasing college attendance.

Reflecting national trends, Texas has experienced overall growth in both postsecondary enrollment and college completion. However, similar to the national trends, significant racial/ethnic gaps remain in Texas, particularly between white and Hispanic students. This fact is troubling given that Hispanics are the fastest growing population of students in Texas, currently making up 48% of the total K-12 student population (see Figure 10). If their rate of growth remains constant over the next several years, Hispanic students will account for nearly 60% of the total student population by the 2015 deadline imposed by *Closing the Gaps*.

Figure 10: Texas Student Population, by Race/Ethnicity, 2001-2009

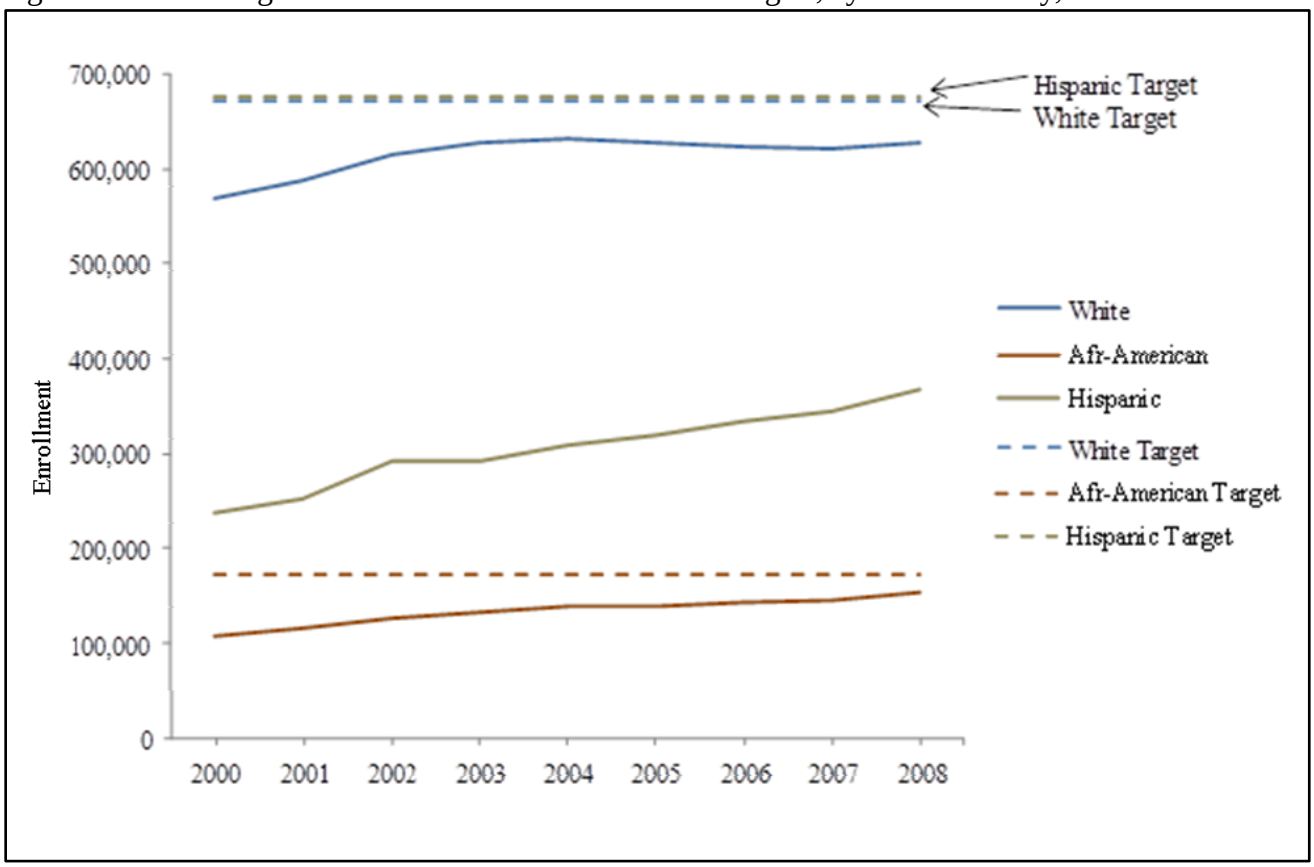


As Figure 11 reveals, postsecondary enrollment has grown for all racial/ethnic groups since 2001. Overall, enrollment in institutions of higher education[8] has increased by 27% over the last eight years. However, when disaggregated by student race/ethnicity, significant gaps in enrollment become apparent. The dotted lines in Figure 8 correspond to the 2015 target enrollment for each racial/ethnic group outlined in *Closing the Gaps*, while the solid lines represent actual enrollment numbers. Currently, white and African-American enrollment numbers are on track to reach the 2015 targets. However, Hispanic students continue to lag behind the other racial/ethnic groups. Note that the green target Hispanic line is almost equal to the blue target white line. In order to reach the target value, Hispanic higher education enrollment must increase by more 300,000 over the next seven years (THECB, 2009).

Overall, four primary conclusions can be drawn from the available data. First, postsecondary enrollment has steadily increased since the 1970s. This finding holds across racial/ethnic and socioeconomic subgroups. Second, the proportion of high school graduates immediately enrolling in postsecondary education has also increased since the 1970s across racial/ethnic and socioeconomic subgroups. Finally, and perhaps most importantly, the above discussion has highlighted the persistent disparities in postsecondary enrollment that exist across racial/ethnic and socioeconomic groups. Despite steady gains in many indicators of postsecondary success for all income and racial subgroups, achievement gaps between whites and non-whites, higher and lower family incomes, remain large.

[8] Institutions of higher education include 4-year universities, 2-year colleges, and professional schools. Private as well as public institutions are also included this calculation. However, institutions are limited to those located within Texas.

Figure 11: Texas Higher Education Enrollment & 2015 Targets, by Race/Ethnicity, 2000-08



Next, we examine trends in postsecondary persistence and completion for the United States as a whole and Texas specifically.

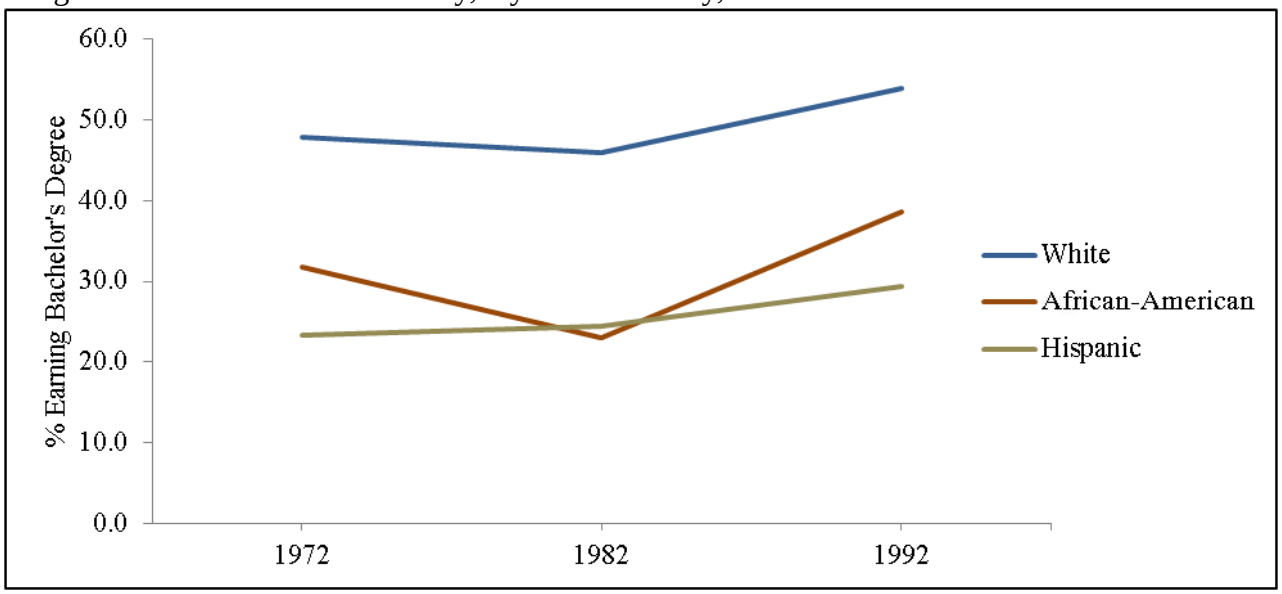
Chapter Four

Trends in Postsecondary Persistence and Completion

Mirroring the previous discussion on postsecondary enrollment and transition, available data suggest that college completion rates, or the percentage of entering postsecondary students that eventually earn postsecondary credentials, have increased over the last several decades. For example, among those graduating from high school in 1972 that went on to enroll in postsecondary institutions, 46% had earned a bachelor's degree 8.5 years later (NCES, 2005). This 8.5-year graduation rate climbed to 50% for the 1992 cohort of high school graduates, and 58% of the 2000 cohort of postsecondary students had earned a bachelor's degree within six years.

But once again, disaggregated postsecondary completion rates continue to show significant racial/ethnic disparities. Figure 12 highlights the differences between racial/ethnic subgroups in the attainment of bachelor's degrees for three cohorts of students. While the proportion of students obtaining a bachelor's degree 8.5 years after enrolling in a postsecondary institution has increased for all racial/ethnic subgroups since 1972, the gap between white and non-white students has remained fairly stable over time (NCES, 2005). For example, 48% of white students entering postsecondary education in 1972 held a bachelor's degree 8.5 years later. Only 32% of African-American students and 23% of Hispanic students in this cohort held a bachelor's degree 8.5 years later. Compared to the cohort of students entering postsecondary education in 1992, the gaps in degree attainment between white and non-white students were virtually identical to the 1972 cohort.

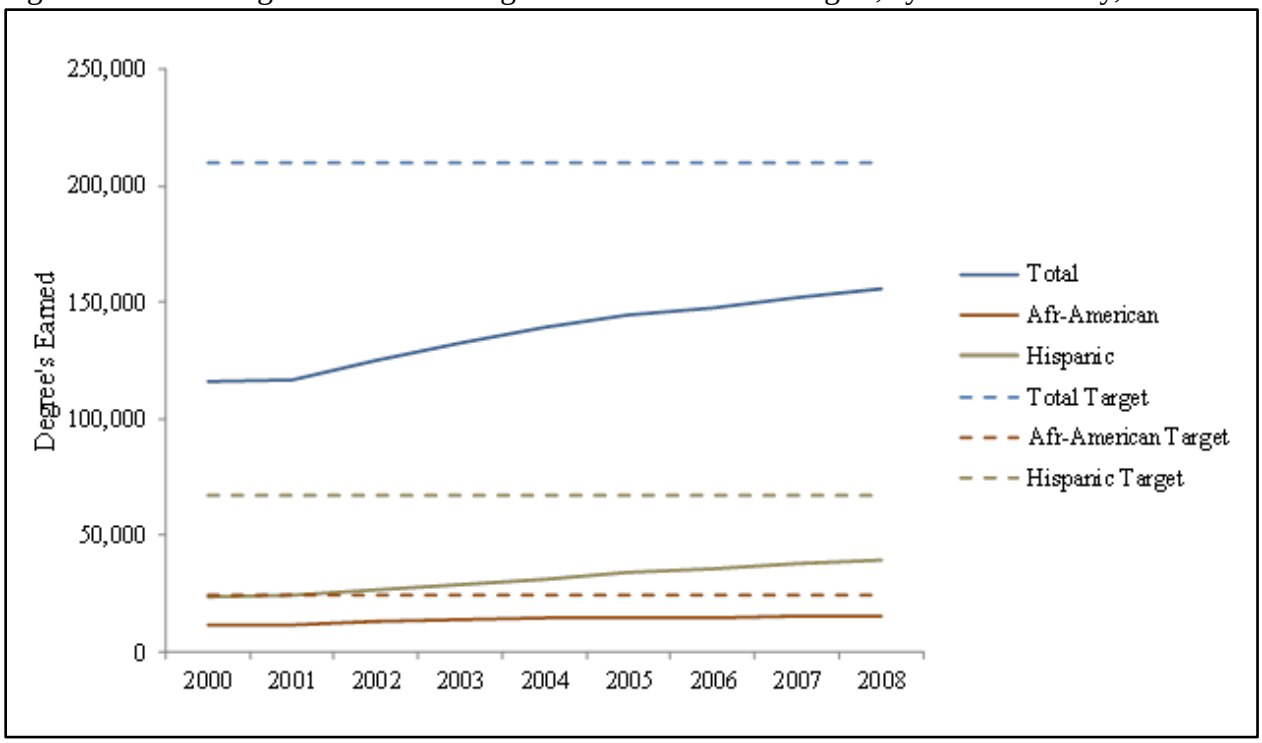
Figure 12: Percent 12th Graders Entering Postsecondary Education that Earned a Bachelor's Degree Within 8.5 Years Nationally, by Race/Ethnicity, 1972-1992



Similar to the trends in higher education enrollment, Figure 13 demonstrates that degree attainment has increased over the past several years in the state of Texas. Since 2001, the number

of higher education degrees[9] being issued has increased by 33.8%, greatly outpacing enrollment growth of the student population. Degree attainment has increased by 38.8% for African-American students and 68.0% for Hispanics since the same year. Despite the fact that non-white students are obtaining degrees in increasing numbers, if current trends persist, both African-American and Hispanic degree attainment will fail to reach the 2015 targets (THECB, 2009). Additionally, even if African-American and Hispanic student postsecondary degree attainment does increase enough over the next few years to achieve THECB's 2015 completion goals, white students will still be earning significantly more degrees than either racial subgroup.

Figure 13: Texas Higher Education Degrees Earned & 2015 Targets, by Race/Ethnicity, 2000-08



Given both the goals set by policymakers in Texas relating to postsecondary enrollment and completion as well as the significant disparities in these outcomes that exist between different student groups, schools and districts are under increasing pressure to adequately prepare their students to gain access to a higher education institution and successfully complete some type of degree or certificate. While this is a difficult task, a significant body of literature exists relating to the K-12 factors that contribute to positive postsecondary outcomes. The following chapter will provide a brief review of this research.

[9] Higher education degrees include bachelor's degrees, associates degrees, and professional certificates.

Chapter Five

Predictors of Postsecondary Transition and Success

Given the persistent gaps in postsecondary transition and success, researchers have devoted significant attention to the role that pre-college factors play in postsecondary outcomes. Extant research has identified several facets of a student's secondary education that significantly predict postsecondary outcomes. The purpose of this section is not to provide a comprehensive review of this vast literature or to disentangle the many ongoing debates regarding the relative importance of specific variables. Rather, this section provides a brief synopsis of the more robust findings to-date.

In a widely cited Department of Education (DOE) study, Adelman (1999) examined student transcript data to assess the relationship between high school characteristics and postsecondary outcomes for a national sample of students who were high school sophomores in 1980. Adelman found student high school GPA, achievement test scores and the rigor of their coursework to be significant predictors of postsecondary completion. The rigor of the coursework a student pursued while in high school was an especially strong predictor of college outcomes, explaining 41% of the variation in college completion rates of his sample. A number of other studies have identified similar relationships between student academic resources and postsecondary outcomes (ACT, 2004; NCES, 2001).

Bowen, Chingos and McPherson (2009) analyzed the college going patterns of a sample of 150,000 high school seniors, graduating in 1999. They found that high school GPA is a much stronger predictor of 6-year graduation rates than student SAT/ACT scores. In fact, for the 52 universities included in the study, SAT/ACT scores are often non-significant predictors, suggesting they have no measurable effect on 6-year graduation rates. This relationship holds across selective and non-selective universities and for all racial/ethnic subgroups. It is important to note, however, that it is not surprising that SAT/ACT scores fail to predict college completion. Such assessments are not designed to predict completion rates, but rather to predict students' GPA in their freshman year of college. These authors also conducted a secondary analysis predicting cumulative college GPA using the same dataset. The results of this analysis suggest that SAT/ACT scores are much better at predicting college GPA than college completion. However, as with 6-year completion rates, high school GPA is a stronger predictor of college GPA than SAT/ACT. Again, this relationship holds across selective and non-selective universities. However SAT/ACT scores were found to be nearly as strong of predictors as high school GPA among those students attending the most selective universities in the country.

Exposure to College-Credit Courses

College-credit courses allow students to receive college credit for the same classes they are taking to meet their diploma requirements. There are two main types of college-credit courses, Advanced Placement (AP) and dual-credit. AP courses allow students to take a national test at the end of the school year covering their course content; this test will allow them either to test out of base level college courses or to be granted course credit for them upon entrance to a higher

education institution. Dual-credit courses are a bit different in that they are classes where the student is simultaneously enrolled at a high school and a higher education institution. Students in dual-credit courses gain credit to both institutions through course content and assessments. While dual-credit coursework allows students to earn college credits, not all dual-credit courses are considered to be advanced by TEA. For example, technical courses taken at a community college can count as dual-credit, however, they may not be considered advanced. Both AP courses and dual-credit have been shown to positively impact student success in high school and greater participation in higher education, especially for minority and poor students (Flowers, 2008; Hoffman, 2003; Kirst, Venezia, & Nodine, 2009; Santoli, 2002; Texas P-16 Council, 2007).

Advanced Placement Courses

The AP program run by the College Board has been active in schools for more than fifty years and has more than 16,000 high schools participating (Flowers, 2008). Students at these schools are able to enroll in advanced courses and test out of 34 different college level courses (The College Board, 2011). While the individual credit policies differ according to the institution, usually students with average or better scores on AP exams can either be granted course credit or test out of foundation type courses. This allows them to move forward faster in their college degree plan than students who have to take the introductory courses.

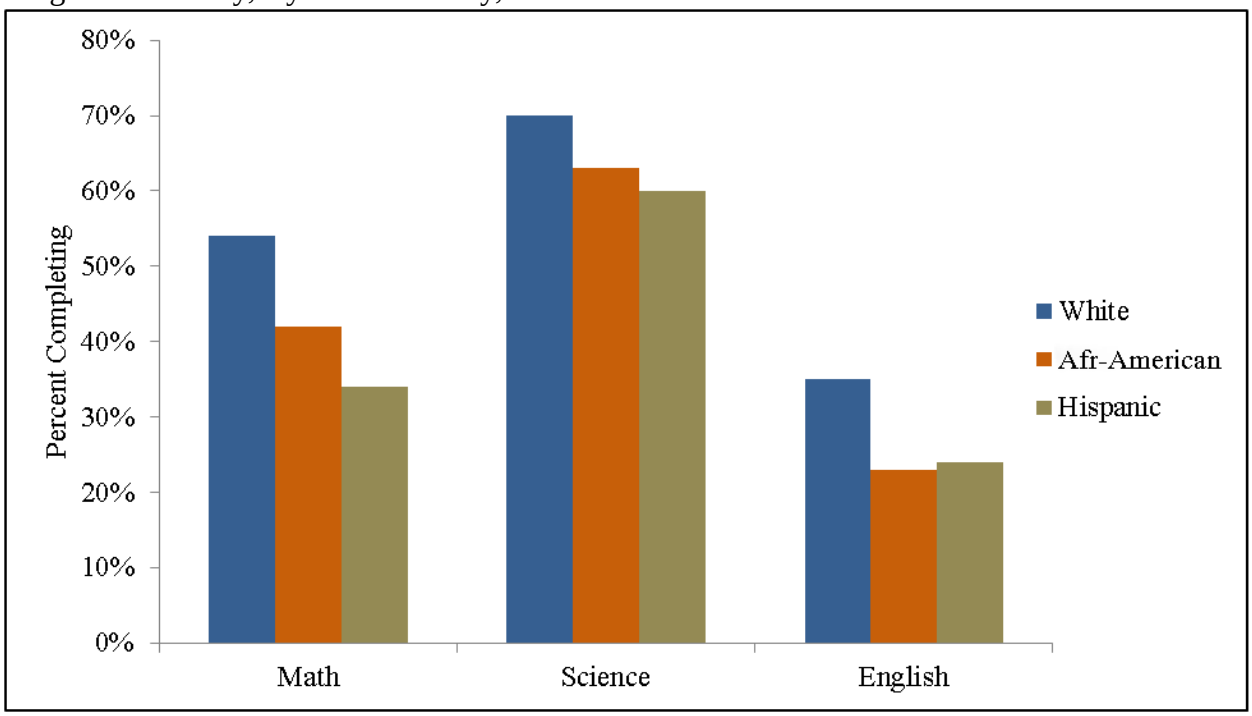
AP coursework in high school is linked to a variety of positive outcomes. Santoli (2002) conducted a literature review of research on AP participation and found that the research suggests positive impacts of the program on college enrollment, persistence, and degree completion. Morgan and Ramist (1998) found that students who placed out of their first college course due to AP scores made higher grades in their consecutive advanced college courses than those who had to take the introductory courses. Morgan and Maneckshana (2000) found that students who participated in AP during high school were more likely to graduate in four years and have higher GPAs.

Participation in AP courses seems to be especially beneficial to traditionally disadvantaged students. For example, African American and Hispanic students who participated in the AP program scored higher on college entrance exams and had higher college GPAs (Flowers, 2008). Further, they were more likely both to complete their undergraduate studies but also go on for additional graduate work than their peers who did not participate in the AP program. Currently though, minority and low-socioeconomic students are vastly underrepresented in AP programs (Klopfenstein, 2004; Ndura, Robinson, & Ochs, 2003; Solorzano & Ornelas, 2002; 2004; The College Board, 2004; 2006; Venkateswaran, 2004).

Despite the benefits associated with advanced coursework, particularly for underrepresented groups, extant research has found that non-white and poor students graduate from high school less prepared for college than their white and economically privileged counterparts (Barth, 2003; NCES, 1997). For example, according to a NCES (1997) study conducted on high school graduates in 1992, less than half of African-American and Hispanic graduates had the necessary qualifications for admission into a 4-year university. Comparatively, nearly 70% of whites met the admissions criteria for 4-year universities. More recently, a NCES (2007) report found that

African-American and Hispanic students have among the lowest advanced coursework completion rates. Figure 14 reveals this trend, with whites completing significantly more advanced courses in math, science, and English than both African-American and Hispanic students.

Figure 14: Percent of Students Completing Some Advanced Coursework in Math, Science and English Nationally, by Race/Ethnicity, 2004



This unequal distribution of advanced coursework completion is particularly problematic because the amount and level of advanced coursework taken by a student in high school is highly predictive of their postsecondary success. For example, Adelman (1999) found that the level of high school mathematics a student reaches is highly predictive of their likelihood of obtaining a bachelor's degree. Among students finishing high school with only Algebra 2, 40% obtained a bachelor's degree. Comparatively, 80% of the students that completed calculus eventually earned a bachelor's degree.

Dual Credit/Dual-Enrollment Courses

Courses that are considered dual-credit in high school necessitate a partnership with a local college or university. These higher education institutions either provide instructors or train and certify high school teachers to teach advanced coursework either on the high school campus or at a nearby college campus (Karp & Jeong, 2008). Dual-credit courses count for both high school credit and college credit, even giving the student a college transcript before graduation. Unlike AP courses, where different higher education institutions have different policies regarding the necessary scores on AP exams needed to count as credit for that institution, dual-credit courses

are actual college credits and not subject to the particular policies of the enrolling higher education institution.

Each year, thousands of high school students take advantage of dual-credit opportunities. A vast majority of both two- and four-year higher education institutions enroll high school students with over 800,000 students taking part in college credits while still in high school (Kleiner & Lewis, 2005). However, the impact of dual-credit on postsecondary outcomes is not well known given the relative novelty of dual-credit.

Bailey and Karp (2003) conducted a review of the early research on dual-credit courses finding little support for the program at the time. Lerner and Brand found similar results in their 2006 study but both studies evinced the need for further scrutiny and better statistical methodologies (Karp & Jeong, 2008). More recent studies from several different states show more promising evidence for dual-credit programs' effects on academic achievement and attainment. Studies from New York City (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007; Michalowski, 2006; Skadberg, 2005) suggest positive impact of the city's *College Now* dual-enrollment program. Dual-credit programs in Florida also show positive impacts on student enrollment in higher education (Florida Department of Education, 2004; Hoffman, Vargos, & Santos, 2009; Karp & Jeong, 2008). A California program "Ramp Up" focused on middle and low-achieving students and the impact of dual-enrollment on their academic career (Kirst et al, 2009). Researchers found that the "Ramp Up" program increased average proficiency on state assessments, increased retention rates, increased on-time graduation rates, increase earned college credit rates, and reduced time-to-degree for these students (Kirst et al, 2009).

In Texas, dual-credit programs have particularly benefited the Hispanic population, whose participation in college courses through the program has tripled since its inception (Texas P-16 Council, 2007). In addition, those who participated in the dual-credit program were more likely to attend college and earn a Bachelor's degree, with significantly different and positive rates for African Americans and Hispanic who participated in these programs in comparison to those who did not. In all, both dual-credit and AP course offerings have potential to impact traditionally disadvantaged students (Texas P-16 Council, 2007).

Chapter Six

Methodology and Study Sample

The current report focuses on four primary categories of research questions: 1) Who persists through and completes high school; 2) Who gains access to postsecondary institutions and why; 3) Who persists through college and why, and; 4) Who eventually completes their postsecondary education and earns some type of degree or certificate and why? In order to address these sets of questions this report focuses on two separate cohorts of Texas students (Table 1). Students in the first cohort were high school freshman in the school year 2003-04, while students in the second cohort were high school seniors in the 2003-04 school year. As we began following Cohort 1 students in their freshman year, this cohort was studied to determine their high school persistence patterns, their initial college access rates, and the factors that predicted access to postsecondary institutions. However, as the database used for this study only contained higher education data up until the 2009-10 academic year at the time this study commenced, these students had only experienced three years of possible postsecondary education by the completion of this report and few of them had yet graduated from college. Because the second cohort of students graduated from high school in 2004 and had thus been out of high school for six years at the time of this study, this cohort was analyzed for its postsecondary persistence patterns and its four- and six-year college graduation rates.

Table 1: Student Cohorts for Study

School Year	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Cohort 1	9th grade	10th grade	11th grade	12th grade	1st post	N/A	N/A
Cohort 2	12th grade	1st post	2nd post	3rd post	4th post	5th post	6th post

It should be mentioned that the reason the research team did not choose a freshman cohort in an earlier year, such as 1999-2000, and follow that cohort through four years of high school and six years of college is because of important educational policy changes that occurred in Texas and at the federal level around 2003. Specifically, in 2002 then-president George W. Bush signed the *No Child Left Behind Act* (NCLB) into law which significantly increased the level of accountability placed on schools and districts. The provisions of this law began being implemented in 2003. While Texas had implemented its own accountability system years before NCLB, the Texas legislature significantly revamped the state's educational accountability system around 2003 and redesigned the assessment system from the Texas Assessment of Academic Skills (TAAS) to the Texas Assessment of Knowledge and Skills (TAKS). As the research team was interested in how performance on these standardized assessments predicted postsecondary access, we believed that attempting to combine results from the TAAS and the TAKS tests could potentially decrease the validity of our analyses and subsequent interpretations. Other changes in the types of educational data collected that occurred around 2003 also led us to choose to follow two separate cohorts as reflected in Table 1. However, we do believe that following a single cohort of students from their freshman year of high school through six years of college is an important step for future researchers and may provide insights into patterns of college access, persistence and completion not discovered in the current study.

While the study focused primarily on the educational patterns of HISD students, the research team was also interested in comparing the performance of HISD to the state as a whole, Region IV, and neighboring districts. Thus, results are often reported for these other groups of students as well in order to allow the performance of HISD students to be compared to that of their peers. Data will be presented for students across the state of Texas, for all students in Region IV, and for students in the ten largest districts in Region IV after HISD. A list of these ten districts and some basic information about them is presented below in Table 2.

Table 2: HISD and Ten Districts from Region IV Included in Analyses

District	Region	District ID#	# of 8-12 or 9-12 schools	# of K-12 to 7-12 schools	Total Student Pop ('03-04)
Houston	4	101912	35	6	230074
Aldine	4	101902	6	6	62120
Alief	4	101903	4	3	50293
Clr Creek	4	84910	3	3	34770
Cy-Fair	4	101907	7	2	79732
Humble	4	101913	3	1	28902
Katy	4	101914	4	2	44605
Klein	4	101915	4	2	38475
Pasadena	4	101917	6	3	50260
Spring	4	101919	2	4	30157
Sprg Brnch	4	101920	5	2	35899

For the purposes of this study we are only interested in following students who remain in the cohort for all years of focus. This has slightly different implications for the two different cohorts. For Cohort 1, if a student changed districts, dropped out, was held back, moved out of the state, or attended a private school at any time from their freshman year to their senior year of high school they were no longer part of the cohort. Following cohorts in this way has both advantages and disadvantages. The benefit of this type of analysis is that it ensures that a student we identify as being in a particular district remains in that district all four years of high school. When analyzing the relationship between the district a student attends and the student's chances of accessing and completing college it is important that the student received the entirety of their high school education in that district, making a cohort analysis an appropriate technique.

However, one obvious drawback of a cohort analysis occurs when you attempt to compare student persistence and performance aggregated at different units of analysis. In our study we are interested in the performance of students at three separate levels: the state, the region, and the district. This causes the persistence patterns of students at these different levels to appear quite dissimilar; far more students move out of a district than move out of the entire state, so persistence patterns for the districts will appear significantly lower than the persistence rates for the state if you define the state cohort as all students who remain in the state. We have attempted to overcome this potentially misleading comparison by including only students who stayed in the same district throughout high school even for the Region IV and state cohorts. Thus, if a Region IV student moved to another school that was still in Region IV but in a different district, that student would be excluded from the analysis. Other researchers may have decided to include all students who stay in the same region or the state for the Region IV and state cohorts,

respectively, but we believe that the technique we chose better controls for student mobility and results in more logical comparisons between districts, Region IV and the state.

Another important weakness of this methodology is that by restricting the sample to only students who persisted in the same district through all four years of high school and graduated on time we are excluding many high school graduates from the sample. Our results are therefore not generalizable to the entire population of graduates but rather apply only to those students who persist through high school sequentially and graduate on time.

As the second cohort is composed of those students who only attended a district or region of interest their senior year of high school, interpretations of the relationships between district attendance and college persistence, and college completion rates must be more tentative for the analyses of this cohort. For example, because a student who attended District A from kindergarten through grade eleven but moved to District B before her senior year would be included in the District B cohort, it would be unwise to attribute that student's ability to persist in postsecondary to the education she received in District B. The estimated impact of districts on postsecondary persistence and completion should therefore be interpreted cautiously.

Descriptively we examine private university enrollment, college enrollment (this includes community college, technical institutes, and for-profit colleges), public university enrollment, and any postsecondary enrollment (this includes all the previously mentioned institutions). In the chapters where we describe statistical analyses, we create models that address all postsecondary enrollment or public university enrollment.

Given the nature of our outcome variables of interest, two primary statistical techniques were used for our analyses. When an outcome variable being studied is described as "dichotomous" (yes/no, pass/fail, graduated/did not graduate) and occurs at a specific point in time, *logistic regression* techniques are often the most appropriate statistical models. With logistic regression, the outcome variable is defined as the odds that the outcome will occur. For example, if five students attended District A and three of them gained access to a postsecondary institution the odds of a student from that district enrolling in a college or university would be 3/2, or 1.5. Each variable in the model predicts the difference in the odds of the outcome of interest occurring. Thus, variables with estimates greater than one increase the odds of the outcome occurring, while estimates between zero and one represent a decrease in the likelihood of the outcome. As college access and college graduation are both dichotomous variables that occur or do not occur a single time, logistic regression was used to answer the research questions relating to what variables increase or decrease the likelihood that a given student will gain access to and complete postsecondary education.

While logistic regression could also be used for the second set of research questions relating to college persistence, a separate model would need to be run for each semester to determine what factors influenced a student's chances of persisting an additional semester. Given the fact that the second cohort of students was followed through twelve semesters of postsecondary education, twelve separate models would need to be analyzed if logistic regression techniques were used. Because of this, a different technique known as *survival analysis, event-history analysis,* or *failure analysis* was chosen to study student persistence patterns. In survival analysis the

outcome variable is still dichotomous (persist/did not persist) but the technique allows the researcher to follow a cohort over a period of time and include all of the data in a single model for the entire time period. Additionally, unlike the logistic regression models, the outcome variable in the survival models is not a desirable outcome (access, graduation, etc.) but instead is failure to persist in college. Also unlike logistic regression, in survival analysis the outcome is defined as the "hazard rate" of experiencing the negative outcome. While hazard rates are interpreted slightly different than odds ratios, the interpretation of the estimates for the variables in the model are similar. Each variable model will have an estimated hazard ratio which indicates whether or not the variable increases or decreases the possibility of the outcome. Just as in logistic regression, an estimate greater than one indicates an increase in the likelihood of the outcome while an estimate between zero and one represents a decrease in the likelihood. These techniques and the results of the models will be discussed in more detail in the following chapters.

The data for this report were provided by the Education Research Center at the University of Texas at Austin (TERC). This research center is one of three in the state created by the 79th Texas Legislature, 3rd called session, in 2006. These ERCs contain nearly all education data collected by the Texas Education Agency (TEA), the Texas Higher Education Coordinating Board (THECB), and the Texas Workforce Commission (TWC) and combine them into a single database. The integrated nature of the database allows researchers to follow the educational trajectory students take from elementary school through postsecondary institutions and into their careers. TEA and THECB datasets were merged in order to allow the researchers to study the transition patterns students made from K-12 to postsecondary institutions. Appendix A lists a description of all the variables used is any of the statistical models.

The following four chapters of the report are structured in accordance with the four sets of research questions: Chapter Six addresses high school persistence, dropouts, and graduation, Chapter Seven addresses college access, Chapter Eight addresses college persistence patterns, and Chapter Nine addresses college completion and graduation. Apart from Chapter Five, the first half of each chapter is dedicated to a descriptive overview of the event of interest while in the second half of each chapter analyses are presented that help to explain this event. For example, the first part of Chapter Seven describes the general college access rates of the sample cohorts, while the second part presents an analysis of what factors influence students gaining access to postsecondary institutions. Chapters Eight and Nine follow this same general pattern. The descriptive statistics provide an overall picture of the postsecondary access, persistence, and graduation rates of the cohorts, while the statistical models are used in order to explain these phenomena in greater detail. Chapter Six is different in that it only contains descriptive statistics of high school persistence, dropouts, and graduation rates due to the limited amount of data we had to analyze the causes of these phenomena. In other words, it is difficult to determine what factors caused a student to drop out of high school in their freshman year if we only began following students in 9th grade. Future research should surely study the causes of high school persistence in HISD and the state in greater detail.

Chapter Seven

High School Persistence, Dropouts, and Graduation

The state of Texas educates over 4 million students in the public K-12 schools every year. Table 3 below presents some basic demographic information for the state, Region IV, HISD, and the ten other Houston area districts included in the study. As evidenced by this table, enrollment in Texas schools is composed primarily of non-white students with 43.8% of Texas students being Hispanic/Latino and 14.3% African-American as of 2003-04. The percentage of lower-income students in the state has also increased over time with approximately 53% of Texas students being classified as economically disadvantaged in 2003-04 as defined by enrollment in federally funded free- or reduced-priced lunch.

Table 3: Total State, Region IV, and HISD Demographics, 2003-04*

Level	# of Students	Amer. Ind./ Alaska	Asian/ Pacific Isld.	Afr-Amer	Hisp.	White	Econo. Disadv.	LEP	Spec Ed
State	4,311,50	0.3%	2.9%	14.3%	43.8%	38.7%	52.8%	15.3%	11.6%
Region IV	944,176	0.2%	5.4%	21.5%	40.5%	32.5%	51.5%	17.9%	10.0%
Houston	211,157	0.1%	3.0%	29.8%	58.1%	9.1%	81.7%	29.0%	10.0%
Aldine	56,127	0.1%	2.4%	33.1%	58.0%	6.4%	76.6%	24.9%	9.7%
Alief	45,292	0.1%	13.3%	36.8%	43.1%	6.7%	59.6%	31.5%	11.7%
Clr Creek	32,706	0.3%	9.4%	7.4%	15.7%	67.2%	15.1%	6.7%	8.9%
Cy-Fair	74,730	0.2%	8.2%	11.1%	28.7%	51.8%	25.7%	12.9%	9.2%
Humble	26,832	0.4%	3.4%	12.4%	18.2%	65.6%	19.3%	5.8%	9.7%
Katy	41,690	0.2%	7.5%	6.7%	22.1%	63.5%	17.3%	9.6%	9.2%
Klein	35,474	0.3%	7.9%	13.7%	23.8%	54.4%	23.0%	9.9%	10.3%
Pasadena	46,002	0.2%	3.2%	6.4%	70.7%	19.4%	63.2%	25.6%	7.7%
Spring	26,664	0.2%	5.8%	31.9%	31.1%	31.0%	46.5%	13.4%	10.3%
Sprg Brnch	32,920	0.1%	6.2%	6.3%	52.7%	34.7%	54.1%	30.5%	10.9%

* AEIS Data 2003-04

HISD is the largest school district in Texas and the seventh largest in the United States, serving 211,157 students in 307 schools. While the percentage of non-white, low-income, and limited-English proficient (LEP) students has increased across the state and Region IV, HISD boasts significantly higher percentages of all three subgroups than both Region IV and the state. In 2003, the student population in this district was composed of 58.1% Hispanic students and 29.8% African American students while less than 10.0% of enrolled students were white. The diversity of this population is reflected in the 60 different languages spoken in the district. Much of this language diversity is a result of international immigration; thus, the district provides programs for students with limited English proficiency through bilingual and English as a second language classes. Approximately 29.0% of all HISD students are considered to be LEP, a

significantly higher percentage than that of the state or Region IV. Also of note, 81.7% of the student population is economically disadvantaged, approximately 30% higher than both the state and Region IV figures. The percentage of students identified as being LEP also varies significantly from 5.8% in Humble to 31.5% in Alief. Because of the low numbers of American Indian/Alaska Native students, this subgroup will not be presented in any of the results due to low cell counts.

While the ten additional districts selected for inclusion in the study are all located in Region IV, these districts also vary widely in terms of the demographics of their student population and in the rates of high school persistence their students exhibit. As evidenced by Table 3, the racial composition of the student body is significantly different between the districts, with whites constituting as low as 6.4% of the population in Aldine and as high as 67.2% of the student body in Clear Creek. Unfortunately, the racial composition of the districts appears highly correlated with the percentage of students that are classified as economically disadvantaged. Clear Creek has the lowest percentage of low-income students at 15.1% while Aldine has the highest at 76.6% (excluding HISD with 81.7%). Figure 15 provides a picture of the strength of the correlation between race and socioeconomic status for the ten districts and HISD.

Figure 15: The Correlation between Race and Socioeconomic Status in the 11 Study Districts

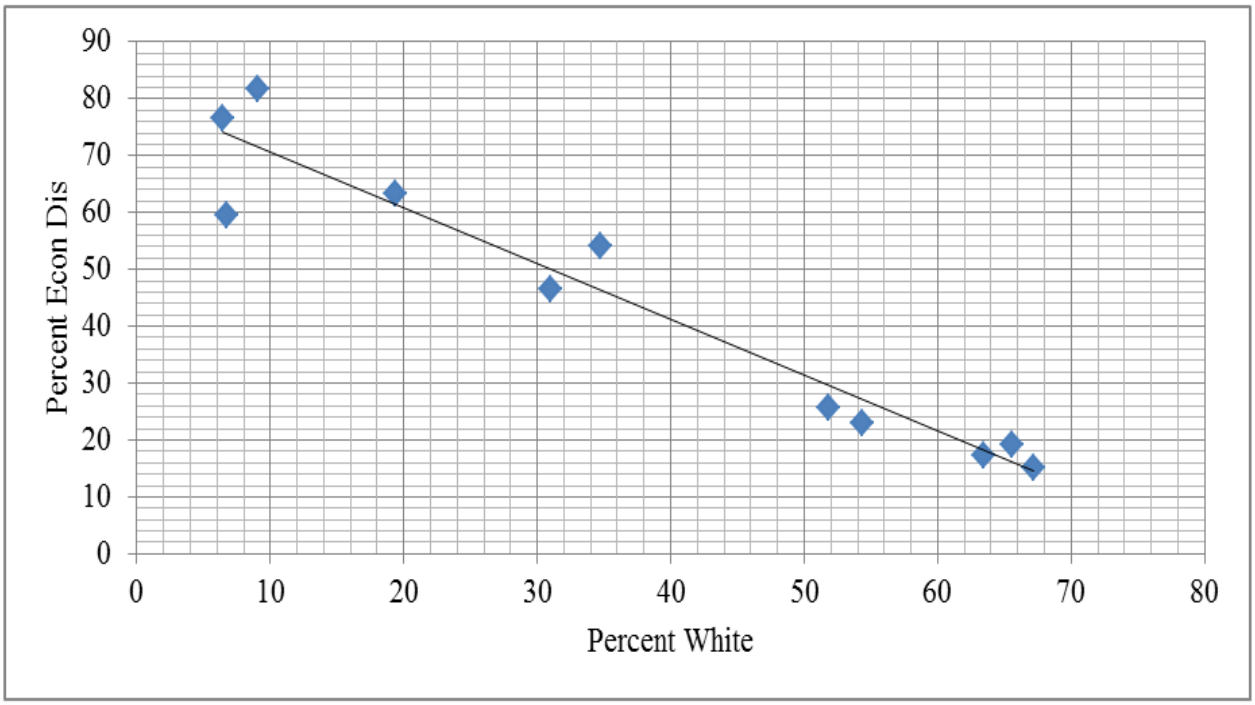


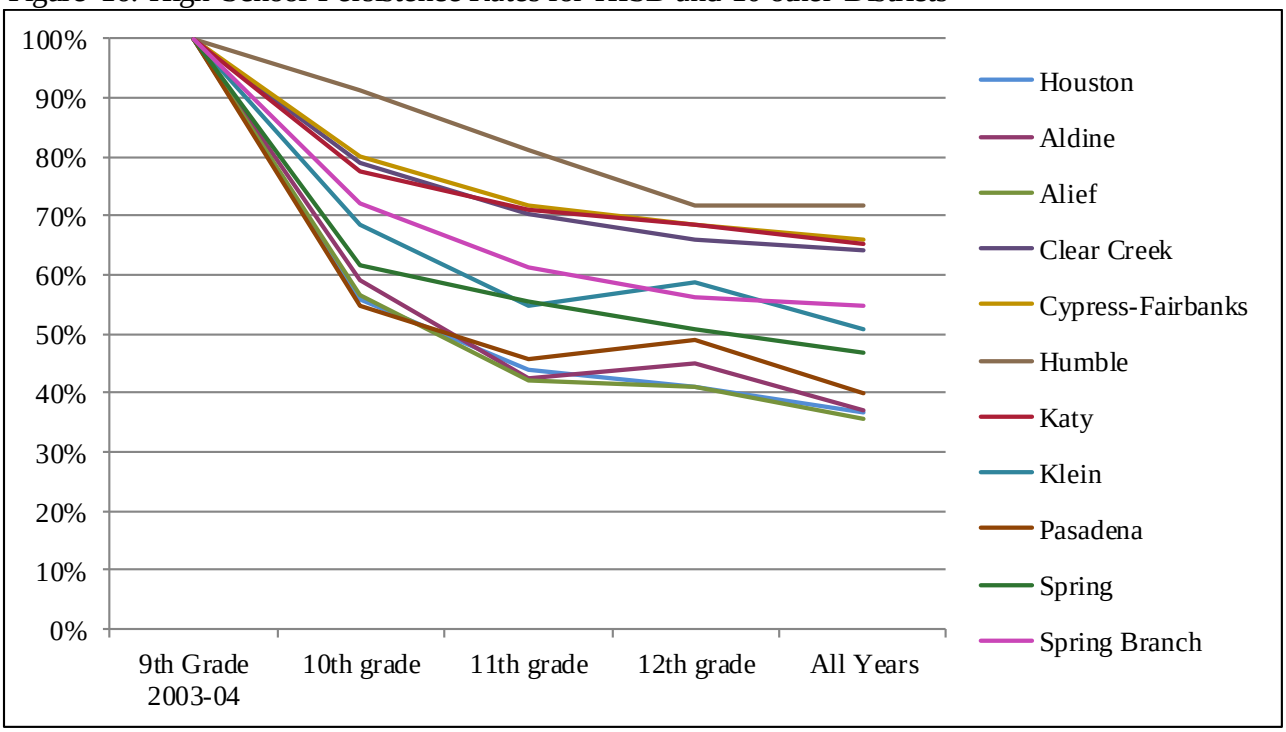
Table 4 exhibits some of the differences in high school persistence patterns between the districts. It should be noted that for these rates students did not need to be present in every previous grade in order to be counted in a following year. For example, a student could be excluded in grade 11 but could reappear in the cohort in grade 12. In fact, a number of cohorts actually did increase between 11th and 12th grade, indicating that districts are possibly recapturing students who may have left school previously. However, for the final cohort a student must have been present in every grade as indicated by the "All Years" row in the table.

Table 4: Same-District Student Persistence Percentages, 2003-07

District	9th Grade Cohort #	10th grade Remaining %	11th grade Remaining %	12th grade Remaining %	All Years Remaining %
Houston	18,524	55.7%	43.8%	41.0%	36.7%
Aldine	4,908	59.0%	42.3%	45.1%	37.0%
Alief	4,205	56.5%	42.1%	40.9%	35.8%
Clr Creek	2,852	79.1%	70.2%	66.0%	64.1%
Cy-Fair	6,589	80.0%	71.8%	68.3%	66.0%
Humble	2,187	91.2%	81.2%	71.9%	71.7%
Katy	3,973	77.4%	71.1%	68.5%	65.1%
Klein	3,681	68.6%	54.7%	58.8%	50.8%
Pasadena	4,028	54.7%	45.7%	48.9%	39.8%
Spring	2,523	61.5%	55.7%	50.8%	46.8%
Sprg Brnch	2,832	72.2%	61.3%	56.3%	54.9%

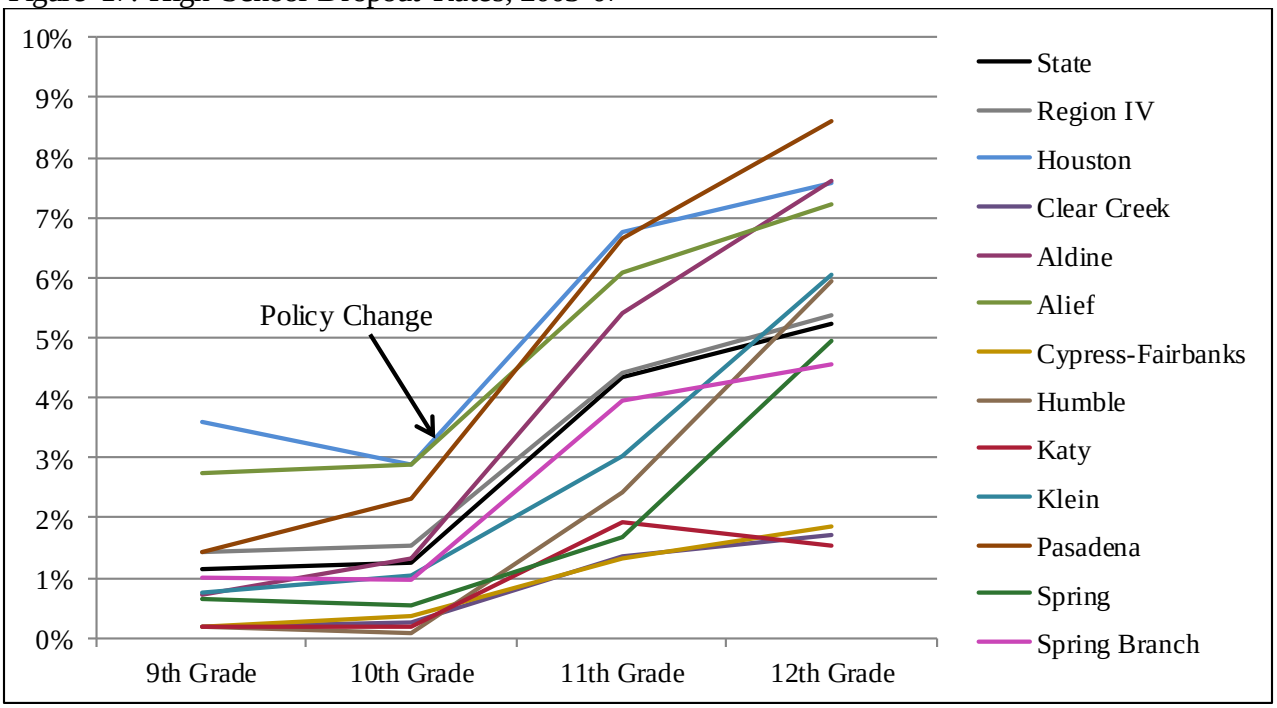
As alluded to previously, these data must be interpreted cautiously as many factors can cause a student to be excluded from the cohort, such as repeating a grade, moving to a private school, or changing districts. These figures are not four-year completion rates and the inverse of these figures are not the district dropout rates. With that being said, the variability between districts is once again stark and the extremely low rates of student persistence in some districts are indeed troubling. While approximately 65.0% of the 9th grade cohort was present in the same district for all four years in Clear Creek, Cypress-Fairbanks, and Katy, and more than 70.0% of the Humble cohort was present all years, four out of the eleven districts had four-year persistence rates of less than 40% with Alief's 35.8% being the lowest. HISD students fared only slightly better than those students who began 9th grade in Alief with 36.7% of the HISD cohort being present in the appropriate grade all four years of high school. Figure 16 below provides a visual representation of these persistence patterns. This figure also illustrates a trend common to all districts in the study which is that the transition between 9th and 10th grade appears to be particularly treacherous for students. Every district in the study lost more than 20% of their students between 9th and 10th grade, and the cohorts for some districts decreased by nearly 50% over this transition.

Figure 16: High School Persistence Rates for HISD and 10 other Districts



Another way to visualize the persistence patterns of high school youth is to graph the trends in dropout rates. Figure 17 provides such a visualization, but once again a number of caveats should be mentioned regarding this figure and the calculation of dropout rates in Texas generally.

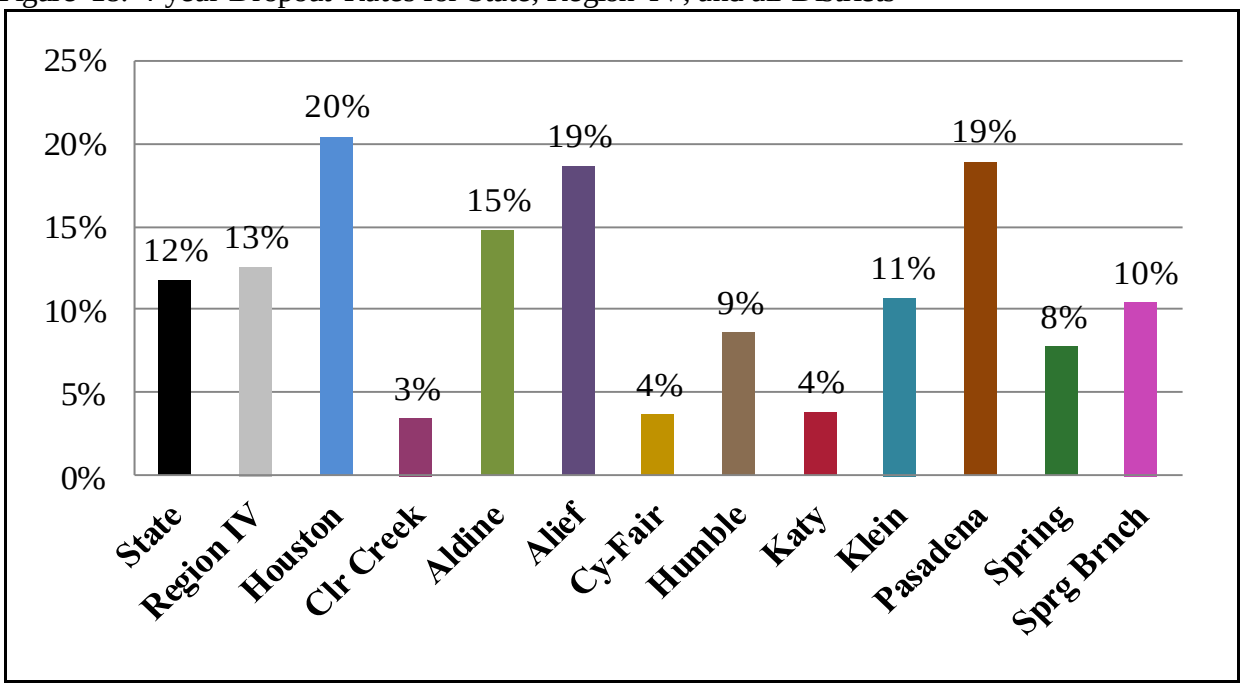
Figure 17: High School Dropout Rates, 2003-07



At first glance, Figure 17 seems to contradict the previous graph of persistence rates over time. While the graph of persistence seems to indicate that the majority of students who drop out leave by the end of 10th grade, the inverse seems to be true regarding Figure 17 with few 9th and 10th grade students dropping out and significantly higher rates of dropouts in 11th and 12th grade. In fact, this contradiction can be explained by educational policy changes that occurred in Texas before the 2005-06 year. Prior to this year, many students who left school were not considered dropouts but were instead classified as "leavers." For example, students who completed all of their coursework but failed their high school exit exam or students who left school with an intention to pursue a General Educational Development (GED) certificate were not considered dropouts. Around 2005, Texas adopted the National Center for Education Statistics (NCES) definition of dropouts which reclassified students who were previously considered leavers, such as the two aforementioned categories of students. This is the primary reason why the dropout rates for 9th and 10th grade appear significantly lower than those for 11th and 12th grade; this policy change took effect during the 11th grade year for students in this cohort. It is likely that the 9th and 10th grade dropout rates would have been in the double-digits if the more stringent NCES definition had been applied in these years.

While the different dropout definitions used for different years makes interpretation of trends in dropout rates difficult, it is still useful for pointing out some of the variability in dropout rates between districts. For example, in grade 12 the dropout rate ranged from approximately 1.5% in Katy to more than 8.5% in Pasadena, with the state and Region IV averages both around 5.0%. Figure 18 contains the four-year dropout rates, the total percentage of students from the grade 9 cohort that were classified as dropouts at any time during their four years of high school, for the state, Region IV, and the districts in the study. Unfortunately, HISD students were at greatest risk of dropping out, with more than 20% of the cohort dropping out at some point during high school.

Figure 18: 4-year Dropout Rates for State, Region IV, and all Districts



Perhaps not surprising, the percentage of students that persisted through high school also varied significantly by race, socioeconomic status, English proficiency, and educational program for Cohort 1 students. Table 19 provides the persistence rates for HISD students by demographic group. While approximately 60% of white and Asian students in the cohort persisted through all four years of high school, about 38% and 31% of African-American and Hispanic students, respectively, were likewise present for all four years. The persistence rate for economically disadvantaged students was 34%, close to the district average due to the large percentage of low-income students in the district. And while only 27% and 19% of HISD's special education and LEP student population, respectively, made it through all four years of high school, more than 80% of students classified as being gifted were present all years. A moderate disparity in persistence rates is also apparent between the sexes. While about 41% of female students were present all years, the same was true for only 32% of male students.

Figure 19: Persistence Rates for HISD Students by Demographic Group

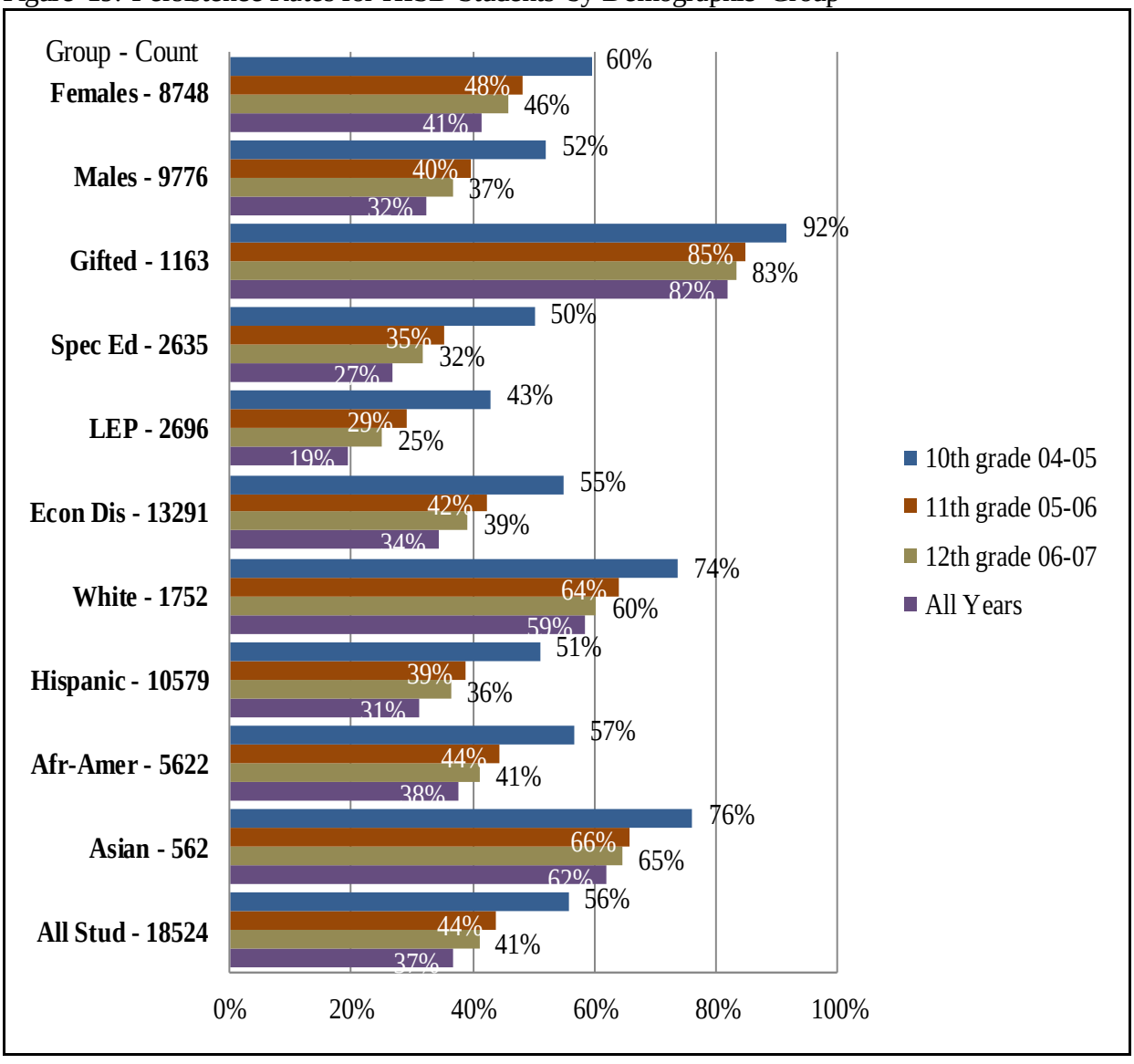
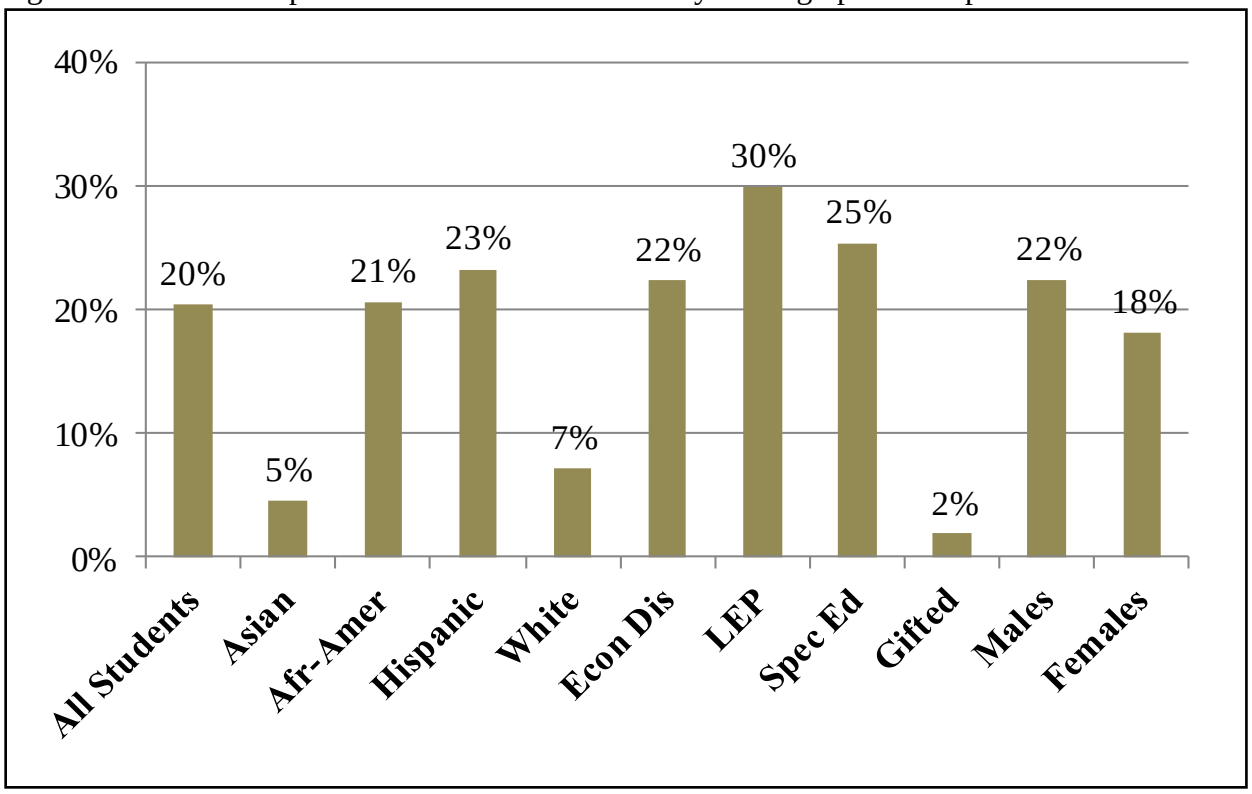


Figure 20 also highlights some of the disparities between demographic groups for HISD students in terms of dropout rates. While HISD has the highest 4-year dropout rate out of any of the districts in the sample, certain student groups are at significantly higher risk than others. Approximately 7% and 5% of white and Asian students, respectively, dropped out at some point during high school, but 21% and 23% of African-American and Hispanic students, respectively, dropped out. LEP students were the subgroup with the highest rate at nearly 30% with special education students having the second highest at 25%. At the other end of the spectrum less than 2% of gifted and talented students dropped out at any point during high school. And once again, male students were more likely than their female peers to dropout by a margin of more than 4%. It should also be reiterated that these figures are probably conservative estimates of the actual number of students that dropped out due to the more lenient dropout definition used prior to the 2005-06 school year, although it is difficult to determine exactly how much higher the 9th and 10th grade rates would be under the NCES definition.

Figure 20: 4-Year Dropout Rates for HISD Students by Demographic Group



The final outcome of interest at the high school level that we investigated for the current report was that of high school graduation rates. Table 5 contains this data for the state, Region IV, HISD, and the other ten districts. Three different methods of calculating graduation rates were used for the data in this table. In the "percent of beginners that graduate" row, a student was counted as a graduate if they were in the 9th grade cohort and they graduated from any district at any time by the 2006-07 school year. This number serves as the percentage of the entering cohort that graduates on-time somewhere in the state. The "percent of persisters that graduate" row restricts the sample to only those students that were present in the same district for all four years of high school and then calculates the percentage of those students that graduates. This

graduation rate is expected to be high given the fact that all of these students made it through all four years of high school without repeating a grade or dropping out, making it somewhat disheartening to see that more than 16% of students in HISD that made it through all four years of high school still failed to graduate, the highest rate of non-graduation for the cohort of persisters among any of the sample districts. The final rate presented in Table 5 represents the percentage of the original 9th grade cohort that persisted in the same district through all four years of high school and graduated on time. While more than 60% of the 9th grade cohorts for Clear Creek, Cypress-Fairbanks, Humble, and Katy persisted through all four years of high school in the same district and graduated on time, HISD, Aldine, Alief and Pasadena all had rates in the low- to mid-30% range. Texas and Region IV both had rates in the mid-40% range for this same graduation rate.

Table 5: Student Persistence and Graduation Rates for State, Region IV, and Study Districts

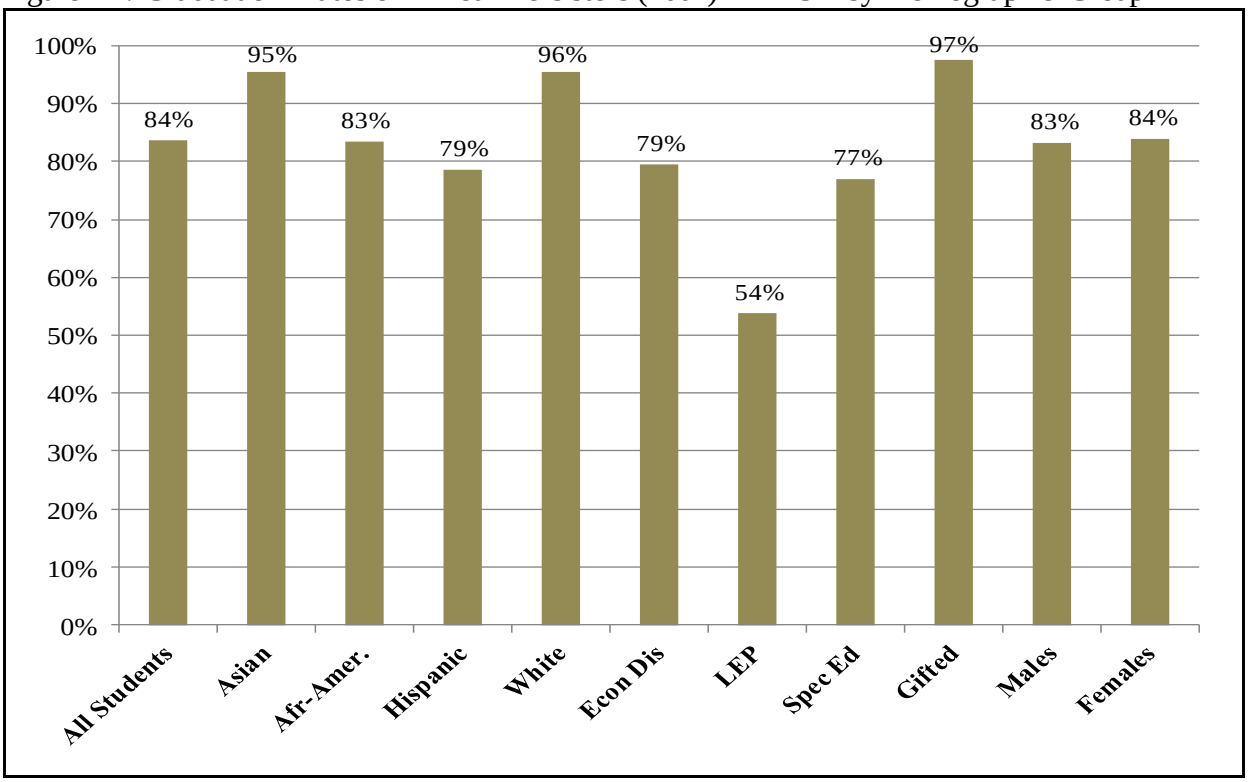
	9th Graders 2003-04	# of Graduates, Any District	% of Beginners that Graduate	All Years, Same District	# of Graduates, Same District	% of Persisters that Graduate	% of total that Persist and Graduate
State	391,557	224,398	57.3%	197,056	178,142	90.4%	45.5%
Region IV	85,844	47,616	55.5%	41,481	37,344	90.0%	43.5%
Houston	18,524	7,986	43.1%	6,793	5,676	83.6%	30.6%
Aldine	4,908	2,383	48.6%	1,815	1,573	86.7%	32.1%
Alief	4,205	1,937	46.1%	1,505	1,302	86.5%	31.0%
Clr Creek	2,852	2,008	70.4%	1,829	1,723	94.2%	60.4%
Cy-Fair	6,589	4,575	69.4%	4,351	4,000	91.9%	60.7%
Humble	2,187	1,586	72.5%	1,568	1,410	89.9%	64.5%
Katy	3,973	2,900	73.0%	2,588	2,509	97.0%	63.2%
Klein	3,681	2,299	62.5%	1,871	1,765	94.3%	48.0%
Pasadena	4,028	1,896	47.1%	1,603	1,387	86.5%	34.4%
Spring	2,523	1,504	59.6%	1,181	1,064	90.1%	42.2%
Sprg Brnch	2,832	1,720	60.7%	1,555	1,441	92.7%	50.9%

Figure 21 provides a general illustration of the disparities in graduation rates for HISD students that persisted through all four years of high school in HISD. While approximately 95% of both white and Asian persisters do graduate on-time, only 83% and 79% of African-American and Hispanic persisters, respectively, receive their degree. LEP students have by far the lowest graduation rate while gifted students have the highest. The difference between the graduation rates of male and female students is less than 1%.

While the data on high school persistence, dropouts, and graduation rates presented thus far have only been disaggregated to the level of district, there is surely a great deal of variability in these outcomes between schools within a district. While an extensive analysis of the performance of

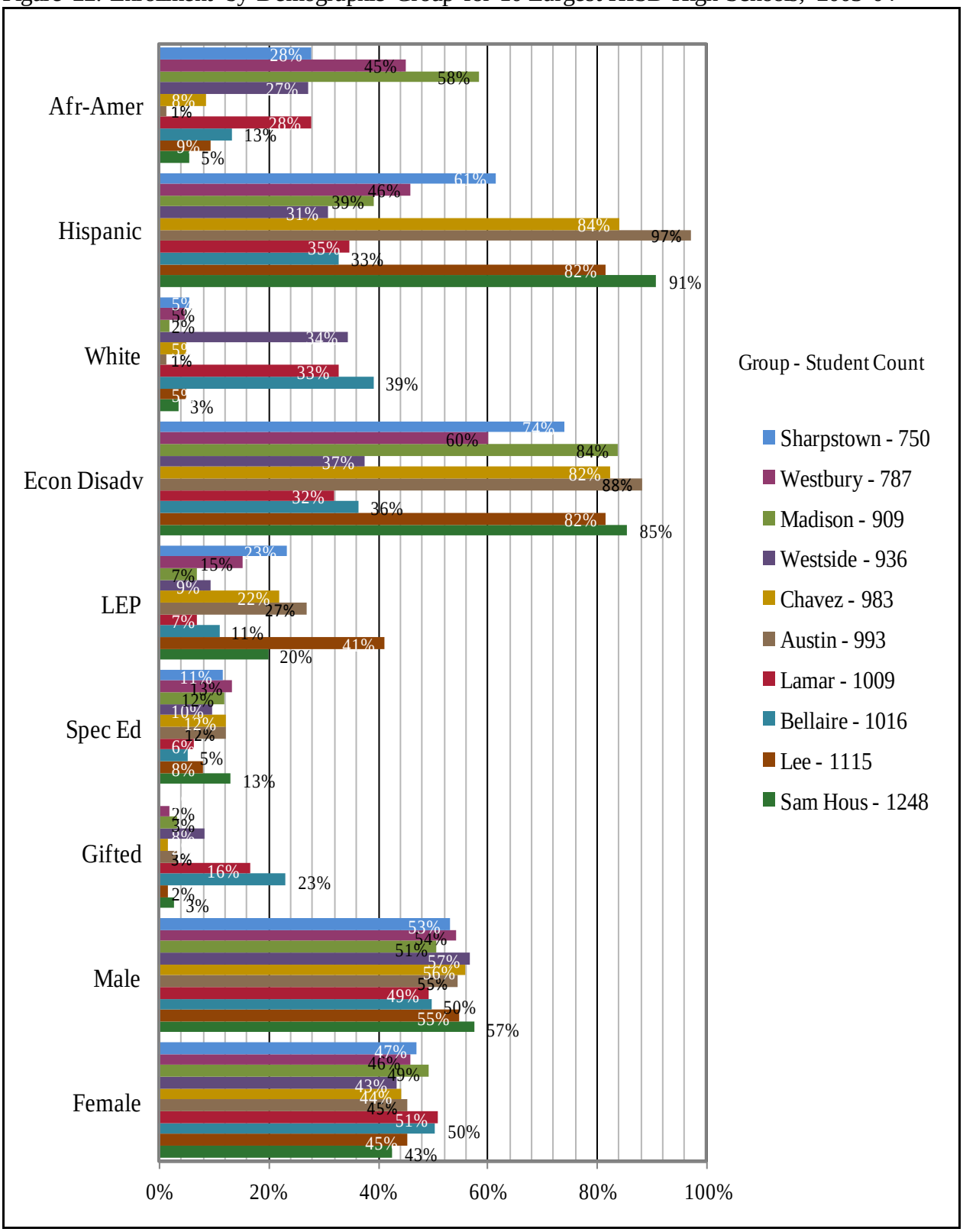
high schools is beyond the scope of the current report as this study is focused primarily on district performance, we present some preliminary data for the outcomes of interest for the ten HISD high schools with the largest 9th grade cohort sizes in the district in Figure 22.

Figure 21: Graduation Rates of 4-Year Persisters (2007) in HISD by Demographic Group



As shown in Figure 22, these schools differ significantly in terms of their demographic makeup. While no school's student body consists of more than 40% white students it is evident that some schools are still far more segregated than others. Contrasting Lamar HS to Austin HS reveals these differences. Lamar's student body is relatively evenly distributed between African-American, Hispanic, and white students, with each group contributing between 27% and 35% of the total school population. Additionally, only 32% of Lamar's student body is economically disadvantaged. On the other hand, 97% of Austin HS's population is Hispanic while African-Americans and whites make up only slightly more than 1.3% each, and nearly 90% of the student body is classified as being economically disadvantaged. The percentage of LEP, special education, and gifted students also varies widely between schools; the proportion of LEP students ranges from 7%-41%, special education students comprise between 5%-13%, and gifted students make up as little as 0.5% of the student body in Sharpstown HS to as much as 23% of the total population in Bellaire HS.

Figure 22: Enrollment by Demographic Group for 10 Largest HISD High Schools, 2003-04



Once again, certain relationships between demographic composition and high school persistence, dropout, and graduation rates are apparent when comparing the performance of different HISD high schools. Schools with larger non-Asian minority, low-income, and LEP populations were far more likely to have lower persistence rates, higher dropout rates, and lower eventual graduation rates. In fact, the correlation between percent white and percent of the 9th grade cohort that eventually graduated was 0.87 (on a scale of 0-1 with 0 being no correlation and 1 being perfect correlation between the two variables). This finding is similar to the relationship between the same variables at the district level. However, it is difficult to determine the cause of this correlation without further analyzing other variables that may influence persistence and graduation. Future studies should continue to analyze the factors that influence high school persistence, dropping out, and graduation, and specifically those school-level variables that affect students' chances of successfully completing their high school education.

Table 6: High School Persistence, Dropout, and Graduation Rates for 10 Largest HISD High Schools

	9th Grade 03-04 Cohort	10th Grade	11th Grade	12th Grade	All Years	Dropout Ever	Graduate On-time
Sharpstown	750	55%	42%	41%	35%	23%	33%
Westbury	787	48%	42%	41%	32%	21%	35%
Madison	909	60%	47%	44%	40%	20%	47%
Westside	936	65%	60%	61%	52%	13%	59%
Chavez	983	53%	46%	45%	37%	23%	41%
Austin	993	47%	32%	33%	24%	23%	38%
Lamar	1009	86%	71%	70%	66%	10%	65%
Bellaire	1016	73%	65%	68%	59%	8%	65%
Lee	1115	39%	31%	29%	19%	32%	22%
Sam Houston	1248	59%	41%	39%	32%	19%	29%

These ten high schools also differ widely in terms of the persistence, dropout, and graduation rates of their students. We once again calculated the four-year persistence rate (the "All Years" row in Table 6 by only including those students that were present in the correct grade at the same school for each consecutive year. In terms of high school persistence, dropout rates, and graduation rates, Lamar and Bellaire are the two highest performing HISD high schools while Lee appears to be the lowest performing. Approximately 59% and 66% of Lamar and Bellaire 9th grade cohorts, respectively, made it through all four years of high school while only 19% of Lee's cohort persisted. Lee's four-year dropout rate of 32% was the highest of the ten schools while Bellaire's 8% was the lowest. In regards to graduation rates, less than 30% of Lee and Sam Houston's cohorts graduated on time while approximately 65% of Lamar and Bellaire's student bodies did (as a caveat, the graduation rate presented in the table was calculated simply by taking the 9th grade cohort and seeing what percentage graduated by 2007 regardless of what school or district they graduated from). In sum, both districts in Region IV and high schools in HISD vary markedly in terms of high school persistence and completion rates.

Chapter Seven

Postsecondary Access and Preparedness

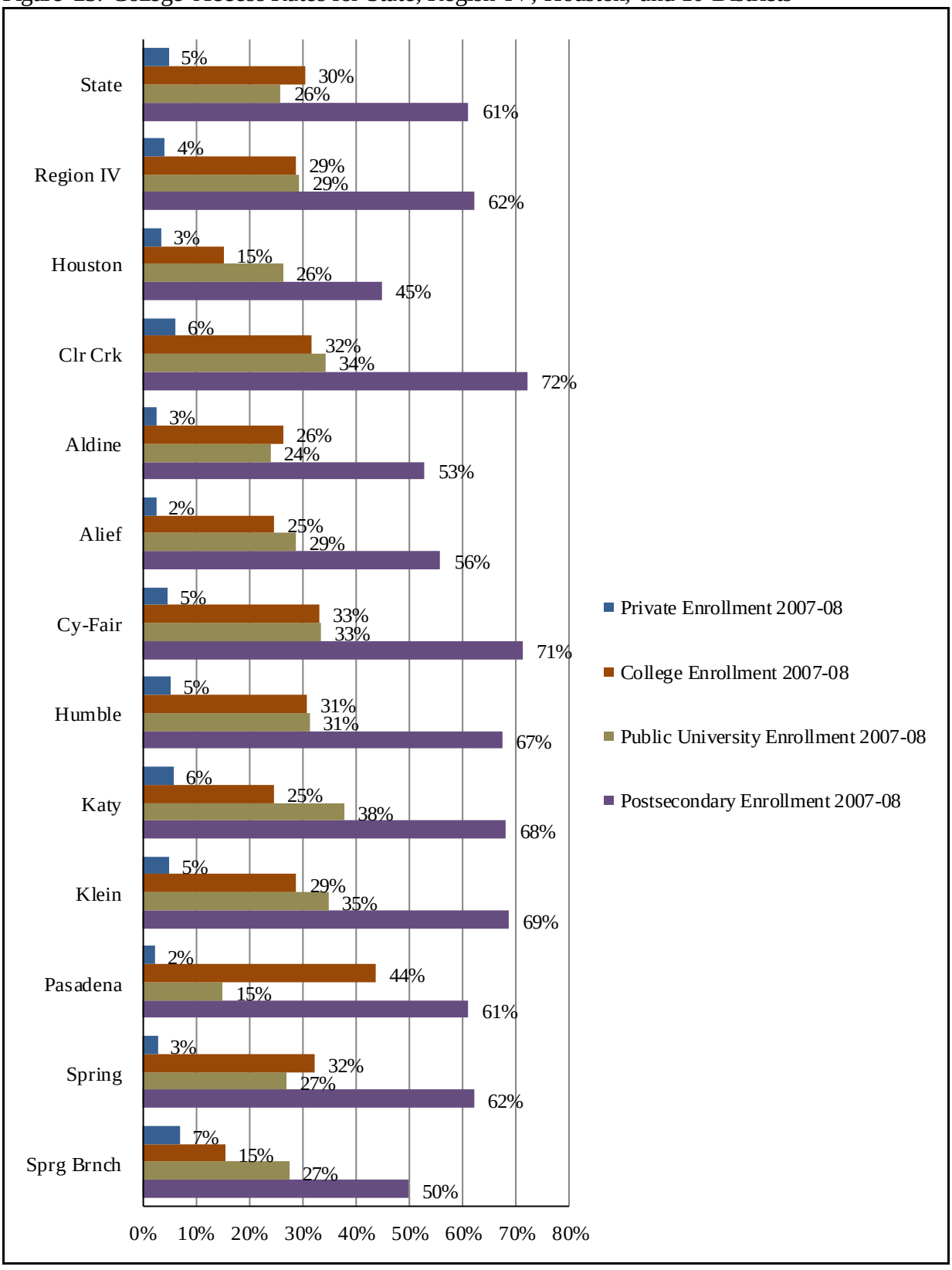
As shown in the previous chapter, districts vary significantly in regards to the rates at which their students persist through high school, complete their secondary education, and drop out of school. Now that we have reviewed these high school persistence rates we can turn to the issue of postsecondary access. The current chapter also uses Cohort 1 students and focuses on three primary topics of interest relating to college access, which are: 1) Who gains access to postsecondary institutions out of the cohort that persisted through high school and graduated on-time; 2) How prepared are postsecondary students as measured by enrollment or non-enrollment in developmental education, and; 3) What factors at the K-12 level predict postsecondary access? We will first present general enrollment rates and compare them across districts before we turn towards explaining the variability in postsecondary access through statistical analysis.

Figure 23 on the following page provides data on the Texas postsecondary institution enrollment rates for the state, Region IV, HISD and the ten other districts in the study. As mentioned before, Cohort 1 students began high school in the 2003-04 school year and graduated in May of 2007, making 2007-08 their first year of possible postsecondary. Students were counted as having accessed a postsecondary institution if they were enrolled in any Texas institution, whether public or private, 2-year or 4-year, as long as they were enrolled for at least one course in either the fall 2007 or spring 2008 semester. The students used as the denominator for the calculations of postsecondary access rates were those students that persisted through all four years of high school in the same district and graduated on-time.

Four different access rates are included for each sample. The first bar in each group represents the percentage of persister graduates that enrolled in a private university, the second bar represents the percentage enrolled in community colleges, technical institutes, for-profit colleges and other such institutions, the third bar represents the percentage enrolled in public universities, and the final bar is the total percentage of students from each cohort enrolled in any type of postsecondary institution.

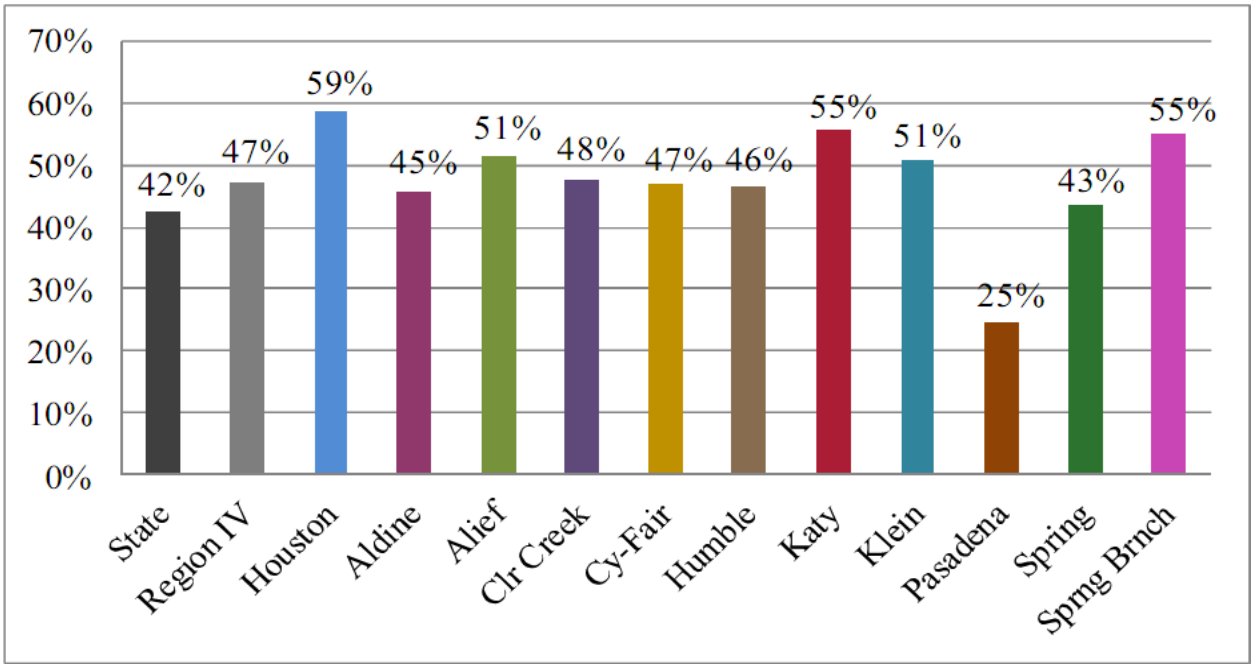
As shown in this figure, the average postsecondary enrollment rates for the state and Region IV were both slightly more than 60%. Clear Creek and Cypress-Fairbanks had the highest rates of postsecondary access with 72% and 71%, respectively, while students graduating from HISD had the lowest rates of enrollment with only 45% of the cohort gaining access to some type of college their first year. Districts also varied greatly in regards to the percent of their graduates that gained access to a public university. Pasadena students were the least likely to enroll in a university with only 15% attending such an institution while students from Katy were the most likely with approximately 38% of these students attending a public university during their first year of possible postsecondary. As we can see, then, the districts in the sample exhibit a great deal of variability in regards to the likelihood of their students attending postsecondary following high school graduation.

Figure 23: College Access Rates for State, Region IV, Houston, and 10 Districts



While HISD students had lower rates of postsecondary access than their peers from any other district, Figure 24 casts the district in a more favorable light. This figure depicts the percentage of the cohort of postsecondary enrollees that attended a public university compared to a college or private university. In this regard, HISD has the highest percentage of its postsecondary students attending a public university rather than a college or private university at nearly 60%. Both the state and Region IV averages are less than 50% and only two other districts, Katy and Spring Branch, have more than 55% of their postsecondary enrollees attending a university. Perhaps surprisingly then, while HISD students are less likely than their peers from neighboring districts to persist through high school, graduate, and gain access to a postsecondary institution, those students from HISD that do make it to the postsecondary level are more likely than students from any other study district to gain access to a public university.

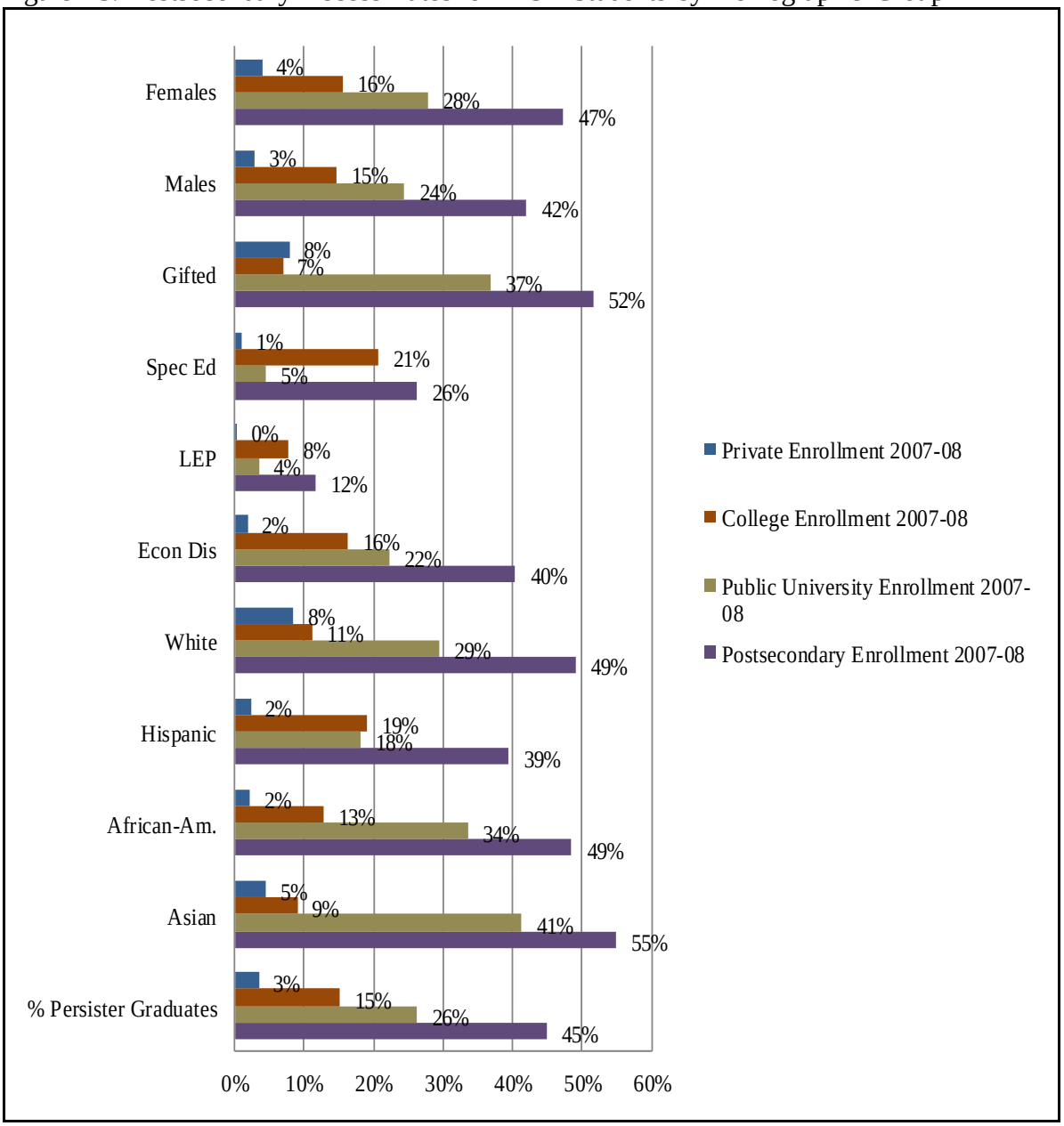
Figure 24: Percent of Students that Attended a Public University of Students Who Enrolled in Some Type of Postsecondary Institution



Given the fact that the majority of HISD students are non-Asian minorities and more than 80% are economically disadvantaged, the high rate of university attendance by HISD students is a positive sign. However, in order to determine if the rates of postsecondary access generally and university attendance specifically are equally high for all subgroups of HISD students it is important to disaggregate the numbers by demographic group. Table 25 on the following page provides this disaggregated data. As shown in this table, HISD has both strengths and areas for improvement in terms of helping their students gain access to postsecondary institutions. On the less positive side, LEP, special education, and economically disadvantaged students have lower rates of postsecondary access than their peers. The situation is particularly dire for LEP students with only 8% attending any type of college. Males also have lower rates than their female counterparts by approximately 5%. However, it is heartening to note that African-American graduates from HISD gain access to postsecondary institutions at nearly the same rate as their white peers and the percentage of African-American graduates that attend a public university is

actually higher than that for whites, although a larger percentage of whites attend private universities. However, Hispanics continue to access postsecondary institutions generally and universities specifically at a rate more than 10% lower than whites.

Figure 25: Postsecondary Access Rates for HISD Students by Demographic Group



As mentioned previously, while the focus of this study is on the relative performance of districts in regards to their influence on the postsecondary outcomes of their students, the variation between schools within districts is also a topic of interest that should be explored. Figure 26 on the following page provides the postsecondary access rates for students from the ten largest HISD high schools (as defined by those schools with the largest 9th grade cohorts in 2003-04) disaggregated by the type of postsecondary institution attended. As evidenced by this figure, the

rate of postsecondary enrollment varied substantially between schools, with a low of 33% to a high of 60% postsecondary enrollment.

Figure 26: Postsecondary Enrollment Types – 10 Largest High Schools in HISD

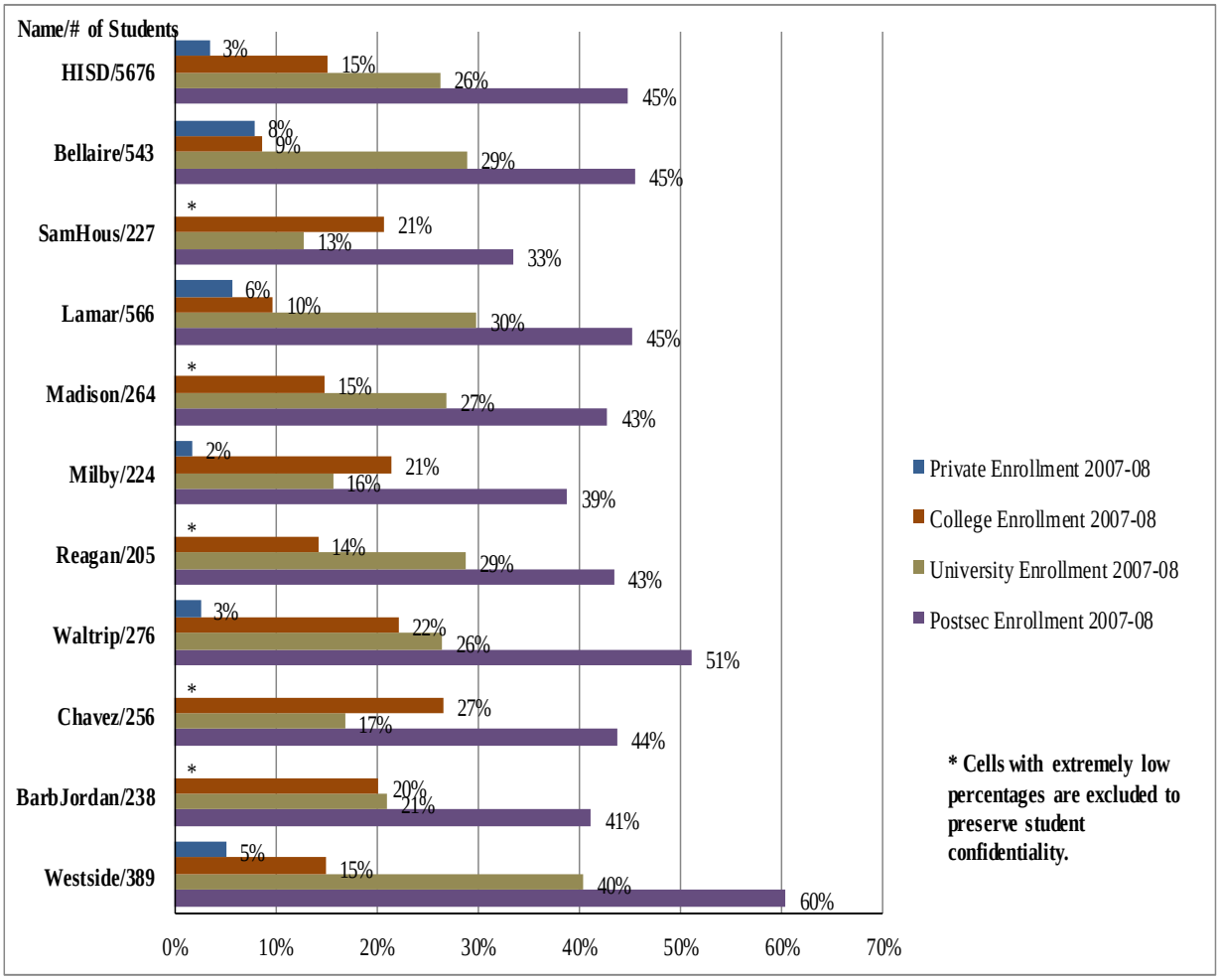
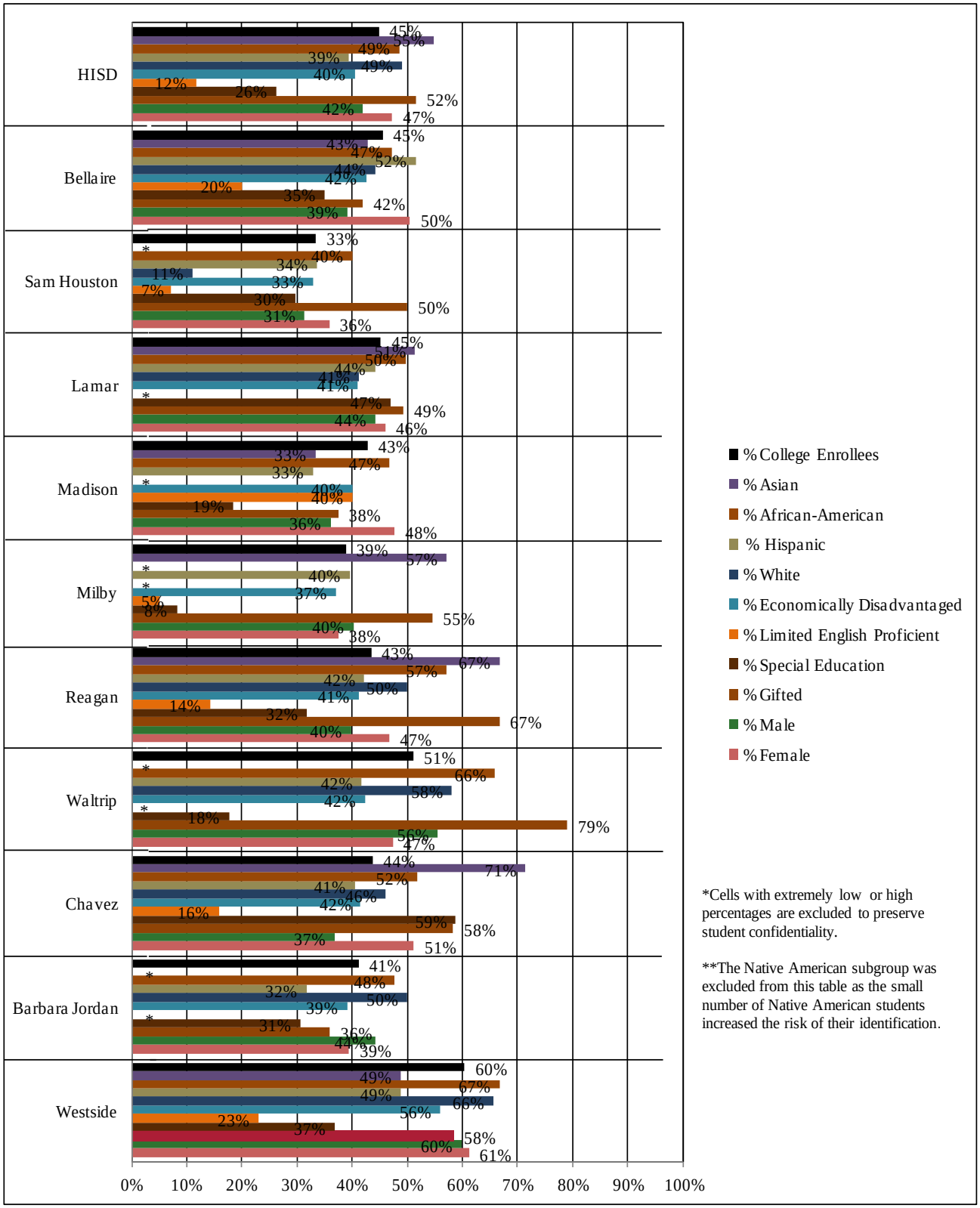


Figure 27 also shows the disaggregated postsecondary access rates by demographic characteristic of the students for the ten largest high schools and HISD. The first point that should be reiterated regarding the postsecondary access rates of HISD students is the fact that African-American and white graduates gain access to postsecondary institutions at roughly the same rate. The bars for all of HISD show that African-Americans only trail whites by about half of one percent. However, Hispanic graduates still gain access to postsecondary institutions at a rate approximately 10% less than whites. Given this fact, it is beneficial to identify those schools that are doing especially well at helping Hispanic students gain access to college, as well as those where the gap between the access rates of Hispanics and whites is especially pronounced. In terms of the latter category, Hispanic students from Westside, Barbara Jordan, and Waltrip fare much worse than their African-American and white peers from the same school, with the difference in the access rates as high as 24% in Waltrip. But a number of schools are performing

Figure 27: Postsecondary Enrollment–10 Largest High Schools in HISD by Demographic Group



quite well in this regard, particularly Bellaire and Lamar high schools. While Hispanic students at Lamar trail their African-American peers by a little more than 5% they are still outperforming their white peers by only about 3%, and Hispanic students at Bellaire are actually gaining access to postsecondary institutions at a rate higher than any other racial subgroup. Also of note, Westside's economically disadvantaged population, Madison's LEP subgroup, and Chavez and Lamar's special education students are all gaining access to college at rates significantly higher than the district averages. Finally, because HISD males are trailing their female peers by more than 5% it is important to point out that Lamar, Waltrip, and Westside have male postsecondary access rates that equal or surpass the rates for females.

It is no doubt important for districts to assist their students in gaining access to postsecondary institutions, but it is equally important that districts prepare students to be academically successful once they reach college or university. While the next two chapters of the report will more deeply analyze the paths students take once they reach postsecondary institutions and the factors that influence college persistence and completion, one way to determine the academic preparedness of postsecondary students is to investigate the number of students that are required to take developmental education coursework once they reach the postsecondary level.

Students that do not meet certain qualifications of academic preparedness are required to take developmental education courses once they reach postsecondary. These courses do not count towards any degree or certificate requirements but are solely designed to remediate and prepare students for future success in postsecondary courses. Students may be exempted from or assigned to developmental education for a variety of reasons, such as performance on state accountability assessments, SAT/ACT scores, or scores on a number of placement tests such as ASSET, ACCUPLACER, COMPASS, and THEA. We focus on the percentages of students that were enrolled in some type of developmental education coursework and the subject areas of the developmental education courses they enrolled in.

Table 7 provides an overview of the rates of developmental education placement for the state, Region IV, HISD, and the ten other districts in the study. The first finding that should be highlighted is the relative rates of developmental education for different subject areas. For the state overall, 9% of students were enrolled in a developmental education course for writing and 12.1% for reading, but approximately 29.4% of all postsecondary enrollees were required to take developmental education for math during their first semester. This finding reinforces the fears of many educational advocates that a significant number of students are not graduating from their school or district adequately prepared for postsecondary success. It is also troubling to note that many students are ill-prepared in multiple subjects simultaneously. While the majority of students assigned to developmental education only are for a single subject, significant numbers of students do take these courses for multiple subjects. Additionally, there also appears to be variation between districts in regards to developmental education enrollment. While only one fourth of Spring Branch students were required to take some developmental education, nearly half of students from Spring were enrolled in developmental education. Figure 28 provides a visual representation of developmental education placement for the cohort.

Table 7: Percentages of Developmental Education Enrollment for State, Region IV, HISD, and Ten Study Districts

	Valid Enrollees (Fall 2007)	Dev Ed Math	Dev Ed Writing	Dev Ed Reading	One Dev Ed Sub	Two Dev Ed Sub	Three Dev Ed Sub	Any Dev Ed Sub
State	91466	29.4%	9.0%	12.1%	23.4%	8.1%	3.7%	35.1%
Region IV	19888	28.8%	9.7%	10.5%	22.0%	7.5%	4.0%	33.5%
Houston	2069	37.0%	14.2%	18.5%	24.9%	11.6%	7.2%	43.7%
Aldine	685	35.2%	18.8%	18.3%	24.2%	12.0%	8.0%	44.2%
Alief	598	34.1%	14.7%	16.1%	25.3%	10.5%	6.2%	42.0%
Clr Creek	1071	22.4%	4.3%	7.7%	19.2%	5.6%	1.3%	26.1%
Cy-Fair	2475	30.2%	11.1%	7.4%	21.9%	7.0%	4.3%	33.2%
Humble	833	27.7%	9.5%	6.0%	20.7%	7.0%	2.9%	30.5%
Katy	1498	23.2%	5.5%	5.3%	19.2%	4.7%	1.8%	25.7%
Klein	1054	26.7%	7.5%	5.3%	21.0%	5.7%	2.4%	29.0%
Pasadena	727	27.5%	7.0%	10.0%	25.2%	6.2%	2.3%	33.7%
Spring	570	43.0%	19.3%	16.7%	27.4%	13.7%	8.1%	49.1%
Sprg Brnch	563	23.1%	6.9%	6.6%	16.2%	5.7%	3.0%	24.9%

Figure 28: Percentages of Developmental Education Enrollment for State, Region IV, HISD, and Ten Study Districts

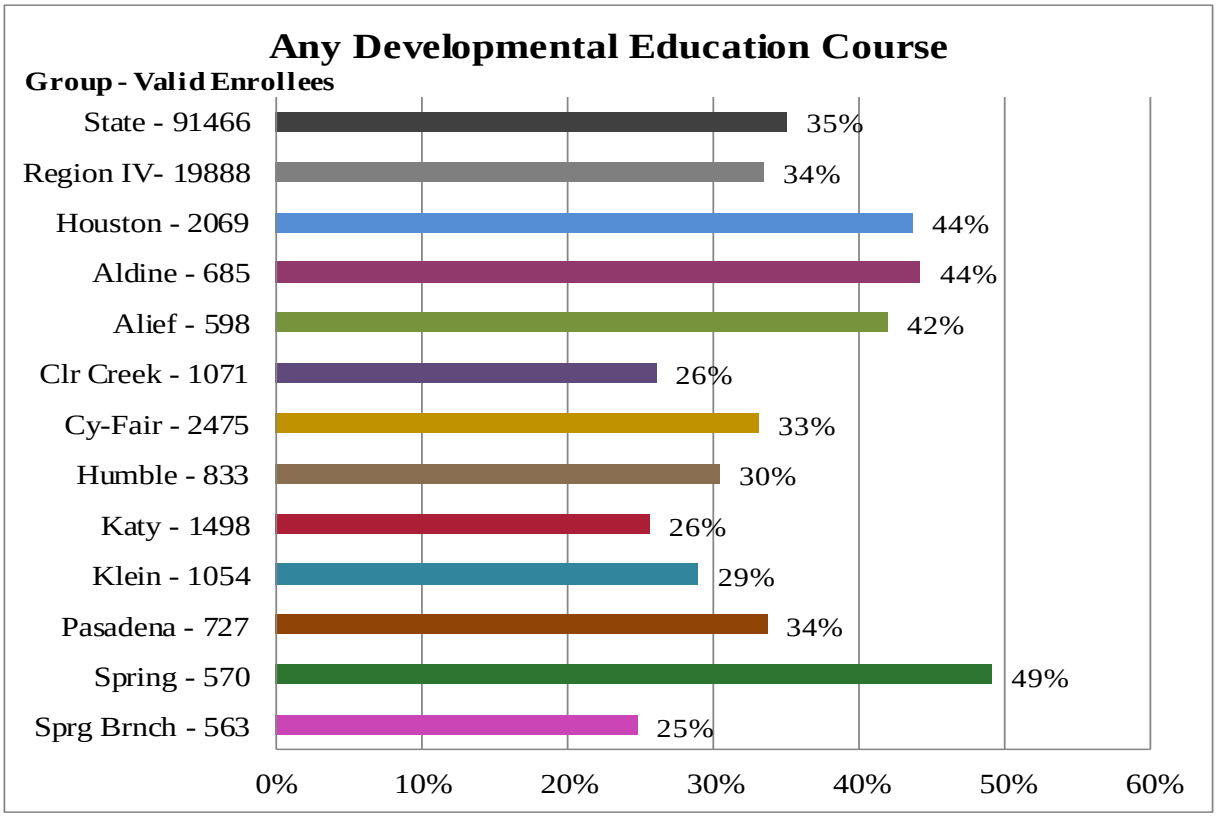


Table 8 provides the developmental education rates for HISD students disaggregated by student subgroup. Once again, the influence of race, socioeconomic status, and a number of other demographic variables is profound in relation to developmental education placement. While approximately 11.9% of Asian students and 19.1% of white students took at least one developmental education course during their first semester of postsecondary, more than half of all African-American and Hispanics students did. Thus, even when non-Asian minority students are gaining access to postsecondary institutions they appear to be significantly less prepared for success in higher education than their peers. Approximately 52.4% of economically disadvantaged students enrolled in developmental education, higher than the district average. The disparity in developmental education placement is most pronounced between special education and gifted students. While only 17.9% of gifted students were assigned to developmental education, approximately 76.9% of special education students were found enrolled in developmental education during their first semester of postsecondary. Interestingly, however, while males appear to gain access to higher education at lower rates than their female peers, a higher percentage of female students were assigned to developmental education.

Table 8: Percentages of Developmental Education Enrollment for HISD Students by Demographic Group

	Valid Enrollees (Fall 2007)	Dev Ed Math	Dev Ed Writing	Dev Ed Reading	One Dev Ed Sub	Two Dev Ed Sub	Three Dev Ed Sub	Any Dev Ed
Students	2069	37.0%	14.2%	18.5%	6.6%	*	3.0%	11.9%
Asian	168	11.3%	4.2%	4.8%	30.0%	33.1%	7.7%	52.6%
AfrAmer	713	43.8%	18.1%	22.0%	30.0%	33.1%	7.7%	52.6%
Hispanic	822	45.5%	17.4%	24.8%	28.7%	15.1%	9.6%	53.4%
White	366	16.4%	3.8%	3.8%	15.0%	3.3%	*	19.1%
Econ Dis	1183	44.1%	18.1%	23.8%	28.4%	14.4%	9.6%	52.4%
LEP	24	45.8%	37.5%	37.5%	25.0%	29.2%	*	50.0%
Spec Ed	91	67.0%	47.3%	51.7%	17.6%	29.7%	29.7%	76.9%
Gifted	381	13.9%	3.7%	5.3%	13.1%	4.5%	*	17.9%
Males	905	34.8%	15.6%	16.2%	22.0%	10.7%	7.7%	40.4%
Females	1164	38.7%	13.1%	20.3%	27.2%	12.2%	6.8%	46.2%

*Cells with extremely low percentages are excluded to preserve student confidentiality.

Analyses of Postsecondary Access

Now that we have presented a descriptive overview of postsecondary access and developmental education patterns, we now turn to our analyses of the factors that predict postsecondary access. As mentioned in our methodology section in Chapter Five, the dichotomous nature of our outcome variable of interest (postsecondary access) lends itself to analysis through logistic regression techniques. With logistic regression, the outcome variable is in fact a ratio of the probability of an event occurring over the probability of it not occurring. For example, if we took a sample of five students, three of which gained access to postsecondary institutions and two of which did not, the odds of a student in the sample getting into college would be 3/2. It should be

noted that the outcome is not a percentage; while 60% of the sample gained admittance into college, the odds of an individual getting access is 1.5. When variables are included in a logistic regression model, an odds ratio is estimated for each variable which represents the difference in the odds of the outcome variable occurring. If an estimated odds ratio is greater than 1 the likelihood of the outcome occurring is higher while an odds ratio between 0 and 1 means that the odds of the outcome occurring are lower.

We first examine student access to any postsecondary institution. The outcome variable is any type of postsecondary access. In other words, the model does not differentiate between type of postsecondary institution such as community college, technical school, public university, or private university. Table 9 presents the variables that were included in Postsecondary Access Model 1. The first column is the name of the variable in the model, the second column is the standard estimate of the variable, the third column is the odds ratio for the variable which is calculated from the standard estimate, and the final column contains the results of a test of statistical significance (a number less than .05 is considered "statistically significant" by conventional social science standards). For this model, no individual-level student characteristics were included; we simply wanted to begin by testing the relationship between the district a student attended and the likelihood of gaining access to college. To make the odds ratio estimates of the model interpretable the indicator variable for HISD was excluded from the model and serves as the reference category which is captured by the intercept parameter. The odds ratio estimate for each variable therefore represents the difference in the odds of postsecondary access between a student from the variable district and a student from HISD. As HISD had the lowest rates of postsecondary access out of the study districts it is unsurprising that HISD also had the lowest odds ratio in the model. The odds of students from Clear Creek and Cypress-Fairbanks gaining access to a postsecondary institution were more than three times the odds of access for HISD students. All districts performed statistically significantly better than HISD in terms of general postsecondary access when no other variables were controlled for in the model.

Table 9: Postsecondary Access Model #1: District Indicators

Variable	Standard Estimate	Odds Ratio	Rank	Sig.
Intercept (Houston)	-0.20	*	11	*
Aldine	0.32	1.38	9*	<.0001
Alief	0.44	1.56	8*	<.0001
Clr Creek	1.15	3.17	1*	<.0001
Cy-Fairbanks	1.11	3.03	2*	<.0001
Humble	0.92	2.53	5*	<.0001
Katy	0.96	2.62	4*	<.0001
Klein	0.99	2.69	3*	<.0001
Pasadena	0.65	1.92	7*	<.0001
Spring	0.69	2.01	6*	<.0001
Spring Branch	0.20	1.22	10*	<.0001

While the previous model provides a general picture of the relative rates of postsecondary access for students from different districts, the model does not account for variability in the student populations demographically or academically. The second analysis adds individual-level student characteristics to the model to accomplish two ends. First, by controlling for these student attributes we are able to better approximate the relative performance of the districts in terms of helping their students gain access to postsecondary institutions. Second, we are also able to explore the relationship between individual-level characteristics, such as a student's race, economic status, and academic preparation, and that student's chances of enrolling in a postsecondary institution.

Table 10: Postsecondary Access Model #2: Individual-Level Variables and District Indicators

Individual-Level Variables				District-Level Variables				
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Rank	Sig.
Intercept	-5.46		<.0001	Intercept	-5.46	0.00	10	<.0001
Asian	0.29	1.34	<.0001	Aldine	0.28	1.33	8*	<.0001
African-American	0.04	1.04	0.374	Alief	0.27	1.31	9*	<.0001
Hispanic	-0.26	0.77	<.0001	Clr Creek	0.76	2.14	2*	<.0001
Econ Dis	-0.33	0.72	<.0001	Cy-Fair	0.80	2.23	1*	<.0001
LEP	-1.40	0.25	<.0001	Humble	0.54	1.71	6*	<.0001
Special Ed	-0.29	0.75	<.0001	Katy	0.52	1.67	7*	<.0001
Gifted	-0.10	0.90	0.035	Klein	0.63	1.88	3*	<.0001
Male	-0.19	0.83	<.0001	Pasadena	0.60	1.83	4*	<.0001
Percent Attend	0.05	1.05	<.0001	Spring	0.57	1.78	5*	<.0001
TAKS Reading CR	0.30	1.34	<.0001	Sprg Brch	-0.03	0.97	11	0.66
TAKS Math CR	0.26	1.29	<.0001					
TAKS Social CR	0.31	1.36	<.0001					
TAKS Science CR	0.14	1.16	0.006					
TAKS All CR	-0.11	0.90	0.074					
Total Advanced Core	0.00	1.00	0.538					
Total Dual-Credit	0.11	1.12	<.0001					

Table 10 presents the results for Postsecondary Access Model #2. The variables in the model are divided into two parts, but this is simply for ease of interpretation and does not reflect any characteristic of the analysis itself. The left-hand side of the table includes all individual-level variables that were included in the model and the right-hand side contains the district variables. While HISD was once again chosen as the district to be the reference category and the estimate of HISD's odds ratio is contained in the intercept parameter. The intercept is more complex in this model. The intercept parameter is the estimate of the odds of postsecondary access for a student that has a "0" (e.g., not gifted, not special education, not male, etc.) for all the other variables in the model. In the Postsecondary Access Model #2, the intercept parameter now represents the odds of access for a HISD student that also has a "0" for all the individual-level variables as well (see Appendix A for variable definitions). For example, the intercept represents students that are white because they do not have a "1" in any of the other ethnicity variables. The intercept represents the odds for a HISD student who is not classified as LEP, not economically disadvantaged, not identified as being special education, not gifted, etc. The "TAKS ___ CR"

variables is also dichotomous and indicates whether or not a student scored high enough on the TAKS test in that subject to be classified as college-ready, meaning that the intercept only represents those students who were not college-ready in any subject area as measured by the TAKS exams. Finally, the "Total Advanced Core" and "Total Dual-Credit" variables represent the total number of advanced core classes and dual-credit, respectively, that a student received credit for from all four years of high school. In this case, the intercept represents students who received no credit for advanced or dual-credit coursework. In logistic regression models with this many variables the intercept thus becomes less meaningful. We will first highlight some key findings from the individual-level variables before turning to the district variables.

In terms of ethnicity, Asian students are approximately 1.34 times more likely than whites to gain access to college, while Hispanic students are about 0.77 times less likely than whites to access college. However, the model did not find any significant difference between the access rates of whites and African-Americans. As was predicted, economically disadvantaged, LEP, and special education students were all significantly less likely to enroll in college, with LEP students being by far the least likely with odds of 0.25. Males were also found to be roughly 0.83 times less likely than females to make it to college. Interestingly, while some researchers have argued that there is little relationship between performance on standardized assessment and college access, our model found that scoring at the level of college-readiness was significantly related to college enrollment for every TAKS subject area. However, when controlling for performance on the individual assessments, there was no additional benefit of scoring at the college-ready level on all subjects simultaneously. Also noteworthy were the findings that each additional dual-credit course passed increased a student's odds of accessing college by approximately 1.12, but there was no significant relationship between advanced coursework and college enrollment.

As Postsecondary Access Model #2 contains all of the individual-level variables listed above, the estimates of the odds ratios for the district now have a slightly different interpretation. They still represent the difference in the odds of postsecondary access between a student in a variable district and a student in HISD but they now also control for all of the individual variables. The odds ratios are thus interpreted as the difference in the odds of access between a student in a variable district and an identical student (as defined by the variables in the model) in HISD. As we can see, the inclusion of these individual-level variables did change the odds ratios for the district variables. While a student from Clear Creek or Cypress-Fairbanks appeared to be approximately three times as likely to enroll in college compared to a student from HISD in the Postsecondary Access Model #1, when controlling for the individual-level variables a student from either of these same two districts is now (in Postsecondary Access Model #2) only about two times as likely to make it college as a HISD student. In fact, all of the odds ratios have decreased from the previous model to the current one, indicating that controlling for student characteristics reduces the estimated differences in the performance of districts in terms of student postsecondary access. Additionally, while Spring Branch was estimated to be performing significantly better than HISD in the previous model, the inclusion of the student-level variables has caused there to be no significant difference between Spring Branch and HISD in the current model. However, the nine other districts are still estimated to be performing significantly better than HISD even when controlling for individual-level variables.

While Postsecondary Access Model #2 attempted to account for variation in student population with individual-level variables, one of the drawbacks of this type of model is that assumes that there is no additional influence of student characteristics at the aggregate level. One might question this assumption and argue that a student characteristic, such as being economically disadvantaged, has an individual effect on the student's chances of accessing college but also the percentage of economically disadvantaged students across the district has an independent effect on that outcome. In other words, because the previous model did not account for district-level variables we were essentially treating all districts as identical in terms of the aggregate characteristics of their student body. Postsecondary Access Model #3 further explores the influence of district-level aggregate student demographics.

Table 11: Postsecondary Access Model #3: Individual-Level Variables and District-Level Variables

Individual-Level Variables				District-Level Variables			
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Sig.
Intercept	-3.81		<.0001	Intercept	-3.81		<.0001
Asian	0.23	1.35	<.0001	District Minority%	0.04	1.04	<.0001
African-American	0.05	1.05	0.339	District LEP%	0.01	1.01	0.403
Hispanic	-0.26	0.77	<.0001	District Econ Dis%	-0.05	0.96	<.0001
Econ Dis	-0.33	0.72	<.0001	District Special Ed%	-0.15	0.86	<.0001
LEP	-1.39	0.25	<.0001	District Gifted%	0.03	1.03	0.043
Special Ed	-0.29	0.75	<.0001				
Gifted	-0.10	0.90	0.035				
Male	-0.19	0.83	<.0001				
Percent Attend	0.05	1.05	<.0001				
TAKS Reading CR	0.30	1.35	<.0001				
TAKS Math CR	0.26	1.30	<.0001				
TAKS Social CR	0.30	1.35	<.0001				
TAKS Science CR	0.14	1.15	0.008				
TAKS All CR	-0.11	0.90	0.076				
Total Advanced Core	0.00	1.00	0.451				
Total Dual-Credit	0.11	1.11	<.0001				

The results of the third model are presented in Table 11. Once again we divided the variables in the model into individual-level variables and district-level variables for ease of interpretation. For this model we began by excluding all of the district-level indicator variables that were included in the previous two models and included only the aggregate district-level variables. These variables represent the percent of the entire student body (not just the 9th grade cohort) that was classified as having the characteristic the variable represents (See Appendix A for variable definitions). As these variables are continuous and can range anywhere from 0-100%, the odds ratios represent the change in the odds of a student accessing college for every 1% increase in the district-level variable. For example, the economically disadvantaged odds ratio of 0.96 means that, controlling for all of the individual-level characteristics as well as the other district-level

variables, a student is 0.96 times as likely to access college for every one percent increase in the district's economically disadvantaged population. The aggregate impact of special education students was also found to negatively influence postsecondary access chances as every one percent increase in a district's special education population results in a student being 0.86 times as likely to enroll in college. Districts with higher percentages of economically disadvantaged and special education students are therefore predicted to have lower rates of postsecondary access. The opposite holds true for the gifted population as increases in the district's gifted student percentage increases the likelihood of students accessing college. Interestingly, this model also found the same positive relationship for percent minority. Students are actually 1.04 times as likely to make it to the postsecondary level for every one percent increase in the minority population. No significant relationship was detected between percent LEP and the odds of postsecondary access.

The next logical step in our analyses would be to add all of the district-level indicators to the previous model in order to determine the relationship between the district a student attended and her odds of postsecondary access controlling for both individual characteristics and district makeup. However, the nature of the two types of district variables prevents all of these variables from being included in the model simultaneously. The reasons for this are statistically complex so we will not discuss them here, but one method of circumventing this difficulty is to add the district-level indicators to the previous model one at a time and re-run the model for each district. With this method we can calculate an estimate of the odds of postsecondary access for each district while still controlling for the district-level characteristics, but the interpretation of the odds ratios changes slightly. Because only one district indicator is included in the model at a time the estimated odds ratio now represents the difference in the odds of accessing postsecondary between students from the district included in the model and the *average* for students from the ten other districts that are excluded from the model. The results of the eleven models are presented in Table 12 entitled Postsecondary Access Model #4. For example, the estimate of Aldine's odds ratio is approximately 1.10, meaning that a student from Aldine is about 1.1 times as likely to enroll in college compared to the average of the ten other districts. The resulting estimates for the other variables besides the district indicators will be excluded from the table for the sake of simplicity as we have discussed the relationship between these variables and postsecondary access above.

A number of findings from this analysis are important to point out. First, the inclusion of the district-level characteristic variables did significantly change the odds ratios of districts, their relative rankings, as well the significance levels of the estimates. While Clear Creek and Cypress-Fairbanks still perform significantly better than the district averages, Spring Branch is now estimated to be the highest performing district in the study when controlling for the district-level variables. This finding is particularly interesting given the fact that Spring Branch was estimated to be the lowest performing district in Postsecondary Access Model #2 when no district-level characteristics were included in the model. Additionally, even though these three districts are performing significantly better than the average for the other districts, the estimates of the odds ratios are much lower than in previous models. The highest ranked districts were estimated to be performing three times better in the first model and twice as good in the second model; in these analyses a student from the district with the highest odds ratio is only 1.3 times as likely to access college compared to the average for the other districts. While this difference is

not insignificant, we can see that controlling for district composition significantly reduces the previously observed variation in postsecondary access. The ranking of the districts is included in the "Rank" column and only those districts that are performing statistically significantly different than the average are marked with an asterisk. Unfortunately, however, HISD is still the lowest performing district in the study even when controlling for district composition. A HISD student's odds of accessing a postsecondary institution are approximately 0.62 compared to the average of the other districts. Humble and Katy are also estimated to be performing significantly worse than the average for the other districts.

Table 12: Postsecondary Access Model #4: District Indicator Estimates Controlling for Individual-Level Variables and District-Level Variables

Variable	Standard Estimate	Odds Ratio	Rank	Sig.	Prev. Model Rank
Houston	-0.48	0.62	11*	0.004	11
Aldine	0.10	1.10	5	0.328	9*
Alief	-0.16	0.85	9	0.197	8*
Clr Creek	0.18	1.20	2*	0.007	1*
Cy-Fair	0.14	1.15	3*	0.006	2*
Humble	-0.13	0.88	8**	0.051	5*
Katy	-0.22	0.80	10*	<.0001	4*
Klein	0.02	1.02	6	0.808	3*
Pasadena	-0.11	0.90	7	0.331	7*
Spring	0.11	1.11	4	0.184	6*
Spring Branch	0.28	1.32	1*	0.038	10*

Analyses of University Access

While the outcome variable in the access models presented thus far has been postsecondary access generally, it is possible that the odds ratio estimates may be different depending on the type of postsecondary institution attended. Given the national and state push for increased university access, particularly for subgroups traditionally underrepresented in universities such as non-Asian minority and economically disadvantaged students, it is also important to investigate the performance of districts in terms of university access specifically. The next set of models that are presented all have university access as the outcome variable. This variable does not differentiate between the fall and spring semester during students' first postsecondary year, so a student will be counted as having accessed a university as long as they attended for one of the first two long semesters. The models that were run for these analyses are essentially identical to the previous models of general postsecondary access apart from the different outcome variable. The same logistic regression technique was used so the estimates of the odds ratios should be interpreted as they were for the previous analyses.

As in the preceding section, the first model we ran only included the district indicator variables in order to get a baseline understanding of the relative university access rates of the districts. The results of University Access Model #1 are presented in Table 13. Just as in the Postsecondary Access Model #1 above, the HISD indicator variable was excluded from the model which resulted in the model's intercept representing the odds ratio for HISD. Converting the intercept estimate to an odds ratio would result in an odds estimate of 0.35, or approximately 1/3, meaning that out of every four HISD students, one accesses a university while three do not. This was to be expected given the fact that 26% of the HISD cohort accessed a university in their first postsecondary year. Alief, Clear Creek, Cypress-Fairbanks, Humble, Katy, and Klein performed significantly better than HISD in terms of university access when no other variables were controlled for, while Aldine and Pasadena performed significantly worse. There was no statistically significant difference between HISD's university access rate and the rate for Spring, or Spring Branch.

Table 13: University Access Model #1: District Indicators

Variable	Standard Estimate	Odds Ratio	Rank	Sig.
Intercept (Houston)	-1.03	*	9	*
Aldine	-0.12	0.88	10**	0.064
Alief	0.12	1.13	6**	0.074
Clr Creek	0.38	1.46	3*	<.0001
Cy-Fair	0.34	1.41	4*	<.0001
Humble	0.24	1.27	5*	0.0002
Katy	0.53	1.71	1*	<.0001
Klein	0.40	1.49	2*	<.0001
Pasadena	-0.71	0.49	11*	<.0001
Spring	0.03	1.03	8	0.698
Spring Branch	0.06	1.06	7	0.387

The next university access analysis we ran included all of the district indicators from the previous model and added the individual-level variables. The results of University Access Model #2 are presented in Table 14. Once again, the table divides the estimates based on whether a variable was at the individual or district level. As before, the intercept in this model now represents a student who has a "0" for all the other variables in the model. As the HISD indicator variable was excluded from the model the intercept represents the odds of enrolling in university for a HISD student who is white, female, not economically disadvantaged, not LEP, etc. One aspect of these results that should be considered is the potentially different relationship between a predictor variable and postsecondary access generally versus the relationship between that same variable and university access specifically. As we will see, some factors that did not appear to be significantly related to postsecondary are in fact significant predictors of university access. We first turn to a description of the individual-level variables before returning to the estimated odds ratios for the study districts.

The first four variables presented relate to student ethnicity, and the indicator variable for white was excluded and serves as the reference category. The relationship between ethnicity and university has both some expected and some unexpected features. Similar to the models for general postsecondary access, in terms of university access, Asian students still perform significantly better than whites while Hispanics continue to perform significantly worse. A Hispanic student is only about 0.65 times as likely to enroll in university as a white student with the same academic background, language status, and economic status. However, one of the most intriguing findings from this analysis is the fact that African-Americans are more than twice as likely to access a university compared to a similar white student. This finding was quite unexpected given the fact that there was no significant difference between whites and African-Americans in any of the postsecondary access models. It may be beneficial to explore this relationship for students from across the state to see if these relationships hold true for all of Texas.

Table 14: University Access Model #2: Individual-Level Variables and District Indicators

Individual-Level Variables				District-Level Variables				
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Rank	Sig.
Intercept	-7.72	0.0004	<.0001	Intercept	-7.72	*	8	*
Asian	0.28	1.33	<.0001	Aldine	-0.03	0.97	9	0.699
African-American	0.75	2.11	<.0001	Alief	0.07	1.07	7*	<.0001
Hispanic	-0.43	0.65	<.0001	Clr Creek	0.18	1.20	4*	0.01
Econ Dis	-0.11	0.90	0.015	Cy-Fair	0.29	1.34	2*	<.0001
LEP	-1.19	0.31	<.0001	Humble	0.09	1.09	6	0.233
Special Ed	-0.97	0.38	<.0001	Katy	0.31	1.36	1*	<.0001
Gifted	0.09	1.10	0.051	Klein	0.28	1.32	3*	<.0001
Male	-0.11	0.90	0.0007	Pasadena	-0.44	0.65	11*	<.0001
Percent Attend	0.05	1.06	<.0001	Spring	0.15	1.16	5**	0.084
TAKS Reading CR	0.42	1.52	<.0001	Sprg Brch	-0.07	0.93	10	0.352
TAKS Math CR	0.56	1.75	<.0001					
TAKS Social CR	0.47	1.60	<.0001					
TAKS Science CR	0.23	1.26	0.0002					
TAKS All CR	-0.04	0.96	0.568					
Total Advanced Core	0.06	1.06	<.0001					
Total Dual-Credit	0.18	1.20	<.0001					

LEP students were still significantly less likely than non-LEP students to enroll in a university. While being classified as economically disadvantaged or special education negatively impacted a student's odds of access in both the current model and the general postsecondary model, the relationship between special education classification and access is far more negative in the university model (0.38 compared to 0.75) while the relationship between being economically disadvantaged and access is far less negative for university access (0.90 compared to 0.72). High school attendance was also found to significantly increase the odds of university access. The relationship between TAKS scores and university access is roughly the same as the relationship between TAKS scores and general postsecondary access; scoring at the level of college-readiness on each subject has an independent and positive effect on a student's chances of accessing

university, although there is no additional benefit of being college-ready for all TAKS subjects once the influence of scores on the individual subjects is controlled for. Finally, while dual-credit coursework still significantly increases a student's likelihood of postsecondary access generally and university access specifically, advanced coursework was found to have a significant influence on the odds of university access even though no such relationship was found between advanced coursework and general postsecondary enrollment. It is difficult to hypothesize as to why earning credit in advanced courses increases a student's chances of accessing university but does not positively influence the odds of general postsecondary access. Future research could investigate this finding more thoroughly to determine what mechanisms are influencing these findings.

In terms of district performance, controlling for individual student characteristics did change the estimated odds ratios for the districts and the rankings did change slightly. However, many districts continued to perform significantly better than HISD in terms of university access and only Pasadena performed statistically significantly worse. Spring Branch and Aldine had lower estimated odds ratios than HISD but these differences were not found to be statistically significant.

While the previous model controlled for individual student characteristics, once again the model assumed that there is no additional impact of aggregate district characteristics on the odds of postsecondary access. University Access Model #3 presented in Table 15 explores this assumption by including the district-level student characteristic variables that were included in the Postsecondary Access Model #3. Once again, the district-level indicators were excluded from the model at first in order to estimate the relationship between the district-level variables and university access. As these district-level variables represent the percent of a given subgroup in a district, the estimated odds ratios for these variables should be interpreted as the difference in the odds of university access for every one percent increase in the subgroup population in the district.

A number of results of this model are noteworthy. Two district-level variables were found to be significantly and positively related to a student's odds of university access. As in the Postsecondary Access Model #3, the percent of a district's population identified as gifted had a positive relationship on students' chances of enrolling in university. However, the second district-level variable that was found to be positively related to university access was the size of the district's special education population. The estimated odds ratio of 1.05 for the district-level special education variable signifies that for every one percent increase in the special education population a student is 1.05 times as likely to access a university. This finding is especially interesting given the fact that the relationship between percent special education and general postsecondary access was significantly negative in the Postsecondary Access Model #3. Although the precise cause of this phenomenon is uncertain, one potential explanation is that special education students gain access to colleges with relative frequency but rarely attend universities. Therefore, higher district percentages of special education students increases competition for slots in colleges and negatively influences odds of college access but decreases competition for university access among non-special education students. Future research should more fully explore these ostensibly countervailing relationships between special education and postsecondary access.

Table 15: University Access Model #3: Individual-Level Variables and District-Level Variables

Individual-Level Variables				District-Level Variables			
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Sig.
Intercept	-3.81		<.0001	Intercept	-3.81		<.0001
Asian	0.28	1.33	<.0001	District Minority%	0.01	1.01	0.082
African-American	0.76	2.14	<.0001	District LEP%	0.01	1.01	0.567
Hispanic	-0.43	0.65	<.0001	District Econ Dis %	-0.02	0.98	0.019
Econ Dis	-0.10	0.90	0.024	District Special Ed%	0.05	1.05	0.034
LEP	-1.19	0.30	<.0001	District Gifted%	0.04	1.04	0.012
Special Ed	-0.97	0.38	<.0001				
Gifted	0.07	1.08	0.111				
Male	-0.11	0.90	0.0006				
Percent Attend	0.05	1.06	<.0001				
TAKS Reading CR	0.41	1.51	<.0001				
TAKS Math CR	0.56	1.76	<.0001				
TAKS Social CR	0.48	1.61	<.0001				
TAKS Science CR	0.23	1.25	0.002				
TAKS All CR	-0.40	0.96	0.565				
Total Advanced Core	0.06	1.06	<.0001				
Total Dual-Credit	0.19	1.20	<.0001				

In the current model, the variable for the percent of minority students in the district also changed rather significantly compared to the Postsecondary Access Models. The previous analyses estimated that the percent of minority students in the district was significantly and positively related to the odds of a student gaining access to a postsecondary institution. The odds ratio was approximately 1.04 and was found to be quite statistically significant in the Postsecondary Access Model, but the relationship between percent minority and university access, while still positive, is not nearly as strong as before. The odds ratio is now estimated to be approximately 1.01 and is not found to be statistically significant at the standard $p < .05$ level (although it is still nearly statistically significant at $p = .082$). Once again, it is difficult to say why having a higher percentage of minority students may be positively related to postsecondary access generally but not university access specifically. Future research may be needed to better understand the mechanisms that influence this relationship. As in the Postsecondary Access Model, the percent of students in a district classified as economically disadvantaged decreased the odds of university access, while there was no significant relationship between the percent of the student population classified as LEP and access.

In the final set of analyses in this chapter we investigated the relationship between the district a student attended and her chances of university access when controlling for both individual- and district-level factors. In Table 16, entitled University Access Model #4, it should be reiterated that the nature of the district-level variables required us to run a separate model for each district but the results are all contained in the single table below. The estimates for the individual and

aggregate district variables presented in the table are identical to those contained in the previous table, although the estimates did change slightly with the inclusion of each new district indicator.

Table 16: University Access Model #4: District Indicator Estimates Controlling for Individual-Level Variables and District-Level Variables

Variable	Stnd Est	Odds Ratio	Rank	Sig.	Prev. Model Rank
Houston	0.64	*	1*	*	9*
Aldine	0.33	1.39	2*	0.006	10**
Alief	-0.16	0.84	8	0.188	6**
Clr Creek	-0.06	0.94	7	0.367	3*
Cy-Fair	0.20	1.22	3*	0.001	4*
Humble	-0.31	0.74	10*	<.0001	5*
Katy	0.17	1.18	4*	0.003	1*
Klein	-0.05	0.95	6	0.426	2*
Pasadena	-0.72	0.49	11*	<.0001	11*
Spring	0.04	0.96	5	0.663	8
Sprg Brch	-0.30	0.74	9*	0.037	7

The results of this analysis are perhaps the most surprising encountered thus far in the report. When controlling simultaneously for the influence of student-level characteristics and district-level variables, districts that previously appeared to be performing quite poorly in terms of university access are now estimated to be performing significantly above average. The most notable finding is the estimated performance of HISD in the current set of models. In University Access Model #2, which only contained individual-level variables and the district indicators, HISD ranked eighth out of the eleven districts in terms of university access, and the general Access Model #4 predicted that a student attending HISD had the lowest odds of accessing a postsecondary institution out of all of the districts in the study. However, in the current model HISD actually has the highest odds ratio of any district in terms of university access. A HISD student is approximately 1.9 times as likely to enroll in a university compared to the average of the other ten districts, an odds ratio more than 0.5 higher than the district with the next highest ratio. In this regard it appears that HISD is significantly outperforming expectations of university access given the composition of its student population. Aldine, Cypress-Fairbanks, and Katy are also performing significantly above the average for the other districts while Humble, Pasadena, and Spring Branch are performing significantly worse. The remaining districts all performed at approximately the average of the districts.

To summarize this chapter of the report, a number of themes have emerged as a result of the analyses of postsecondary access. One of the most important threads that ran through these analyses is the frequent disconnect between a general description of the patterns of postsecondary access and the results of the actual statistical analyses. A primary reason for this

finding may be due largely to the influence of student characteristics both at the individual level and at the aggregate. Contrasting the performance of districts with significantly different student populations may result in an apples-to-oranges comparison, making statistical analyses especially important for uncovering a more accurate understanding of performance. Another common finding from these analyses is the positive relationship between academic preparation, as measured by advanced and dual-credit coursework and TAKS scores, and postsecondary access. Another common finding that is less fortunate is that of the relatively low odds of Hispanic and LEP students enrolling in postsecondary institutions. In every analysis we conducted, Hispanic students had the lowest chances out of any ethnic group of making it to the postsecondary level and LEP students often had the lowest odds of any subgroup whatsoever. Given the rapidly increasing populations of Hispanic and LEP students in Texas, more attention needs to be paid to these students in order to ensure that their rates of postsecondary access begin to approach the rates of their peers. Finally, an important point to consider is that the nature of the analysis and the outcome of interest significantly change the ostensible performance of the district. A district may appear to be performing poorly in one area while excelling in another. It is therefore important to attempt to develop a nuanced understanding of district performance in order to more effectively tailor district strategy to the most urgent needs of students.

Chapter Eight

Postsecondary Persistence

The previous chapter identified a number of factors that both improve and inhibit a student's chances of gaining access to a postsecondary institution: academic preparation through advanced and dual-credit coursework, performance on standardized assessments, demographic characteristics, and the district a student attends are all predictive of college access. However, gaining access to a college or university does not guarantee that a student will persist through and successfully complete their postsecondary education. Thus far it remains to be seen if the variables that predict college access will also predict college persistence and completion. This chapter focuses on college persistence patterns for students across the state and students from Region IV, HISD, and the ten area study districts.

As mentioned in the methodology section in Chapter Six, the cohort of students used for the previous two chapters had been out of high school for only three years at the time of this study, making it difficult to study their college persistence and completion patterns. We therefore have elected to follow a different cohort of students for the final two sections of our analyses. Cohort 2 students were seniors during the 2003-04 school year and had thus experienced six years of possible postsecondary education by 2009-10. While these analyses will once again focus both on individual and district variables that predict persistence, at this point we wish to reiterate that conclusions and interpretations of the findings relating to the influence of the district a student attended on her chances of persistence should be tentative given the fact that we only know that Cohort 2 students attended their district for their senior year. In other words, it would be possible to have a student who attended District A from kindergarten through grade eleven but moved to District B for her senior year included in the District B cohort. In this case it is difficult to determine how much District B might influence her postsecondary persistence. However, the benefit of this analysis is that we can include all students who graduated from a district in our analyses instead of just those that attended the same district for all four years of high school.

Table 17 provides the demographic characteristics of Cohort 2 for the state, Region IV, HISD, and the other ten districts. While the differences between the districts are important to consider just as in the previous two chapters, what is particularly interesting to note is the significantly different demographic compositions of Cohort 2 compared to Cohort 1. For example, in most districts Cohort 2 has significantly higher percentages of white and gifted students and significantly lower percentages of non-Asian minority, LEP, and economically disadvantaged students. In HISD only about 9% of the ninth graders in Cohort 1 were white but the percentage is nearly 15% for the seniors in Cohort 2. Additionally, the percentage of economically disadvantaged students in Cohort 2 is approximately 10% more than the percentage of Cohort 1 students. These trends may be explained by disproportionate numbers of non-Asian minority, LEP, economically disadvantaged, and special education students dropping out of high school early.

Table 17: Demographic Characteristics of Cohort 2 for State, Region IV, HISD, and Ten Study Districts

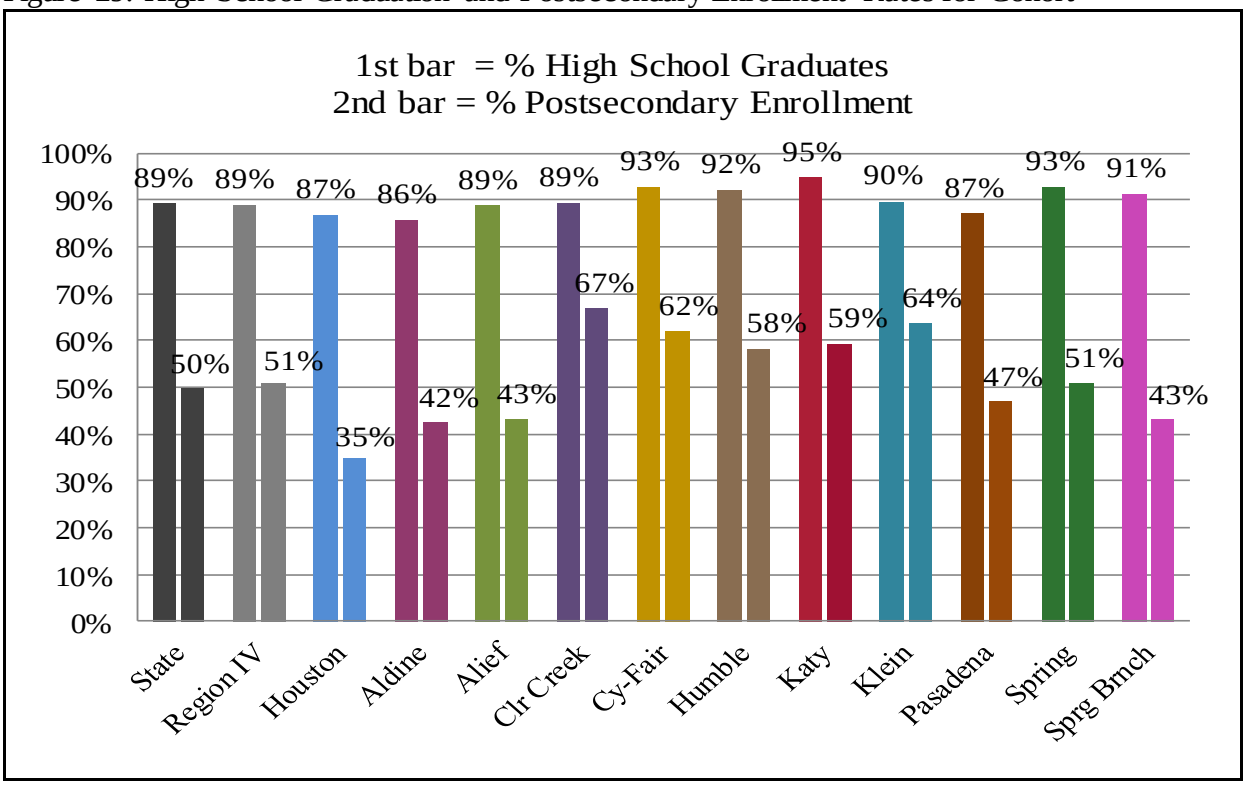
	12th Grade 03-04	%Asian/ PacIsl	%AfrAm r	%Hisp/ Latino	%White	%Econ Disad	%Lmt Eng Prof	%Spec Ed	%Gifted
State	266676	3.3%	13.8%	36.0%	46.5%	32.7%	3.9%	11.3%	9.8%
Region IV	55322	6.8%	21.5%	30.5%	41.1%	30.0%	3.7%	9.3%	9.3%
Houston	9804	4.3%	32.0%	49.0%	14.7%	61.7%	7.6%	11.3%	13.6%
Aldine	2663	4.2%	35.7%	50.9%	9.2%	57.8%	4.5%	10.2%	5.3%
Alief	2341	19.8%	36.4%	32.1%	11.7%	30.1%	6.4%	12.1%	6.2%
Clr Creek	2144	11.3%	7.7%	11.6%	69.2%	5.7%	2.5%	7.2%	10.6%
Cy-Fair	4934	9.1%	10.6%	21.5%	58.8%	12.8%	2.5%	9.8%	9.2%
Humble	1816	4.0%	11.9%	14.9%	68.9%	8.8%	1.3%	7.8%	11.4%
Katy	2768	6.6%	5.9%	16.8%	70.5%	9.3%	1.5%	9.0%	9.2%
Klein	2548	8.8%	13.3%	16.9%	60.7%	12.5%	2.3%	9.0%	5.3%
Pasadena	2335	4.4%	6.6%	60.4%	28.4%	34.5%	6.0%	5.8%	7.4%
Spring	1566	6.6%	30.6%	23.4%	39.2%	27.4%	2.1%	8.2%	16.1%
Sprg Brnch	2059	9.5%	5.8%	37.0%	47.6%	35.1%	7.2%	7.7%	9.9%

*AEIS Data, 2003-04

Figure 29 provides the graduation rates and initial postsecondary enrollment rates for the state, Region IV, HISD, and the ten other districts in the study. The graduation rate (first bar of each pair) represents the percent of students enrolled as high school seniors from each district that graduated at the end of their senior year. The postsecondary enrollment rate (second bar of each pair) represents the percentage of high school graduates from each district that enrolled in any type of postsecondary institution in Texas during either the fall or spring semester in the year immediately following graduation.

While the scale of the graph somewhat masks the disparities between districts in regards to graduation rates, these disparities are in fact quite pronounced. Students from Aldine had the lowest graduation rate in the sample of 86%, while 95% of Katy's high school seniors graduated on time, a difference of about 9%. The state and Region IV averages were both 89%. The disparities between districts in relation to initial postsecondary enrollment rates are even starker as initial postsecondary access rates ranged from 35% in HISD to 67% in Clear Creek. In other words, nearly two-thirds of all graduates from Clear Creek enrolled in some type of postsecondary institution while only one-third of HISD's graduates did the same. In terms of the raw percentages, then, students from Clear Creek are approximately twice as likely to go to college after graduation as students from HISD.

Figure 29: High School Graduation and Postsecondary Enrollment Rates for Cohort

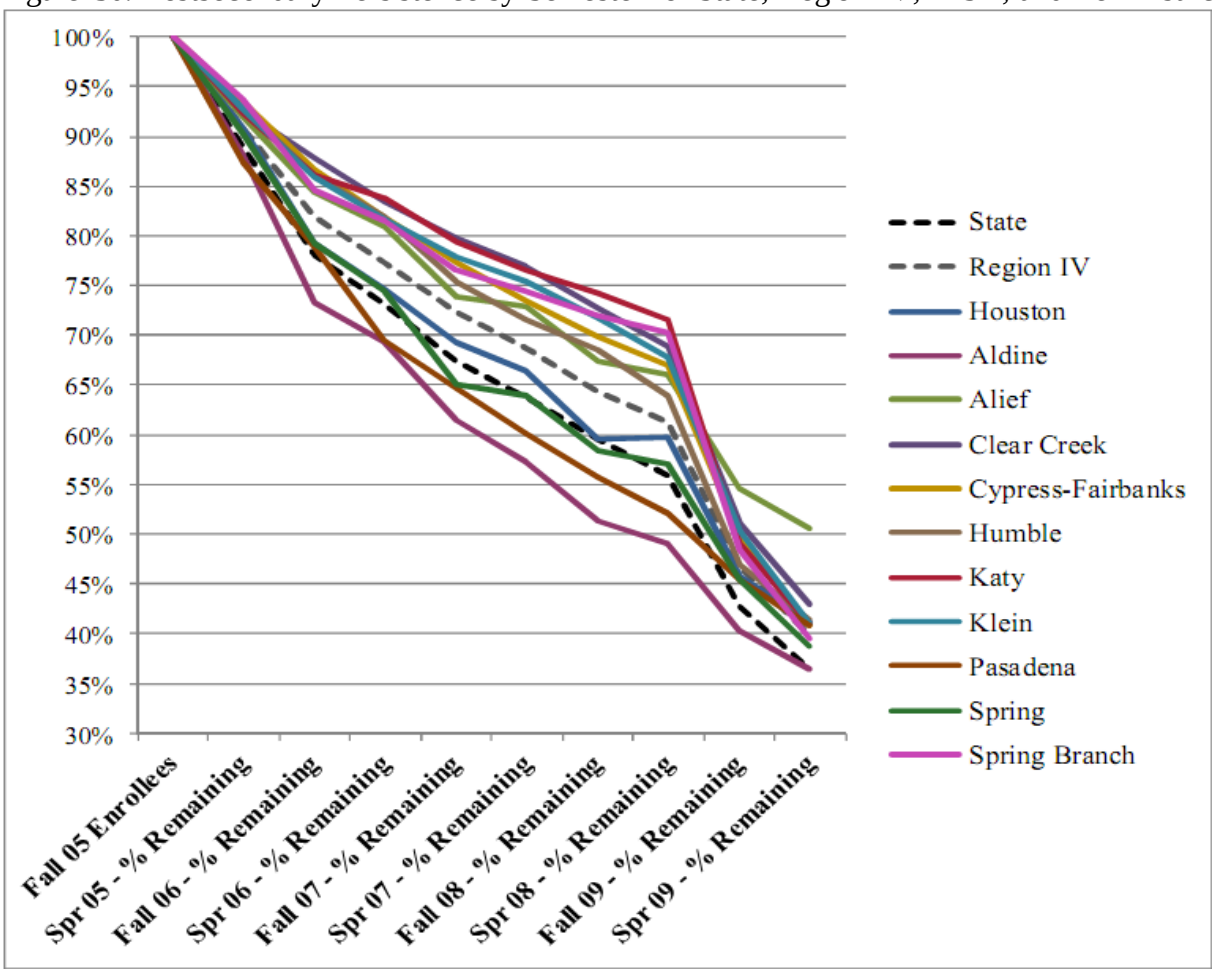


Now that we have reviewed the demographic composition of Cohort 2 and their high school graduation and initial college access rates we can begin to investigate the postsecondary persistence patterns of these students. Figure 30 provides a picture of these patterns for the state, Region IV, HISD, and the ten other districts. Students who gained access to any postsecondary institution in the fall of 2005 were included in the baseline cohort, and the percentage of that cohort remaining in each subsequent semester is provided in this figure. It should also be mentioned that this figure only spans the first five postsecondary years. This is because significant percentages of students are lost after the fourth year, but this is likely due primarily to students graduating from college. Additionally, the calculations of these rates allow for students to exit and subsequently reenter postsecondary and still be counted as attendees in later semesters.

There appear to be both a number of similarities and some important differences in the persistence patterns of students from these different samples. In terms of similarity across districts, Region IV, and the state, the first two semesters of postsecondary enrollment seem to be particularly treacherous for students as sizeable percentages of the cohort are lost during these semesters. This trend in postsecondary attrition is therefore similar to the attrition rates we calculated in our high school persistence analyses As much as 12.7% of the cohort of postsecondary enrollees was not found by the spring semester, and Aldine lost more than a quarter of its cohort by the start of the second academic year. The rate of attrition appears to decrease after these first two semesters for all cohorts. However, there was also significant variation between districts in terms of attrition. Seven out of the eleven districts lost less than 8% of their students between the first and second semesters and five of the districts had attrition percentages of less than 15% for the first academic year. Clear Creek had the highest first-year

retention rate at 88% while Aldine had the lowest at 73%, a difference of nearly 15%. HISD ranked eighth out of the eleven districts. Figure 31 provides a visual representation of these persistence patterns by semester.

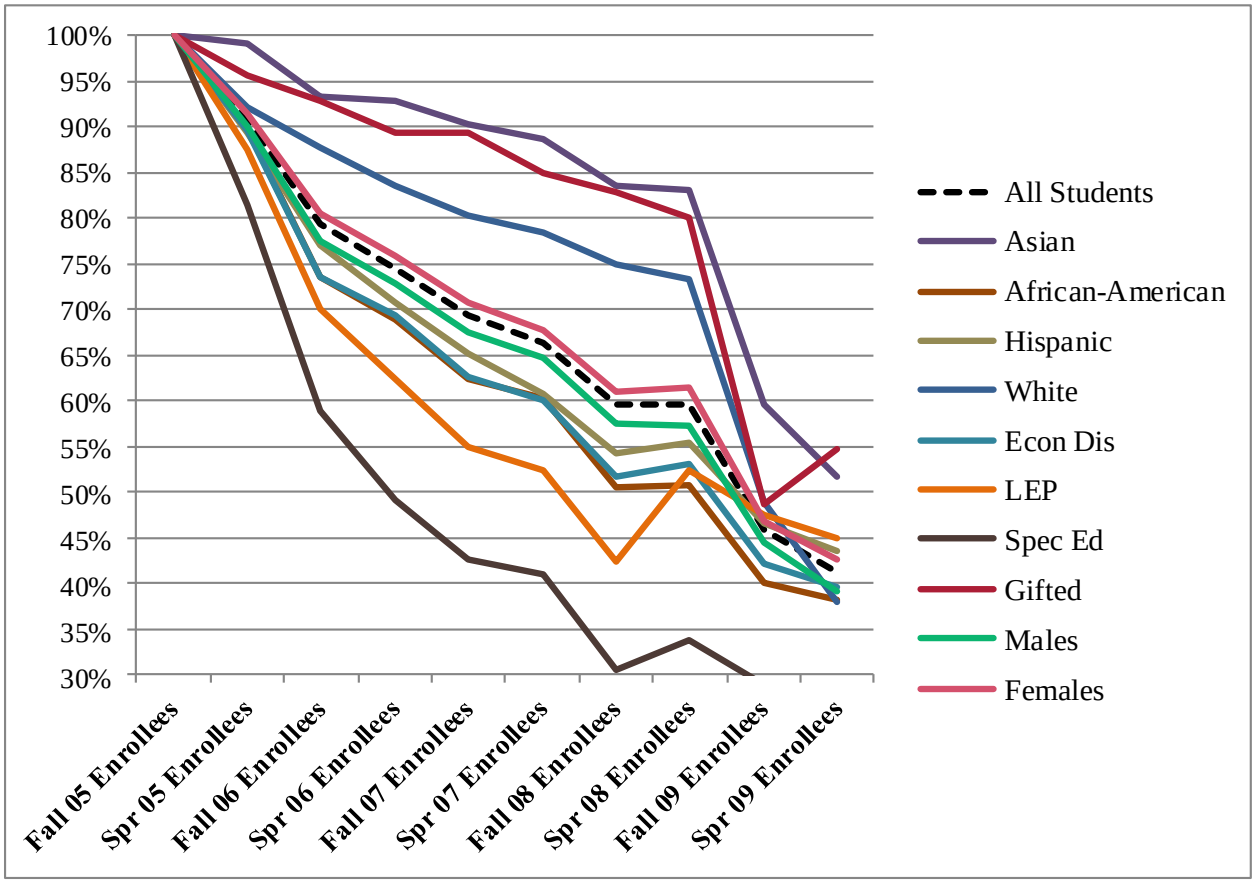
Figure 30: Postsecondary Persistence by Semester for State, Region IV, HISD, and Ten Districts



While there is substantial variation in postsecondary persistence between districts, it is also important to investigate the amount of within-district variation in these trends. Figure 31 provides the persistence rates for HISD students disaggregated by demographic group. Many of the findings for the persistence patterns highlighted above hold true for HISD students of all demographic groups. Specifically, the transitions between the first and second semester and particularly between the first and second academic year (between spring 2005 and fall 2006) are especially hazardous, and this finding holds relatively constant for all demographic groups. Even more significant than the commonalities among the demographic groups, though, is the differences in the rates of attrition between these groups. Most notable in this regard is the variation between ethnic groups in terms of postsecondary persistence. Asian students have by far the lowest rates of leaving postsecondary as less than 1% of the cohort was lost after the first semester and less than 7% after the first year. Although not quite as low, the attrition rate for white students was also fairly moderate with only about 12% of white students being absent from postsecondary by the beginning of the second academic year. However, this is not the case for

African-American and Hispanic students. By the fall 2005-06 semester more than 23% of all Hispanic students had left postsecondary and the attrition rate for African-Americans was even higher at 26%. In sum, while about one out of every ten white and Asian students did not make it to their second postsecondary year, the same was true for approximately one out of every four African-American and Hispanic students. Also of note are the extremely high rates of attrition for students designated as being LEP or special education. After the first academic year, 30% of LEP students were no longer enrolled in a postsecondary institution and the same was true for more than 40% of special education students. On a more positive note, there was not a substantial difference in the attrition rates between male and female students as only about 3% fewer males than females remained in the cohort after the first academic year.

Figure 31: Postsecondary Persistence for HISD Students by Demographic Group

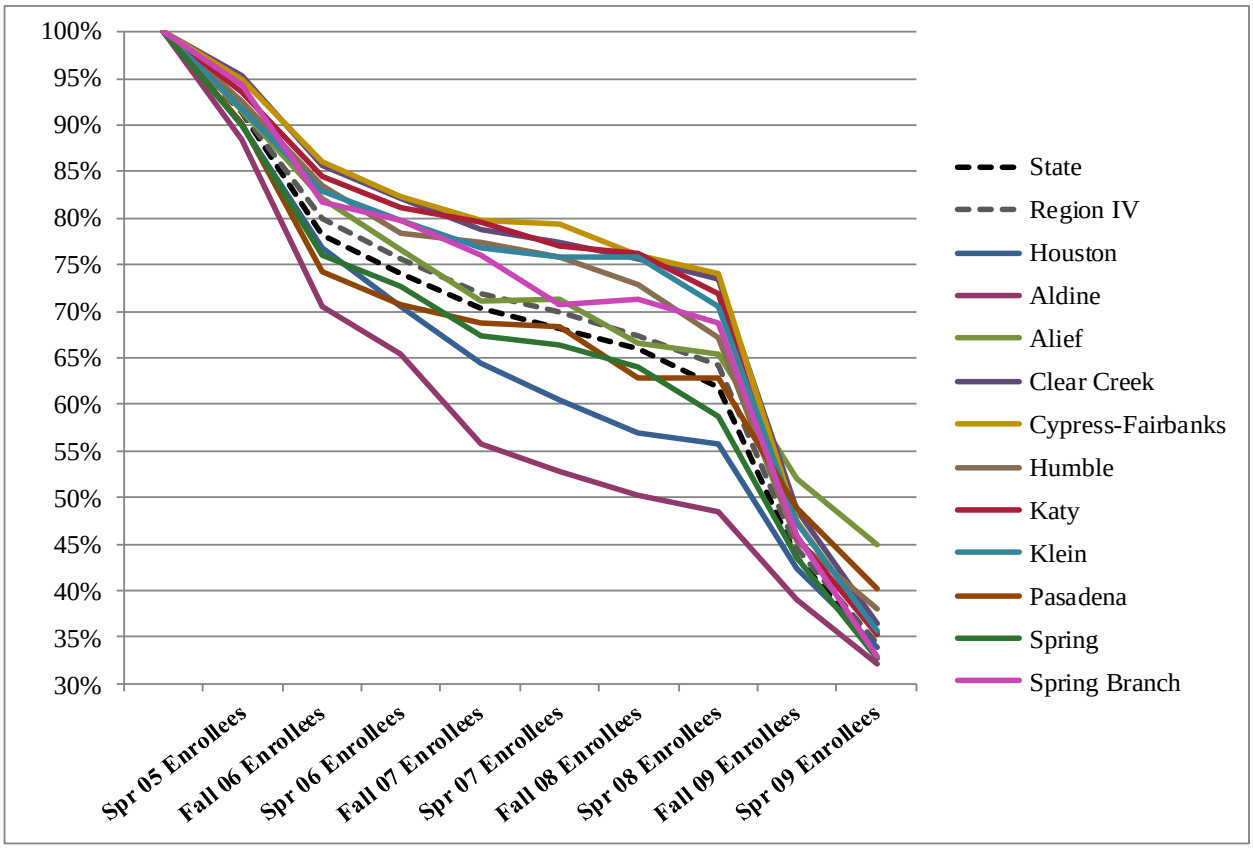


While the previous two figures provide a general picture of postsecondary persistence rates, these data may be somewhat misleading for two primary reasons. First, because students enrolled in any type of postsecondary institution were included in the initial cohort it is unreasonable to expect that students enrolled in different types of postsecondary institutions, such as technical schools compared to universities, should all attend postsecondary for the same amount of time. Second, and along the same lines, students that successfully complete their postsecondary education and thus cease attending may also contribute to the overestimation of postsecondary dropouts. In other words, the previous calculations do not differentiate between dropping out of postsecondary and earning a degree or certificate. While the analyses provided later in this

chapter will attempt to account for student graduation when analyzing persistence patterns, it is beneficial to also investigate the persistence rates only of university students. With the cohort restricted to students attending a university we can expect with greater confidence that students should remain enrolled for at least four years.

Figure 32 below provides depicts the public university persistence percentages for students from the state, Region IV, HISD, and the ten other districts. Students are only counted in subsequent semesters if they continue to attend a public university. Those that transfer to two-year colleges or technical schools, for example, will be excluded from the calculations. However, for this analysis students that do not appear in the cohort for one semester may reenter the cohort if they reenroll in university in a subsequent semester.

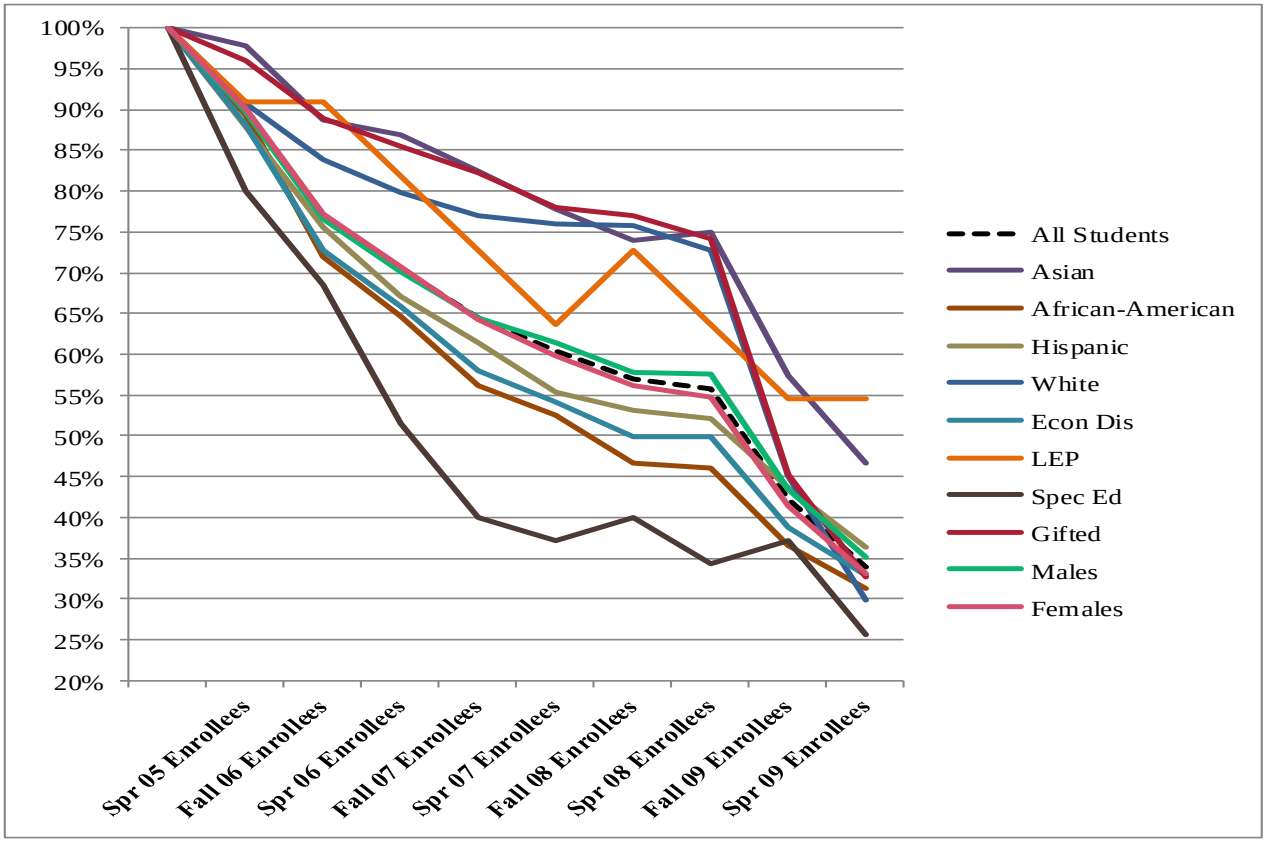
Figure 32: University Persistence by Semester for State, Region IV, HISD, and Ten Districts



Many of the trends for university persistence are similar to the trends for postsecondary persistence results. First, even for the high-performing districts there appears to be a significant decrease in university enrollment between the first and second academic years (or second and third semesters). Most districts lost approximately 10% of their cohort between these two enrollment periods and some lost as much as 18% of their university students. The rate of attrition slows down after this point for all districts and the cohorts decline steadily over the next few semesters. However, the rates of persistence also vary widely between districts. After just a single academic year, approximately 15% more of Clear Creek and Cypress-Fairbanks students are still in university compared to students from Aldine. HISD, Aldine, Pasadena, and Spring all

have one-year persistence rates of less than 80%, while all the other districts in the study had rates higher than 80%. The four-year persistence rates reveal particularly stark disparities; while four out of the eleven districts had four-year persistence rates between 70% and 75%, only 56% of HISD's cohort and 48% of Aldine's cohort made it through four years of university education. As before, the rapid acceleration of the attrition rate between the spring 2008 and fall 2009 semesters is likely due primarily to students graduating from university.

Figure 33: University Persistence Rates by Semester for HISD by Demographic Group



While the differences between districts in terms of university persistence rates may be stark, the within-district disparities are also important to consider. Figure 33 provides the university persistence rates for HISD students disaggregated by demographic group. As we saw in the previous figure, there is a fairly significant decrease in enrollment for most student subgroups between the second and third semesters, or first and second years, of university. The cohort of white students decreased the least by about 7% but more than 17% of all African-American university students left during this transition. Economically disadvantaged students also appear to be particularly at risk as more than 15% of the original cohort left between the second and third semester. The disparities between groups are also severe in regards to the four-year persistence rate. The white, Asian, and gifted subgroups had the three highest four-year persistence rates. Between 72% and 75% of each of these groups were still attending a university by the spring 2008 semester. However, only 52% of Hispanic students and 46% of African-American students were still attending university during their eighth semester. In other words, the African-American subgroup decreased by 30% more than the Asian subgroup over the four-

year period. Special education students appeared to face the highest risk as more than 65% of all special education university students did not make it to their eighth semester. Males actually persisted at slightly higher rates than females by approximately 3% for the four-year period.

Analyses of Postsecondary Persistence

Now that we have a general picture of the persistence patterns of postsecondary students generally and university students specifically we can begin to analyze the relationships between a variety of K-12 variables and the likelihood of persistence. As described in the methodology section, the nature of the phenomenon of persistence makes it non-conducive to analysis through logistic regression. This is true for two primary reasons. First, logistic regression is only suited to modeling an outcome that occurs or does not occur at a specific time. The longitudinal nature of persistence makes it less amenable to analysis through logistic regression. Second, logistic regression is not suited to handle what are termed "censored" observations. An example of this in the case of postsecondary persistence may be illustrative. A student enrolled in postsecondary can either drop out of their institution or they can continue to persist, but they can also graduate from postsecondary. Graduates are no longer persisting but neither are they still in the risk set for dropping out, making them a censored observation from the time of their graduation onwards. Logistic regression is not designed to handle these types of censored observations.

Because of both of these limitations of logistic regression, survival analysis techniques were used for studying postsecondary persistence. Survival analysis allows researchers to track a sample over a period of time and is also designed to handle censored observations like those described above. With survival analysis the outcome is considered to be a "failure" of some kind, such as dropping out of postsecondary. Once a subject experiences this failure they are excluded from the sample for the rest of the study; there can be no subsequent reentry after they exit. The likelihood of an individual in the sample experiencing this failure is known as the hazard rate. The intercept parameter functions as the baseline hazard rate, and the survival model then estimates how much each other variable in the model increases or decreases this likelihood of failure. Similar to logistic regression, this estimate is in the form of a ratio. However, because the outcome variable in this analysis is a negative occurrence, higher hazard ratios indicate that a student is at a higher risk for experiencing this negative event. The interpretation of hazard ratios will become clearer as we review the results of the first model, which can be found in Table 18.

Just as in the previous chapter on postsecondary access, our first model of postsecondary persistence only included the district indicator variables in order to determine the general differences between the districts in terms of the likelihood of their students persisting through or dropping out of postsecondary. Once again, the HISD variable is excluded from the model and thus serves as the district rate which all other districts in the model are being compared against. However, in this set of procedures there is no estimated intercept parameter so the HISD rate must be inferred from the results of the other variables. The second column in the table is the parameter estimate of each variable, the third column is the hazard ratio which is derived from the parameter estimate, and the fourth column contains the results of the tests of statistical significance for each variable. As mentioned previously, the hazard ratio in these models functions in a way similar to the odds ratios in the preceding chapter by providing a comparison

of the likelihood of the outcome occurring for two groups. However, because the outcome variable in this model is dropping out of postsecondary, the higher the odds ratio for a variable the greater the likelihood of the student leaving postsecondary. Thus, lower odds ratios (between 0 and 1 are positive in that they indicate lower risk of postsecondary failure.

The results of the Postsecondary Persistence Model #1 in Table 18 are generally to be expected given our previous calculations of the general rates of postsecondary persistence for districts. Students from Katy, Clear Creek, and Cypress-Fairbanks have the three lowest rates of dropping out of postsecondary while those from Aldine, Pasadena, and Spring have the three highest rates. HISD students perform just slightly better than students from Pasadena and Spring, but because the estimates of the hazard ratios for Pasadena and Spring are not statistically significant we would conclude that there are no measurable differences between these districts in terms of persistence rates. Students from Aldine that gain access to a postsecondary institution have by far the greatest likelihood of dropping out before graduation and are at approximately 27% greater risk of postsecondary failure (lowest persistence) than students from HISD. In order to compare the hazard rates of two districts you may also divide their respective hazard ratios. For example, in order to determine the difference in risk between the highest and lowest postsecondary persistence district you would divide Aldine's ratio of 1.27 by Katy's ratio of 0.71 for a result of approximately 1.78, meaning that students from the district with the lowest persistence rate are about 1.8 times more likely to drop out of postsecondary than students from the districts with the highest persistence rate.

Table 18: Postsecondary Persistence Model #1: District Indicators

Variable	**Parameter Estimate**	**Hazard Ratio**	**Rank**	**Sig.**
Intercept (Houston)	*	*	8	*
Aldine	0.2397	1.27	11*	<.0001
Alief	-0.2387	0.79	6*	<.0001
Clr Creek	-0.3347	0.72	2*	<.0001
Cy-Fair	-0.2928	0.75	3*	<.0001
Humble	-0.2374	0.79	7*	<.0001
Katy	-0.3362	0.71	1*	<.0001
Klein	-0.2892	0.75	4*	<.0001
Pasadena	0.0114	1.01	10	0.8155
Spring	0.0086	1.01	9	0.8721
Spring Branch	-0.2696	0.76	5*	<.0001

Now that we have modeled the relationships between the district indicators and postsecondary persistence, Postsecondary Persistence Model #2 (Table 19) presents the results of the second analysis which adds the student-level variables to the model. The variables are divided into two categories for ease of interpretation with the individual-level variables on the left-hand side and the district indicator variables on the right. The interpretation of the district variables is also modified slightly with the inclusion of the individual-level variables. In the first persistence model, the estimates of the district variables represented the average relationship between district attended and persistence for all students in the districts. In this model, each district's hazard ratio represents the difference in the hazard between a student in one district and a student from

another district that is identical on all the individual-level variables included in the model. We can thus say that we are controlling for student-level characteristics and getting a more accurate picture of the influence of districts on postsecondary persistence.

As evidenced by the results of this model, controlling for student characteristics does change the estimates for the districts, at times quite significantly. There are a few districts that changed more than others that should be pointed out. First, when controlling for individual-level variables Klein is now estimated to have the lowest hazard rate out of any district in the model. A student from Klein is estimated to be only 0.70 times as likely to exit postsecondary prior to graduation as a student from HISD. The district whose students appeared to have the lowest hazard rate in the first model, Katy, now ranks sixth out of the eleven districts. However, Clear Creek and Cypress-Fairbanks students are still predicted to have the second and third highest chances of postsecondary persistence, respectively, meaning that controlling for student characteristics did not affect the estimated relationship between these districts and persistence, at least in terms of how Clear Creek and Cypress-Fairbanks compare to the other districts. Unfortunately, including the individual variables did not improve the estimate of HISD's performance as the district ranks ninth out of the eleven districts even when controlling for student attributes. Aldine is still the district with the lowest persistence rate with a failure rate approximately 25% higher even than HISD.

Table 19: Postsecondary Persistence Model #2: Individual-Level Variables and District Indicators

Individual-Level Variables				**District-Level Variables**					
Variable	**Prmtr Est**	**Hazard Ratio**	**Sig.**	**Variable**	**Prmtr Est**	**Hazard Ratio**	**Rank**	**Original Rank (model #1)**	**Sig.**
Asian	-0.22	0.80	<.0001	Houston	*	*	9	8	*
African-American	0.28	1.32	<.0001	Aldine	0.23	1.25	11*	11*	<.0001
Hispanic	0.19	1.22	<.0001	Alief	-0.16	0.85	4*	6*	0.002
Econ Dis	0.13	1.14	<.0001	Clr Creek	-0.21	0.81	2*	2*	<.0001
LEP	0.21	1.24	0.0501	Cy-Fair	-0.17	0.84	3*	3*	<.0001
Special Ed	0.47	1.60	<.0001	Humble	-0.13	0.88	5*	7*	0.0152
Gifted	-0.01	0.99	0.9462	Katy	-0.12	0.88	6*	1*	0.0103
Male	0.11	1.12	<.0001	Klein	-0.35	0.70	1*	4*	<.0001
Total Advanced Core	-0.08	0.93	<.0001	Pasadena	0.01	1.01	10	10	0.7947
Total Dual-Credit	-0.11	0.89	<.0001	Spring	-0.03	0.97	8	9	0.5365
Percent Attend	-0.04	0.96	<.0001	Sprg Brnch	-0.03	0.97	7	5*	0.6072

It should also be noted that the inclusion of student characteristics did reduce the overall variability between the districts by fairly substantial amounts. In the first persistence model, seven out of the eleven districts were estimated to be performing at least 20% better than HISD. However, in this model only Klein's failure rate is more than 20% lower than HISD's, and the

five other districts that are performing statistically significant better than HISD have hazard rates between 0.81 and 0.88 times the rate of HISD. Overall, then, controlling for individual characteristics resulted in much closer estimates of district persistence patterns.

In regards to the student-level variables, there are both similarities and some important differences between the current persistence model and the access models from the previous chapters. In terms of race, Asian students are once again found to be performing better than their white peers while Hispanics are performing lower than whites, results that are consistent with the access models. However, while African-Americans were found to be accessing postsecondary at rates equivalent to whites and were twice as likely to enroll in a university when controlling for other variables, African-Americans are estimated to be at significantly higher risk than whites of exiting postsecondary early. Economically disadvantaged, LEP, and special education students are likewise significantly less likely to persist than their peers. Fortunately, academic preparation does appear to improve a student's chances of persisting as all three academic variables (advanced coursework, dual-credit coursework, and attendance) were found to significantly reduce the likelihood of early postsecondary exit.

As mentioned in the previous chapter, controlling for individual-level student characteristics does impact the estimated relationships between the districts and the outcome variable, but failing to also include district-level variables representing the aggregate impact of student characteristics means that we are assuming there is no effect of student characteristics at the district level. To test this assumption, in the next model we included the individual-level variables as well as the district-level variables representing the percent of the student population categorized in different demographic groups. Once again, these variables are not simply the percentage of the cohort that is so categorized but rather the percent of the entire district. This decision was made because of the assumed impact of the entire district's population of students on any particular school or grade level. Additionally, the disparate rates of high school attrition for non-Asian minority, economically disadvantaged, LEP, and special education students may have resulted in underestimations of the impact of aggregate student characteristics as the twelfth grade cohort has substantially fewer of these students than the rest of the district.

The Postsecondary Persistence Model #3 (Table 20) contains the results of this next model. We will first discuss the impact of the inclusion of the district-level variables on the estimates of the individual-level variables before turning to the estimates of the district-level variables themselves. The majority of the student-level variable estimates did not change significantly from Postsecondary Persistence Model #2 to this model. No variables that were statistically significantly related to persistence in the previous model became insignificant in this model or vice versa. This is likely due to the fact that the district indicator variables included in Postsecondary Persistence Model #2 capture much of the variation in aggregate characteristics represented by the district-level variables included in the Postsecondary Persistence Model #3.

While district-level variables likely affect the relationship between individual student characteristics and postsecondary persistence, the direction and strength of their influence is thus far unknown. The inclusion of the district-level variables in the model attempts to discover these precise relationships, and many of them are unexpected. As shown in the table on the following page, the results of the analysis indicate that higher percentages of non-Asian minority and LEP

students actually decrease the risk of postsecondary failure by a statistically significant amount. Specifically, for every one percent increase in the percentage of minority students in the district a student's risk of dropping out of postsecondary decreases by approximately 1%. This is an interesting finding that aligns with the results of the Postsecondary Access Model #3. In both of these models, higher percentages of minority students result in higher likelihood of positive postsecondary outcomes. Given the limitations of the study it is difficult to determine why this relationship might be occurring, but future research could more deeply investigate this finding. Less surprising was the finding that the percent of economically disadvantaged students in the district has a negative impact on any given student's likelihood of postsecondary persistence. Once again, this result was also found in the previous chapter on access as higher percentages of economically disadvantaged students in the district had a harmful impact on any given student's chances of postsecondary access generally and university access specifically. The results of the current model estimate that for every one percent increase in the economically disadvantaged population, a student's likelihood of failure increases by approximately 3%. Additionally, there was also a strong, negative relationship between the percent of gifted students in the district and likelihood of postsecondary failure. Overall, it appears that many of the district-level variables are not only significantly related to postsecondary outcomes but their influence on the outcome is often consistent across different analyses. We will continue to assess these relationships throughout the remainder of the report.

Table 20: Postsecondary Persistence Model #3: Individual-Level Variables and District-Level Variables

Individual-Level Variables				District-Level Variables			
Variable	Prmtr Est	Hazard Ratio	Sig.	Variable	Prmtr Est	Hazard Ratio	Sig.
Asian	-0.23	0.80	<.0001	District Minority%	-0.01	0.99	0.0006
African-American	0.28	1.32	<.0001	District LEP%	-0.03	0.97	<.0001
Hispanic	0.19	1.21	<.0001	District Econ Dis%	0.03	1.03	<.0001
Econ Dis	0.14	1.15	<.0001	District Special Ed%	-0.01	1.00	0.9332
LEP	0.22	1.24	0.0520	District Gifted%	-0.06	0.94	<.0001
Special Ed	0.47	1.61	<.0001				
Gifted	-0.01	0.99	0.8732				
Male	0.12	1.12	<.0001				
Total Advanced Core	-0.07	0.93	<.0001				
Total Dual-Credit	-0.11	0.90	<.0001				
Percent Attend	-0.04	0.96	<.0001				

Now that we have attempted to control for aggregate student characteristics when modeling the relationship between individual-level variables and persistence patterns, the next step is to include the district indicator variables in the model to determine the relationship between the district attended and postsecondary persistence controlling for both individual-level and district-level variables. The Postsecondary Persistence Model #4 (Table 21) contains the results of this set of analyses. Just as in the final model of postsecondary access, the nature of the district-level variables prevents all of the district indicator variables to be included in the model simultaneously. The district indicators were thus added to the model one at a time, although the

results of all of district estimates are synthesized into the table below. Because the district variables were added one at a time their interpretation also must change accordingly. The estimates of the district variables now represent the difference in the hazard of postsecondary failure between a student who attended the district that is currently in the model and the average for all "identical" students (i.e., controlling for all other student characteristics captured by the model) from the other ten districts excluded from the model at that time. Thus, if a district's hazard ratio estimate was 0.95, we would state that a student from this district has a 5% lower risk of postsecondary failure than the average for the other ten districts, controlling for student characteristics. Additionally, while the inclusion of each specific district indicator slightly modified the estimates of the other variables in the model these changes were not substantial. We therefore only present the updated district indicator estimates in Postsecondary Persistence Model #4 below.

Table 21: Postsecondary Persistence Model #4: District Indicator Estimates Controlling for Individual-Level Variables and District-Level Variables

Variable	Prmtr Est	Hazard Ratio	Rank	Original Rank (model	Sig.
Houston	-0.031	0.97	4	8	0.8185
Aldine	0.097	1.10	9	11*	0.2128
Alief	0.004	1.00	5	6*	0.9680
Clr Creek	-0.086	0.92	3	2*	0.0865
Cy-Fair	0.102	1.11	10*	3*	0.0086
Humble	0.103	1.11	11*	7*	0.0425
Katy	0.041	1.04	7	1*	0.3417
Klein	-0.166	0.85	2*	4*	0.0002
Pasadena	-0.213	0.81	1*	10	0.0110
Spring	0.018	1.02	6	9	0.7674
Sprg Brnch	0.528	1.05	8	5*	0.6183

In our first model of postsecondary persistence which only included the district indicator variables our initial impression was that the district a student attended had quite a strong influence on chances of postsecondary persistence. When we added student-level variables to the model the strength of this district influence declined but there still appeared to be significant differences between the districts. However, many of these differences are reduced when both individual-level and district-level variables are controlled for in the model. Only four out of the eleven districts were estimated to be performing statistically significantly different than the average for the other districts. Humble and Cy-Fair students were estimated to have the lowest postsecondary persistence patterns, with students from these districts having approximately 1.11 times higher risk than students from the other districts. Klein and Pasadena had the two highest postsecondary persistence rates and both had hazard ratios 15-20% lower than the average. The hazard ratio estimates for the seven other districts in the study were not statistically significantly different than the overall average. As mentioned before, because the strength of statistical tests to

identify significant differences between groups is contingent upon the size of the sample, larger sample sizes may have resulted in more districts being found to be statistically significantly different. However, the fact that the majority of the individual-level and district-level variables were still found to be statistically significantly related to postsecondary persistence indicates that these variables likely have a greater influence on persistence than the district a student attended.

While these results are by no means conclusive, the findings tentatively suggest that districts do not exert a substantial influence on postsecondary persistence when controlling for student characteristics, both at the individual and aggregate district level. The one caveat of this statement is that we have thus far been aggregating all postsecondary students together. Whether the influence of districts on university persistence specifically is different than their impact on postsecondary persistence generally remains to be seen. The next set of analyses therefore addresses this question by restricting the sample to only those students who gained access to a public university during their first postsecondary semester. We are excluding students who attend private universities from these analyses because we predict that many non-school factors, such as family income, religious affiliation, and other factors, may strongly influence a student's choice to attend a private university.

Analyses of University Persistence

Just as in the previous models of postsecondary persistence, the first model of university persistence only contains the district indicator variables in order to estimate the general differences between districts in terms of their students' university persistence patterns (see Table 22). We expect the estimates of the University Persistence Model #1 generated by our statistical model to be similar to the postsecondary persistence percentages (Table 18) we previously calculated because no other variables are being included in the model, and this is what we find.

Table 22: University Persistence Model #1: District Indicators

Variable	Parameter Estimate	Hazard Ratio	Rank	Sig.
Intercept (Houston)	*	*	10	*
Aldine	0.17	1.19	11*	0.0136
Alief	-0.36	0.70	7*	<.0001
Clr Creek	-0.53	0.58	2*	<.0001
Cy-Fairbanks	-0.55	0.57	1*	<.0001
Humble	-0.46	0.63	6*	<.0001
Katy	-0.53	0.59	3*	<.0001
Klein	-0.48	0.62	5*	<.0001
Pasadena	-0.49	0.61	4*	<.0001
Spring	-0.17	0.84	9	0.0477
Spring Branch	-0.35	0.70	8*	<.0001

Aldine and HISD have the highest risk of postsecondary failure (lowest persistence) out of all of the study districts. And while students from HISD had the second highest university failure rate,

those from Aldine still had about 20% higher likelihood of dropping out. All of the remaining nine districts performed statistically significantly better than HISD. Students from Cypress-Fairbanks, Clear Creek, and Katy had the lowest university failure (highest persistence) rates out of all of the districts, and the differences between the hazard rates of these districts compared with HISD were not only statistically significant but also quite substantial. University students from all three of these districts were estimated to be at approximately 40% lower risk of dropping out than students from HISD. The apparent variation between districts is so substantial, students from Aldine, the lowest performing district, are more than twice as likely to exit university prior to completing their degree as students from Cypress-Fairbanks, the highest performing district.

While students from different districts appear to be persisting through university at significantly different rates, once again whether the influence of the district a student attended remains as strong when controlling for student and district variables remains to be seen. The disparities between the districts in terms of university persistence appear even larger than the rates for postsecondary persistence generally, but these disparities may still be caused primarily by the differences in the characteristics of students that attend and graduate from these districts rather than by the performance of the districts themselves.

In the University Persistence Model #2 we added the individual-level variables to the previous model in order to determine the relative performance of districts when holding student characteristics constant. Interestingly, many of the same changes that occurred when student variables were added to the district indicators in the third model of postsecondary persistence also occurred for the university persistence model. Specifically, while the estimated hazard ratio for Klein was in roughly the middle of the district estimates in the University Persistence Model #1, when controlling for student characteristics once again in the University Persistence Model #2, Klein appears to be the highest performing district. The hazard rate for a student from Klein is only 0.67 the rate of an identical student from HISD. Districts that were previously estimated to be high performers have also moved in the opposite direction in this model and now appear to have substantially higher estimates. For example, Katy is now the seventh ranked district when controlling for student-level variables when it was estimated to be the third highest performing district in the first model, although university students from Katy are still persisting at a significantly higher rate than HISD students. However, Aldine is still the only district with a higher rate of early university exit than HISD.

Just as in the previous section on postsecondary persistence, adding student characteristic variables to the model does appear to significantly reduce the apparent variability between the districts in terms of university persistence. In the initial university persistence model, three districts had hazard rates less than 0.6 times the rate for HISD and another four districts had rates between 0.6 and 0.7 times the HISD rate. In this model, University Persistence Model #2, Klein is the only district whose rate of university failure is less than 0.7 times the rate for HISD. While seven out of the eleven districts were still predicted to be performing statistically significantly better than HISD, there were no statistically significant differences between HISD and the remaining three districts even though two of these districts, Spring and Spring Branch, appeared to be performing significantly better than HISD in the University Persistence Model #1. In the

next model we will see if including district-level variables continues to reduce the ostensible variable between the districts for this outcome.

Table 23: University Persistence Model #2: Individual-Level Variables and District Indicator Variables

Individual-Level Variables				District-Level Variables					
Variable	Prmtr Est	Hazard Ratio	Sig.	Variable	Prmtr Est	Hazard Ratio	Rank	Original Rank (model	Sig.
Asian	-0.15	0.86	0.0130	Houston	*	*	10	10	*
African-American	0.40	1.50	<.0001	Aldine	0.16	1.17	11	11*	0.0294
Hispanic	0.14	1.15	<.0001	Alief	-0.26	0.77	5*	7*	0.0005
Econ Dis	0.19	1.22	<.0001	Clr Creek	-0.27	0.76	4*	2*	0.0002
LEP	-0.49	0.95	0.8599	Cy-Fair	-0.33	0.72	2*	1*	<.0001
Special Ed	0.20	1.22	0.1279	Humble	-0.25	0.78	6*	6*	0.0024
Gifted	0.05	1.05	0.3531	Katy	-0.18	0.84	7*	3*	0.0124
Male	0.10	1.10	0.0040	Klein	-0.40	0.67	1*	5*	<.0001
Total Advanced Core	-0.05	0.95	<.0001	Pasadena	-0.28	0.76	3*	4*	0.0061
Total Dual-Credit	-0.08	0.92	<.0001	Spring	-0.10	0.90	8	9	0.2393
Percent Attend	-0.05	0.96	<.0001	Sprg Brnch	0.00	1.00	9	8*	0.9879

While the primary purpose of this model was to reexamine the relationship between the district a student attended and her likelihood of university persistence when controlling for student characteristics, the estimates of the student variables are also quite interesting. In the previous chapter, we saw that African-Americans were just as likely as white students to access a postsecondary institution and were twice as likely as whites to enroll in a university when controlling for other variables. However, the University Persistence Model #2 estimates that African-Americans have the lowest chances of persisting through university and are approximately 1.5 times more likely than whites to exit before earning a degree. Hispanics are also significantly more likely than whites to drop out early and Asian students are significantly less likely.

Once again, we also see that one's economic status strongly influences postsecondary outcomes. Low-income students are about 1.2 times as likely as their more affluent peers to fail to persist through university. Thus, being economically disadvantaged has had a negative influence on every postsecondary outcome we have analyzed thus far. Males were also found to be significantly less likely than females to experience positive postsecondary outcomes in this model, being approximately 1.1 times more likely to fail to persist through university. There was no significant relationship discovered between LEP, special education, or gifted status and the likelihood of persisting through university. Finally, the model provides evidence that academic preparation does positively influence students' chances of persisting through university. The dual-credit, advanced coursework, and attendance variables were both found to significantly reduce the likelihood of leaving university early. For every dual-credit course students pass during high school they are approximately 0.92 times less likely to drop out of university, and for

every advanced course they complete they are 0.95 times less likely to exit early. The percent of the total days in the school year a student attends high school also reduces their risk of early university exit.

The results of the University Persistence Model #3, which contains the individual-level variables and the district-level aggregate student characteristic variables, are presented in Table 24. All of the district-level variables were found to be statistically significantly related to university persistence. Once again, the percentage of minority, LEP, and gifted students in the district are all positively related to university persistence. A student's risk of exiting university early decreases by approximately 3% for every percentage increase in the LEP and non-Asian minority student population and approximately 7% for every percentage increase in the gifted population in the district.

Table 24: University Persistence Model #3: Individual-Level Variables and District-Level Variables

Individual-Level Variables				District-Level Variables			
Variable	Prmtr Est	Hazard Ratio	Sig.	Variable	Prmtr Est	Hazard Ratio	Sig.
Asian	-0.16	0.85	0.0091	District Minority%	-0.03	0.97	<.0001
African-American	0.41	1.50	<.0001	District LEP%	-0.03	0.97	<.0001
Hispanic	0.13	1.14	0.0162	District Econ Dis%	0.04	1.05	<.0001
Econ Dis	0.20	1.22	<.0001	District Special Ed%	0.07	1.07	0.0237
LEP	-0.05	0.95	0.8468	District Gifted%	-0.08	0.93	<.0001
Special Ed	0.21	1.23	0.1132				
Gifted	0.05	1.05	0.3364				
Male	0.10	1.11	0.0033				
Total Advanced Core	-0.05	0.95	<.0001				
Total Dual-Credit	-0.08	0.92	<.0001				
Percent Attend	-0.04	0.96	<.0001				

On the other hand, the percentage of economically disadvantaged and special education students is inversely related to persistence. A student's risk of leaving university without a degree increases by approximately 5% for every percentage increase in the economically disadvantaged population and 7% for every one percent increase in the special education population. These results are generally consistent with the findings from the previous models on postsecondary persistence. There were no significant changes in the student-level variable estimates with the exclusion of the district indicator variables and the addition of the district-level demographic variables to the model.

The final analyses presented in this chapter attempt to determine the relationship between the district a student attended and chances of university persistence controlling both for the characteristics of the student, as well as the demographic composition of the district attended. As mentioned before, district indicators were added to the model one at a time but the results of these analyses were combined into a single table, University Persistence Model #4, in Table 25.

The estimates for the rest of the variables in the model apart from the district indicators were excluded in order to focus on the changes in the estimates of the district indicator variables.

In the final model of Postsecondary Persistence Model #4, we saw that the relationships between the district a student attended and chances of persistence were often insignificant when individual-level and district-level student characteristics were accounted for. This is generally what we find when the outcome variable is now university persistence. Because each district indicator now represents the difference in the risk of university failure between the district that was included in the model at that time and the average for the remaining districts that were excluded from the model, we conclude that only two districts, Pasadena and Klein, were estimated to be performing statistically significantly different than the average for the other districts. Students from Pasadena had the lowest risk of university failure and were 0.73 times as likely to exit early as students from the other districts. Klein students were 0.86 times as likely to exit university early compared to the average likelihood for identical students from the other districts. While the estimate for HISD was not found to be statistically significant, students from this district did have the highest risk of university failure with a hazard ratio of approximately 1.23 times that of the average for the other districts. Overall, though, the inclusion of the other variables in the model once again significantly reduced the variability between the districts in terms of university persistence while the relationships between the district-level variables and the student-level variables with persistence remained strong and consistent for the most part.

Table 25: University Persistence Model #4: District Indicator Estimates Controlling for Individual-Level Variables, and District-Level Variables

Variable	Prmtr Est	Hazard Ratio	Rank	Original Rank (model #1)	Sig.
Houston	0.21	1.23	11	10	0.3079
Aldine	0.10	1.11	10	11*	0.4413
Alief	0.02	1.02	7	7*	0.8952
Clr Creek	-0.08	0.93	4	2*	0.3251
Cy-Fair	0.09	1.10	8	1*	0.1472
Humble	0.02	1.02	6	6*	0.7891
Katy	0.10	1.10	9	3*	0.1431
Klein	-0.15	0.86	2*	5*	0.0404
Pasadena	-0.32	0.73	1*	4*	0.0327
Spring	0.01	1.01	5	9	0.9306
Sprg Brnch	-0.08	0.92	3	8*	0.6095

There are a number of important takeaways when comparing the results of the final models of persistence (the Postsecondary Persistence Model #4 and the University Persistence Model #4) to the final models of postsecondary access (the Postsecondary Access Model #4 and the University Access Model #4) presented in the previous chapter. In terms of commonalities, both chapters have shown that student characteristics, both demographic characteristics and academic ones

such as TAKS scores, course-taking patterns, and attendance, appear to have a significant influence on postsecondary access and persistence alike, but the nature of these relationships is not always constant for different outcomes of interest. The most notable example of this is the relationship between race/ethnicity and postsecondary outcomes. In the previous chapter, African-American students were as likely as whites to gain access to any postsecondary institution and significantly more likely than white students to gain access to university when student and district characteristics were controlled for while Hispanic students were significantly less likely. However, when the outcome became postsecondary persistence, African-American students now faced the greatest risk of failing to persist through postsecondary out of any racial subgroup. Hispanics were still at greater risk of dropping out than white students but only by a ratio of approximately 1.15.

In terms of the influence of districts, two findings stood out most prominently when comparing the results of the access analyses to the models of persistence. First, district-level demographic characteristics actually appear to have a stronger influence on persistence than access, a finding that is both intriguing and difficult to explain. Second, the opposite trend appears to hold for the districts themselves. While seven out of the eleven districts were found to significantly influence access, only four districts appear to have a significant impact on postsecondary persistence and two have a significant impact on university persistence, although the lack of statistically significant differences in the university analyses is likely influenced by the reduction in the sample size in these analyses compared to the postsecondary persistence analyses. However, it may be the case that the demographic composition of the district does influence a student's chances of persistence more than the non-demographic characteristics of the district, whatever those might be. Either way, it does appear that the influence of the districts wanes as students persist through postsecondary institutions.

Chapter Nine

College Completion

The final chapter of analyses in this report focuses on whether or not students successfully complete their postsecondary education and what factors influence their eventual outcomes. This chapter is important for two primary reasons. First, while some research has indicated that simply enrolling in a postsecondary institution and completing some coursework has a positive effect on employment and earning potential, the ultimate goal of districts should obviously be to prepare those students that do access postsecondary to successfully complete some type of degree or certificate. The second point that should be made relates to a limitation of the types of analyses conducted in the previous chapter. In survival analysis models, which were used to study postsecondary persistence, once a student exits a postsecondary institution for even a semester they are considered to be excluded from the sample for the remainder of the time period and coded as having "failed" to persist. For example, a student who persists through their first seven semesters of university, takes one semester off, then reenters university and successfully completes a bachelors degree would have been considered a "failure" as defined by the previous analyses. Because there is no variable for dropping out of school in the postsecondary files like there is in the K-12 data, the only way to determine postsecondary persistence or failure is to assess whether or not a student is enrolled in any given semester. While the language of "dropping out" was used to describe students in the previous section, this phrase is inappropriate given the inability to distinguish between actual dropouts and those who are temporarily withdrawing from postsecondary. These facets of the previous analyses likely result in an overestimation of the percentage of students who fail to persist. This overestimation may be particularly severe for those students who are either more mobile or who may take semesters off to work and save money to finance their postsecondary education. The current chapter is therefore devoted to assessing college completion regardless of the paths students take to reach that goal.

These analyses will once again use Cohort 2 students that were enrolled as seniors in 2003-04 and therefore had experienced six years of possible postsecondary education by the time these analyses were conducted. This six-year time period is often used to study completion as the majority of students who eventually earn a degree or certificate do so by six years after initially enrolling in postsecondary but sizeable numbers of students have not earned a degree by the conclusion of their fourth year. However, because we are studying postsecondary completion the cohorts will be limited to only those students that enrolled in some type of Texas postsecondary institution during either or both the fall 2004 or spring 2005 semesters, the two full semesters immediately following high school graduation. The demographic characteristics of this cohort may be found in Table 17 in the previous chapter.

As we are now investigating postsecondary completion it would be prudent for us to more fully discuss exactly what is meant by completion. The THECB identifies four categories of postsecondary credentials: certificates, associate degrees, bachelor's degrees, and graduate degrees. Graduate degrees will obviously be excluded as all students completing graduate degrees would have previously completed an undergraduate degree and thus already been captured by the analyses. Bachelor's degrees are general academic degrees that are awarded by

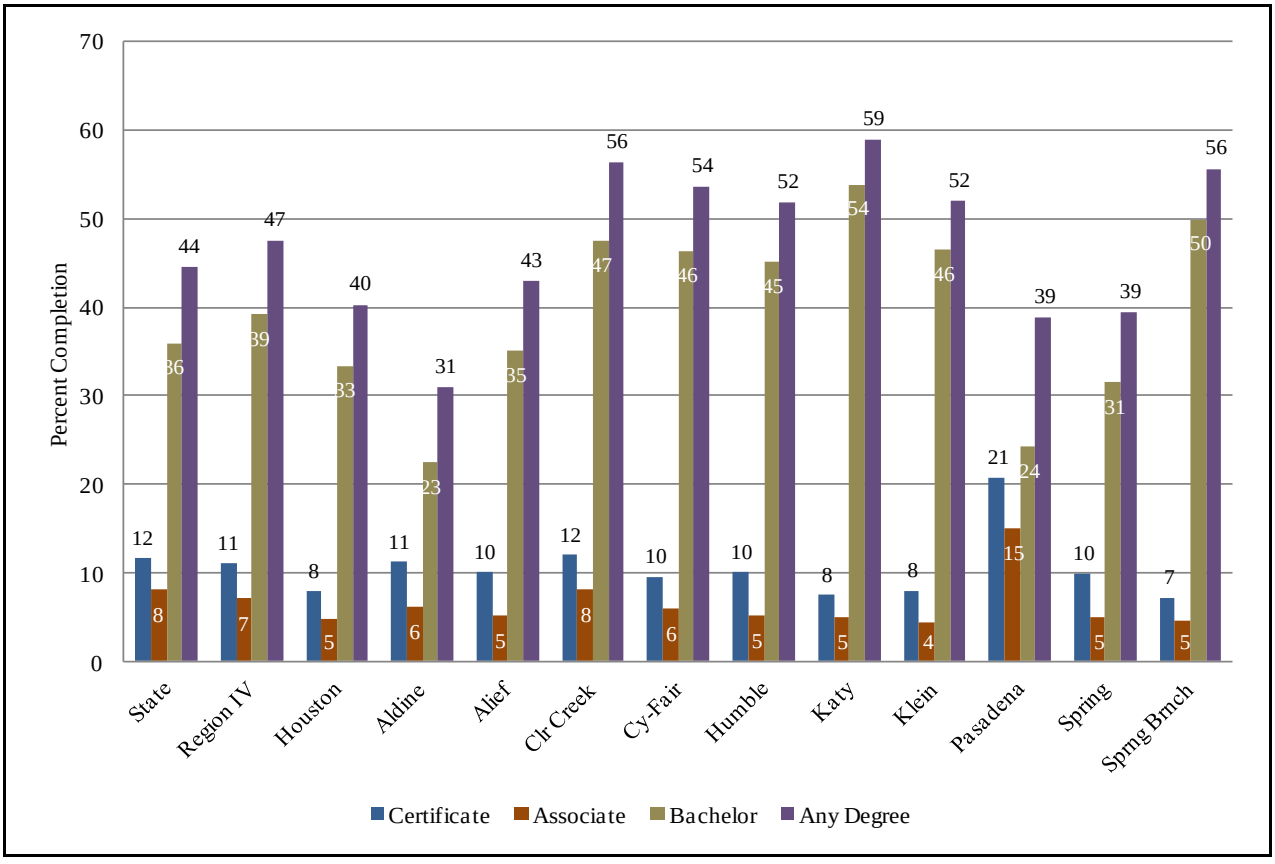
universities to students who have completed a minimum of 120 semester credit hours of coursework towards their degree requirements. While these degree types are commonly understood, associate degrees and certificates are less familiar to many. As defined by the THECB, associate degrees can be of three types: an associate of arts (AA), an associate of science (AS), or an associate of arts in teaching (AAT). While there are differences between these types of degrees, each associates degree is designed primarily to prepare students to successfully complete a baccalaureate degree in the future. As the THECB (2009) stated, "The academic associate degree forms the foundation and prerequisites for transfer into a baccalaureate program and, to the extent possible, is aligned with the upper-division requirements of the baccalaureate program at specific four-year institutions to facilitate a seamless transition with minimal loss of credit earned" (p. 1). The number of semester credit hours needed to earn an associate degree is between 60 and 66, depending upon the institution and the specific program, so students wishing to earn an associate degree and transfer to a university are intended to do so between their second and third years of postsecondary. In contrast with associate degrees, postsecondary certificates are not designed to prepare students to successfully complete a bachelor's degree but are instead aligned with the workforce. As stated by §5.48(c) of the Texas Administrative Code relating to the requirements of postsecondary institutions in regards to creating certificate programs, these programs "must meet identified workforce needs or provide the student with skills and/or knowledge that shall be useful for their lives or careers." Certificate programs are also different than associate degrees in that postsecondary institutions themselves have considerable leeway in designing and developing these programs as they do not need to align with the requirements of a baccalaureate degree. For these reasons, community and technical colleges are the only postsecondary institutions entitled to develop such undergraduate certificate programs as "these institutions are uniquely suited by virtue of their specialized mission, local governance, and student support services to provide such opportunities in an efficient and economical manner" (TAC, §5.48(f)(1)).

While bachelor's degrees are obviously considered to be the highest quality undergraduate degree out of those listed above, we believe that associate degrees and certificates are both valuable outcomes for many students. We will therefore divide the analyses of postsecondary completion into two parts. The first set of analyses will focus on whether students completed any type of postsecondary degree or certificate and the factors that predict completion. The second set of analyses will focus solely on the likelihood that students will earn a bachelor's degree. In regards to the first set of analyses, we were initially unsure as to whether or not associate degrees should be included as these degrees are meant primarily to prepare students to transition to a university and eventually complete a baccalaureate education. However, because THECB does define a student who completes an associate education as having earned a credential we elected to include such students in our general postsecondary completion models.

Before we turn to the results of the analyses we first present some broad figures relating to completion rates for Cohort 2. Figure 34 contains the percentages of students who earned some type of degree or certificate. For each district, the completion rates are disaggregated by the type of credential earned by the student and an overall completion rate is also provided. The sums of the disaggregated completion rates are often greater than the overall completion rate as students can earn multiple credentials. The rates are calculated by using only the cohort of postsecondary enrollees as the denominator rather than the entire twelfth grade cohort.

As was to be expected, the variation between districts in terms of the completion rates of their cohorts is quite significant. Just as in much of the analyses of postsecondary persistence, students from Aldine had the lowest rates of postsecondary completion out of all of the study districts with only 31% of their students completing any degree or certificate within six years following graduation. Katy had the highest completion percentage with approximately 59% of their cohort successfully earning a postsecondary credential. Postsecondary students from the highest performing district are therefore nearly twice as likely to complete some type of degree or certificate compared with students from the lowest performing district. The disparities between the districts appear even starker when simultaneously considering the gaps in access rates and completion rates. Another interesting finding that was common for all districts was the fact that students complete postsecondary certificates at much higher rates than associate degrees. Pasadena had the highest certificate completion percentage with approximately 21% of their enrollees completing some type of certificate within six years. The average completion rates for the state and Region IV for any degree were 44% and 47%, respectively.

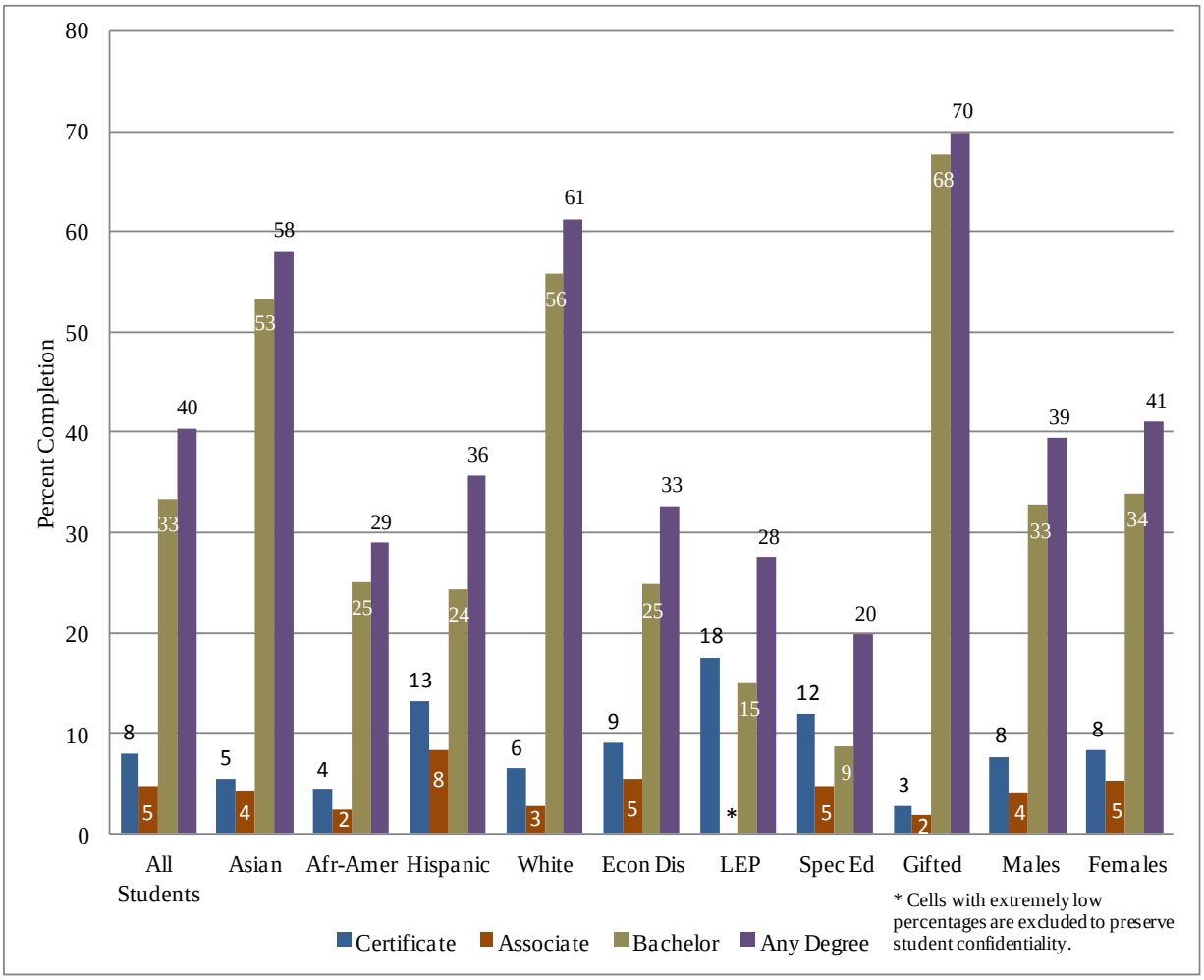
Figure 34: Postsecondary Completion Rates by Type for State, Region IV, HISD, and Ten Districts



Although we assume that the disparities between the districts in terms of their student postsecondary completion rates are to some degree reflective of their demographic compositions, it is important to disaggregate the completion data by demographic group to determine the rates for different student subgroups. Figure 35 presents the percentages of postsecondary completers from HISD by demographic characteristic. Many of the disparities that we found in the previous

analyses of high school persistence, postsecondary access, and postsecondary persistence are likewise found in the completion rates. As seen in previous chapters, African-American and Hispanic students are performing far below the levels of white and Asian students in completion rates for any degree (final purple bar in figure 35). Approximately 60% of all white and Asian students that enrolled in some postsecondary institution during their first year after graduation eventually earned some type of degree or certificate. The same was true for only 36% of Hispanic students and 29% of African-American students. The difference in the overall completion rates for Hispanic and African-American students is also interesting given the fact that African-Americans gain access to postsecondary institutions more frequently than Hispanics but it is Hispanics who are more likely to successfully complete their postsecondary education.

Figure 35: Postsecondary Completion Rates for HISD by Demographic Group



Economically disadvantaged, LEP, and special education students were also found to have extremely low rates of any degree completion, with special education students having the lowest rate at only 20%. Gifted students were by far the most likely to complete their degree or certificate with approximately 70% of all gifted students who enrolled in postsecondary earning a credential within the first six postsecondary years. There did not appear to be a substantial difference in the likelihood of completion between males and females.

Disparities are also discovered when the completion rates are further analyzed by the type of credential earned. While approximately 7% more Hispanic postsecondary enrollees compared to African-American successfully completed some type of postsecondary program, this is primarily due to the fact that a significant percentage of Hispanics earned a certificate rather than a bachelor's degree. Approximately 13% of Hispanics earned a certificate, more than twice the percentage of any other ethnic subgroup. When focusing solely on bachelor's degrees, African-Americans actually had a higher percentage of successful completion than Hispanics. LEP and special education students also had certificate completion percentages much higher than the averages for white, Asian, and African-American students.

Analyses of Postsecondary Completion

We can now begin to statistically model the relationships between a variety of factors and postsecondary completion. As with previous chapters, the first set of analyses will focus on postsecondary completion generally while the next set will focus specifically on university students and the completion of bachelor's degrees. Just as in the chapter on postsecondary access, the outcome variable of interest in these analyses is dichotomous (complete/did not complete) and the analyses are not longitudinal. Because of these features we will once again use logistic regression techniques to model these relationships. The estimated odds ratios will represent the likelihood of successfully completing a degree or certificate, meaning that odds ratios greater than 1 indicate a positive relationship between the variable and completion while ratios between 0 and 1 represent a reduction in the likelihood of successful postsecondary completion.

The results of the Postsecondary Completion Model #1 are presented in Table 26. Because the indicator for HISD was excluded from the model and no other variables are included the intercept represents the estimate for HISD and the odds ratios for the other variables represent the difference in the odds of completion between the variable district and HISD. As we have seen in previous analyses, when no other variables are included in the model the differences between the districts are quite pronounced. Students from Katy, the district with the highest estimated odds ratio, are more than twice as likely to successfully complete their postsecondary education as HISD students. On the opposite end of the spectrum, Aldine's students are only 0.67 times as likely to complete postsecondary as students from HISD. In other words, because the ratio between HISD and Aldine is 1/0.67, only two Aldine postsecondary students complete a degree or certificate for every three postsecondary students from HISD. Comparing Aldine to Katy shows the large degree of disparity that exists between the districts; for every Aldine student that graduates from postsecondary, approximately 3.2 Katy students do the same. Overall, the model estimated that six districts had significantly higher completion rates than HISD while only Aldine performed statistically significantly worse.

Table 26: Postsecondary Completion Model #1: District Indicators

Variable	Standard Estimate	Odds Ratio	Rank	Sig.
Intercept (Houston)	-0.39	*	8	*
Aldine	-0.41	0.67	11*	<.0001
Alief	0.11	1.11	7	0.162
Clr Creek	0.65	1.91	2*	<.0001
Cy-Fair	0.53	1.71	4*	<.0001
Humble	0.47	1.59	6*	<.0001
Katy	0.75	2.13	1*	<.0001
Klein	0.47	1.60	5*	<.0001
Pasadena	-0.06	0.94	10	0.4263
Spring	-0.04	0.97	9	0.6702
Sprg Brnch	0.62	1.85	3*	<.0001

In the second model of postsecondary completion the student-level variables were added to the model. The results of the Postsecondary Completion Model #2 are presented in Table 27. We will first discuss the estimates of the individual-level variables before returning to the district estimates and assessing their degree of change with the inclusion of the student characteristic variables. While our calculations of the completion rates in the previous section led us to predict that there would be fairly substantial disparities between subgroups, the magnitude of many of these disparities appear to be larger than any we have encountered thus far. The odds of a Hispanic postsecondary student earning a degree or certificate are 0.63 times the odds of an identical white student, and African-American students complete secondary at a rate less than half that of whites. In other words, a white student is twice as likely to complete a degree or certificate within six years compared to an African-American student from the same district, with a similar academic background, and of the same gender, economic status, and program classification. This finding is especially disheartening given the results of the models on postsecondary access which estimated that there were no significant difference between the access rates of whites and those of African-Americans. Another unexpected result of this analysis in terms of race/ethnicity is the estimate for Asian students. For the first time in all of our analyses, Asians are estimated to perform statistically significantly worse than whites in terms of postsecondary completion with approximately two Asian students earning a degree or certificate for every three white students.

Economically disadvantaged and special education students are also estimated to complete postsecondary at statistically significantly lower rates than their peers. Finally, dual-credit and advanced courses as well as high school attendance are all estimated to significantly increase a student's likelihood of successfully completing postsecondary, thus providing more evidence that academic preparation at the K-12 level can increase the likelihood of student success in college or university.

Table 27: Postsecondary Completion Model #2: Individual-Level Variables and District Indicators

Individual-Level Variables				District-Level Variables					
Variable	Prmtr Est	Odds Ratio	Sig.	Variable	Prmtr Est	Odds Ratio	Rank	Original Rank (Model #1)	Sig.
Asian	-0.36	0.70	<.0001	Houston	*	*	10	8*	
African-American	-0.70	0.50	<.0001	Aldine	-0.42	0.66	11*	11*	<.0001
Hispanic	-0.46	0.63	<.0001	Alief	0.12	1.12	7	7	0.2037
Econ Dis	-0.25	0.78	<.0001	Clr Creek	0.46	1.58	2*	2*	<.0001
LEP	0.01	1.01	0.9437	Cy-Fair	0.39	1.48	3*	4*	<.0001
Special Ed	-0.94	0.39	<.0001	Humble	0.30	1.35	5*	6*	0.0006
Gifted	0.10	1.11	0.1337	Katy	0.37	1.44	4*	1*	<.0001
Male	-0.42	0.66	<.0001	Klein	0.63	1.87	1*	5*	<.0001
Percent Attend	0.10	1.11	<.0001	Pasadena	0.04	1.04	9	10	0.6760
Total Advanced Core	0.17	1.18	<.0001	Spring	0.10	1.10	8	9	0.3242
Total Dual-Credit	0.29	1.34	<.0001	Sprg Brnch	0.14	1.15	6	3*	0.1391

It appears that the inclusion of student-level characteristic variables had a smaller effect on the estimates of the district indicator variables when completion was the outcome compared to when we were modeling access or persistence. While the ranking of the districts did change from the previous model to the current one, the same number of district indicator variables was found to be statistically significant. In both models six districts were found to be performing significantly better than HISD and only one district, namely Aldine, was estimated to have a statistically lower odds ratio. In the current model, students from Klein have the highest odds of completing a postsecondary degree or certificate and are more than twice as likely as students from HISD to do so. Cypress-Fairbanks, Katy, Clear Creek, Humble, and Spring Branch are the five other districts that are also performing significantly better than HISD in regards to postsecondary completion. There were no significant differences between the remaining districts and HISD.

Thus far in our analyses, the relationship between the district a student attends and postsecondary outcomes appears somewhat ambiguous. In our analyses of access, districts still appeared to play a significant role even when controlling for individual and district-level variables. However, in the persistence analyses the majority of the districts were not statistically significantly different from one another with the other variables in the model. It remains to be seen whether districts have an independent effect on their students' chances of postsecondary completion even when controlling for student and district characteristics. The results of this model would tentatively suggest that they do, but student characteristics may also have an aggregate effect at the district level.

The results of Postsecondary Completion Model #3 are contained in Table 28. This model replaced the district indicator variables with the district-level student characteristic variables. While including the district-level variables often had a fairly substantial impact on the estimates of the student-level variables in the analyses on access and persistence, this is not what we find

when the outcome variable is postsecondary completion. The same student variables that were found to be significantly related to completion in the previous model were also significant even when controlling for district characteristics and vice versa. African-American students are still predicted to complete postsecondary at a rate half that of whites, and Asians and Hispanics are likewise still found to be significantly less likely to earn a degree or certificate than their white peers.

Economically disadvantaged and particularly special education students are also still found to be completing postsecondary at significantly lower rates than students who are not in these categories. The only student-level variables that were not found to significantly influence a student's chances of completing postsecondary while controlling for district characteristics were the student-level variables for LEP and gifted classification. While the estimate for gifted is nearly significant at the $\alpha = .10$ level ($p = .1093$), there appears to be almost no relationship between LEP classification and postsecondary completion. The estimated odds ratio for LEP is approximately 1.02, meaning that a LEP student is just as likely as a non-LEP student to successfully complete postsecondary. This finding is somewhat unexpected given the fact that LEP students were previously found to gain access to and persist through postsecondary at significantly lower rates than their peers, but this result may be caused in part by the large number of LEP students that earn a postsecondary certificate rather than attempt an associate or bachelor's degree.

Table 28: Postsecondary Completion Model #3: Individual-Level Variables and District-Level Variables

Individual-Level Variables				**District-Level Variables**			
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Sig.
Asian	-0.36	0.70	<.0001	District Minority%	0.01	1.02	0.0357
African-American	-0.71	0.49	<.0001	District LEP%	0.04	1.04	<.0001
Hispanic	-0.46	0.63	<.0001	District Econ Dis%	-0.04	0.97	<.0001
Econ Dis	-0.26	0.77	<.0001	District Special Ed%	-0.02	0.98	0.3918
LEP	0.02	1.02	0.9363	District Gifted%	0.09	1.10	<.0001
Special Ed	-0.95	0.39	<.0001				
Gifted	0.11	1.11	0.1093				
Male	-0.42	0.66	<.0001				
Total Advanced Core	0.16	1.12	<.0001				
Total Dual-Credit	0.28	1.33	<.0001				
Percent Attend	0.10	1.11	<.0001				

In regards to the district-level variables, four of the five variables included in the model were once again found to be statistically significant. The percent of students in special education programs was the only variable that did not appear to influence the likelihood of postsecondary completion. The aggregate influence of the percent of economically disadvantaged students once again negatively impacts a student's odds of completion. Students are only 0.97 times as likely to earn a degree or certificate for every one percent in the district's economically disadvantaged

population. The variable for percent gifted was also found to be significant. Students are about 1.10 times as likely to complete postsecondary for every one percent increase in the district's gifted population. The estimates for percent LEP and percent non-Asian minority were also found to be statistically significant. Taking a closer look at the relationship between the racial composition of the district and the variety of postsecondary outcome variables we have analyzed begins to reveal a fairly strong and consistent trend. In nearly every analysis thus far, the percent of minority students in the district has significantly influenced the postsecondary outcome of interest, but rather than having a damaging impact on a student it appears as though increasing the percentage of non-Asian minority students increases a student's likelihood of accessing, persisting through, and completing postsecondary. Future research should investigate whether this relationship is relatively constant regardless of the total percentage of minority students in the district. For example, while racial diversity within a district may be beneficial for all students, extremely high levels of racial segregation and isolation may have a damaging effect on students' postsecondary outcomes.

In our final model in which postsecondary completion was defined as earning any type of degree or certificate, the district indicator variables were added back to the model one at a time to determine the relationships between districts and completion when controlling for student-level and district-level characteristics. The results of Postsecondary Completion Model #4 are presented in Table 29. Once again only the district indicator variables are presented in the table as the estimates of the student-level and district-level variables for this analysis were similar to those presented in the previous two tables.

While much of the variability between districts was eliminated with the inclusion of the student and district variables, we still find significant differences between many of the districts in terms of their influence on postsecondary completion. The odds ratio estimates for the district indicator variables ranged from 0.81 to 1.40 in this model. While seven of the districts were found to be statistically significant in the first Postsecondary Completion Model #1, only four districts were significant in this model Interestingly, Pasadena, which had the second lowest estimated odds ratio in the first completion model, was estimated to be the highest performing district in this model when controlling for student and district characteristics.

Pasadena and Klein were the only two districts found to be performing significantly better than the average of the other districts while Cypress-Fairbanks and Humble were the only districts found to be performing significantly worse. Aldine and Alief had the two lowest estimated odds ratios out of the districts in the analysis, but their estimates were not found to be statistically significantly different than the average, likely due to sample size limitations. HISD also moved up five places between the first model and the current one from eighth to third, while Katy actually dropped six places from first to seventh. Thus, controlling for the other variables in the model once again significantly changed our understanding of the relationship between the districts in our sample and students' likelihood of successfully completing their postsecondary education.

Table 29: Postsecondary Completion Model #4: District Indicator Estimates Controlling for Individual-Level Variables and District-Level Variables

Variable	Stnd Est	Odds Ratio	Rank	Original Rank (Model #1)	Sig.
Houston	0.08	1.09	3	8*	0.6996
Aldine	-0.22	0.81	11	11*	0.1140
Alief	-0.20	0.82	10	7	0.1826
Clr Creek	0.04	1.04	5	2*	0.6440
Cy-Fair	-0.13	0.88	8*	4*	0.0476
Humble	-0.20	0.82	9*	6*	0.0172
Katy	-0.03	0.97	7	1*	0.6864
Klein	0.28	1.32	2*	5*	<.0001
Pasadena	0.34	1.40	1*	10	0.0157
Spring	0.04	1.04	6	9	0.7378
Sprg Brnch	0.05	1.06	4	3*	0.7536

Analyses of University Completion

The models thus far presented in this chapter have included any type of postsecondary degree or certificate in the outcome variable. The results of the models from the previous chapters suggest that the relationships between the variables in the model and the outcome of interest often depend on whether or not the outcome is postsecondary generally or university specifically. In our final set of analyses, we will look specifically at what variables influence a student's likelihood of earning a bachelor's degree from a university. It should be mentioned that we debated whether we should include all postsecondary enrollees in these final analyses or restrict the sample to only those students that attended a university during their first postsecondary year. There are pros and cons to both of these approaches. The limitation of including all students in the analyses is that many students who enroll in a college do so without ever intending to transfer to a university and earn a bachelor's degree. This may result in an underestimation of the odds of completing a baccalaureate program. However, restricting the sample to only those students who were enrolled in a university during at least one of their first two postsecondary semesters eliminates all those students who may have begun their postsecondary careers at a community college, successfully transferred to a university, and eventually earned a bachelor's degree. Because approximately 8% of all postsecondary enrollees in the state did earn an associate degree, it is likely that at least some of these students did transfer to a university and intended to pursue a baccalaureate program. We therefore believe that the pros of this approach outweigh the cons and we have thus elected to include all postsecondary students in our analyses regardless of the type of institution at which they began their postsecondary education.

The results of the University Completion Model #1 are presented in Table 30. With no other variables in the model, the differences between the districts in terms of the likelihood of their

students earning a bachelor's degree are large. The odds of completing a bachelor's degree for students from Katy that gained access to a postsecondary institution are 2.33 times the odds of completion for students from HISD, giving Katy students the highest odds of completion. Five other districts are also outperforming HISD statistically significantly better, while only two districts are performing statistically significantly worse. Once again, students from Aldine have the lowest odds of completion, being just slightly more than half as likely to earn a bachelor's degree as HISD students. To determine the range of variability between the districts we can take the odds ratio of the highest performing district (2.33) and divide it by the lowest odds ratio (0.58), which gives us a result of almost precisely 4.0. This means that the odds of bachelor's degree completion for students from Katy are approximately four times the odds of completion for students from Aldine.

Table 30: University Completion Model #1: District Indicators

Variable	Standard Estimate	Odds Ratio	Rank	Sig.	Postsec Rank
Intercept (Houston)	-0.69	*	8	<.0001	8
Aldine	-0.55	0.58	11*	<.0001	11*
Alief	0.07	1.08	7	0.3599	7
Clr Creek	0.59	1.80	3*	<.0001	2*
Cy-Fair	0.54	1.72	5*	<.0001	4*
Humble	0.49	1.64	6*	<.0001	6*
Katy	0.84	2.33	1*	<.0001	1*
Klein	0.55	1.73	4*	<.0001	5*
Pasadena	-0.45	0.64	10*	<.0001	10
Spring	-0.09	0.92	9	0.3249	9
Sprg Brnch	0.69	1.99	2*	<.0001	3*

What is also interesting to note about the results of this model is how similar the estimates of university completion are when compared to the results of postsecondary completion generally. The furthest column on the right-hand side of Table 30 presents the rankings from the Postsecondary Completion Model #1 in the previous section. As we can see, seven out of the eleven districts have the exact same ranking for both models, and the remaining four districts only changed their ranking by one place. All but one district (Pasadena) were found to be performing statistically significantly different than HISD in the previous model (Postsecondary Completion Model #1) are likewise found to be significant in this model. Overall, then, our initial model would suggest that there are few differences in the impact of districts on completion whether the outcome of interest is postsecondary completion generally or the completion of a bachelor's degree specifically. This may be due in part to the fact that on average far more students complete bachelor's degrees than any other type of degree or certificate. However, we will see if this finding holds constant for the districts once the student-level variables and the aggregate district-level characteristic variables are also added to the model.

The next analysis keeps the district-level indicators and adds the student-level variables to the model. The results of the University Completion Model #2 can be found in Table 31. As shown in the table, the majority of student-level variables have a strong and significant relationship with the likelihood of earning a bachelor's degree. Asian, African-American, and Hispanic students complete their university education at rates significantly lower than their white peers. Out of all three of these ethnic subgroups Asian students are most likely to complete their degree but even they are only 0.63 times as likely as whites to do so. Put differently, the odds of bachelor's degree completion for white students are approximately 1.59 times the odds of completion for Asian students. The estimates for African-Americans and Hispanics are even lower, but unlike the models of postsecondary completion in this instance Hispanics have by far the lowest likelihood of earning a bachelor's and are less than half as likely to do so as whites. African-American university students have about 10% higher odds than Hispanics to complete their baccalaureate education.

Table 31: University Completion Model #2: Individual-Level Variables and District Indicators

Individual-Level Variables				**District-Level Variables**						
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Rank	Univ Model #1 Rank	Sig.	Postsec. Comp. Model #2 Rank
Asian	-0.45	0.63	<.0001	Houston	*	*	9	8	*	10
African-American	-0.54	0.58	<.0001	Aldine	-0.62	0.54	11*	11*	<.0001	11*
Hispanic	-0.71	0.49	<.0001	Alief	0.08	1.08	7	7	0.4399	7
Econ Dis	-0.43	0.65	<.0001	Clr Creek	0.38	1.47	4*	3*	<.0001	2*
LEP	-0.41	0.66	0.1329	Cy-Fair	0.41	1.51	3*	5*	<.0001	3*
Special Ed	-1.34	0.26	<.0001	Humble	0.32	1.38	5*	6*	0.0005	5*
Gifted	0.21	1.23	0.0019	Katy	0.48	1.61	2*	1*	<.0001	4*
Male	-0.37	0.69	<.0001	Klein	0.77	2.17	1*	4*	<.0001	1*
Total Advanced Core	0.20	1.22	<.0001	Pasadena	-0.29	0.75	10*	10*	0.0041	9
Total Dual-Credit	0.34	1.40	<.0001	Spring	0.06	1.06	8	9	0.5936	8
Percent Attend	0.11	1.11	<.0001	Sprg Brnch	0.21	1.23	6*	2*	0.0420	6

In addition, program classification appears to have an effect. A special education student appears to have the most harmful influence on the likelihood of university completion, with these students being approximately four times less likely to earn a bachelor's than their peers when controlling for all other variables in the model. Economically disadvantaged and LEP students are also significantly less likely to complete at a university. Female students are approximately 1.5 times as likely to complete as males. Finally, attendance, dual-credit courses, and advanced core courses all positively influence a student's likelihood of completing a degree at a university, and once again dual-credit courses are even more influential than advanced coursework in promoting positive postsecondary outcomes.

With the inclusion of the student characteristic variables we can now reexamine the relationship between the district a student attended and her chances of successfully completing at a university. Interestingly, just as in the Postsecondary Completion Model #2, adding the individual-level variables to the University Completion Model #2 does not appear to substantially change the estimates of the influence of districts. In the previous University Completion Model #1, when no student characteristics were included, six districts had significantly higher odds ratios than HISD and two districts had a significantly lower ratio. All six of the districts estimated to be performing significantly better than HISD in the first model were still found to be outperforming HISD in the current model (#2). Aldine is still ranked as the lowest performing district even when controlling for student-level variables; Aldine students have only half the odds of earning a bachelor's degree compared to HISD students.

In University Completion Model #3, presented in Table 32, the district indicator variables were excluded from the model and replaced with the district-level student characteristic variables. The first general finding for this analysis is that the relationships between the individual-level variables and the likelihood of university completion are roughly the same for this model compared with the previous University Completion Model #2, when no district-level student characteristic variables were included. Economically disadvantaged and special education students are significantly less likely to complete university than their peers, while students classified as gifted at the K-12 level are much more likely to earn a bachelor's. The estimated odds ratio for males of 0.69 is also significant and indicates that females are still approximately 1.5 times more likely to complete a degree. Finally, advanced and dual-credit coursework and high school attendance are also found to significantly increase a student's chances of completing a baccalaureate program.

But perhaps the most significant finding in our opinion is the influence of race/ethnicity on the likelihood of completion. Non-white students are still significantly less likely than their white peers to complete at a university even while controlling for all of the other variables in the model. While we do not wish to belabor this point, we would be remiss not to emphasize the significance of this finding. If two students, one white and one of another race, enrolled in a university with the same economic status, the same language proficiency, the same special education classification, roughly identical academic preparation as measured by the number of dual-credit and advanced courses they took in high school and the percent of high school they attended, and they attended a district with the exact same demographic makeup, our model estimates that the white student would have about twice the odds of earning a bachelor's degree within six years than the non-white student, regardless of whether that student was Asian, African-American, or Hispanic. It is true that we did not include data for high school GPA or SAT scores in the model and that adding these variables may reduce this apparent disparity, perhaps even significantly. Nevertheless, the fact that race appears to have such a powerful effect on a student's likelihood of earning a bachelor's degree is unfortunate. Future research could more deeply investigate the potential causes of these inequitable outcomes for different ethnic groups.

Table 32: University Completion Model #3: Individual-Level Variables and District-Level Variables

Individual-Level Variables				District-Level Variables			
Variable	Stand Est	Odds Ratio	Sig.	Variable	Stand Est	Odds Ratio	Sig.
Asian	-0.47	0.63	<.0001	District Minority%	0.01	1.01	0.0994
African-American	-0.56	0.57	<.0001	District LEP%	0.05	1.05	<.0001
Hispanic	-0.72	0.49	<.0001	District Econ Dis%	-0.04	0.96	<.0001
Econ Dis	-0.43	0.65	<.0001	District Special Ed%	0.05	1.06	0.0682
LEP	-0.42	0.66	0.1226	District Gifted%	0.13	1.13	<.0001
Special Ed	-1.35	0.26	<.0001				
Gifted	0.21	1.24	0.0016				
Male	-0.37	0.69	<.0001				
Total Advanced Core	0.19	1.21	<.0001				
Total Dual-Credit	0.34	1.40	<.0001				
Percent Attend	0.11	1.11	<.0001				

In terms of the district-level characteristics, three out of the five variables in the model were estimated to significantly influence a student's likelihood of completing a bachelor's at the $\alpha < .05$ level, and the other two variables were significant at the $\alpha < .10$ level. Once again, the percent of students in the district classified as economically disadvantaged significantly reduces the likelihood that a student that gains access to a university will successfully complete a bachelor's degree. Larger percentages of gifted students, on the other hand, positively influence the likelihood of completion. A university student's chances of completing are approximately 1.1 times higher for every one percent increase in the gifted population of the district attended during high school. Interestingly, in this model the percentage of LEP students in the district was positively related to our outcome, indicating that a higher percentage of LEP students increases the likelihood that students will earn a bachelor's degree. The percentage of non-Asian minority students and special education students were also estimated to increase university completion likelihoods, although neither of these variables were significant at the $\alpha < .05$ level.

The University Completion Model #4 in Table 33 is both the final model of this chapter as well as the last analysis of the report. All student-level variables and district-level characteristic variables were kept in the model as the district indicators were added one at a time to determine their performance relative to the average of the other districts when controlling for the rest of the variables. As we saw occur in both the final persistence models and Postsecondary Completion Model #4, the inclusion of the student and district variables in University Completion Model #4 eliminates much of the variability between districts in terms of the likelihood of their postsecondary students earning a bachelor's degree. Only two districts, Klein and HISD, performed statistically significantly better than the average for the other districts and only two had significantly lower estimates. Aldine is no longer estimated to have the lowest university completion rate but still ranks ninth out of the eleven districts, while students from Alief now have the lowest predicted likelihood of earning a bachelor's degree. The remaining seven districts did not appear to significantly deviate from the average. However, it is interesting to note that many of the district rankings did change significantly from the first university

completion model to the current one (see column 5 in Table 33), even if the districts' new estimates are not statistically significant. For example, Pasadena was estimated to be the second lowest performing district in the first university completion model, but in this model Pasadena has the third highest odds ratio. Perhaps the most interesting example is HISD. While HISD had the third worst estimated performance in the first model, when controlling for student and district characteristics HISD students now have the highest likelihood of earning a bachelor's degree. HISD students are approximately 1.6 times as likely to earn a bachelor's compared to their peers from the ten neighboring districts in the sample. This is particularly interesting given the fact that HISD students have one of the lower university completion rates in the sample in terms of the raw percentages of students that earn a bachelor's degree.

Table 33: University Completion Model #4: District Indicator Estimates Controlling for Individual-Level Variables, and District-Level Variables

Variable	Stnd Est	Odds Ratio	Rank	Original Rank (Univ Model #1)	Sig.	Postsec. Completion Rank (Model # 4)
Houston	0.4709	1.601	1*	8	0.0343	3
Aldine	-0.1869	0.830	9	11*	0.2213	11
Alief	-0.4729	0.623	11*	7	0.003	10
Clr Creek	-0.141	0.868	8	3*	0.0862	5
Cy-Fair	-0.0966	0.908	7	5*	0.1602	8*
Humble	-0.3	0.741	10*	6*	0.0004	9*
Katy	0.1231	1.131	4	1*	0.0844	7
Klein	0.35	1.419	2*	4*	<.0001	2*
Pasadena	0.2349	1.265	3	10*	0.1237	1*
Spring	0.00098	1.001	6	9	0.9932	6
Sprg Brch	0.028	1.028	5	2*	0.878	4

In sum, once again we see that controlling for student and district characteristics significantly changes our perception of district performance, whether in regard to postsecondary completion generally or university completion specifically. Districts such as Pasadena and HISD appear to be performing quite poorly when no other variables are controlled for, but accounting for student and district-level demographic factors results in these districts being some of the highest performing ones in the region. Conversely, a number of districts appear to have quite high rates of postsecondary completion, but this is not the case once other variables are controlled for. These findings reinforce the belief that accounting for the student composition of the district is of paramount importance when attempting to accurately estimate the impact of districts on the postsecondary outcomes of their students.

Chapter Ten

Conclusion

It is sufficiently difficult to summarize such a large amount of data and results in a few pages, but in this section we will attempt to do just that by identifying some of the themes and findings that were discovered throughout the analyses. We have divided these conclusions into five sections, presented below. The first section will attempt to provide some caveats and ideas that should be considered before the reader draws any specific conclusions about the results of these analyses. These caveats will be discussed in greater detail in Chapter 11: Limitations and Future Research, but we felt that it was prudent to also mention them prior to presenting the conclusions. Each of the next four sections will synthesize the major findings relating to one specific category of variables. These categories are: District Performance, Student-Level Demographic Characteristics, District-Level Demographic Characteristics, and Academic Preparation.

Caveats

- *Influence of controlling for variables* – The estimated relationship between the district a student attends during high school and her postsecondary outcomes depends largely upon what variables are being controlled for in the statistical model. When no other variables are included in the models, the disparities between the districts are large regardless of whether the outcome is access, persistence, or completion. However, accounting for the individual and aggregate influences of student characteristics makes the districts appear to be performing more similar, often quite substantially. For example, only two out of the eleven districts were estimated to be performing statistically significantly different than the rest in terms of university persistence when student and district characteristics were accounted for in the models. However, the raw rates of postsecondary outcomes are also important to consider. We have provided a number of different models as well as the raw rates and percentages for each outcome variable as each analysis adds something different to our understanding of these phenomena. The reader must decide what data or results are most important to them for the specific research question they are currently considering.

- *Influence of postsecondary outcome being considered* – Our understanding of the relationship between district attendance and student postsecondary outcomes also depends on what outcome is currently being considered. HISD is a prime example of this phenomenon. When controlling for the other variables in the study, HISD is estimated to be the lowest performing district in regards to postsecondary access, the highest ranked district when the outcome is university access, the lowest ranked in terms of university persistence, and the highest ranked in regards to university completion. HISD is an extreme case and the performance of many districts appears more stable and consistent across outcome variables. Either way, all outcomes must be considered simultaneously in order to arrive at a more holistic and nuanced understanding of district

performance in regards to postsecondary outcomes, as well as to understand the relative strengths and weaknesses of each specific district.

- *Influence of many variables is dynamic and complex* – This same variability is also present in the relationships between a number of other variables and postsecondary outcomes. The relationship between race/ethnicity and postsecondary for African-American students is a telling example. African-Americans and whites were estimated to gain access to postsecondary institutions at essentially the same rate and African-Americans were actually twice as likely as whites to gain access to university when all other variables were controlled for. However, African-Americans, out of all the ethnic subgroups, had the lowest estimated likelihood of persisting through postsecondary and university and completing postsecondary. Once again, a nuanced understanding of the relationships between predictor variables and postsecondary outcomes is important in order to more effectively design policies and programs that can better assist all students in accessing, persisting through, and successfully completing postsecondary.

District Performance

- *District influence on different postsecondary outcomes* – While there is some degree of variation between the districts on all of the postsecondary outcomes, districts appear to have more influence on certain outcomes than others. In particular, districts play an especially pronounced role in regards to postsecondary access. This finding was expected a priori given the fact that more factors begin to influence students the longer they persist through postsecondary, making the relative influence of districts to likely wane over time. However, there is still some significant variation between districts when the outcome is persistence or completion, meaning that the influence of districts is still present to some extent even after four to six years of postsecondary.

- *District influence on postsecondary generally compared to university specifically* – One of the results discovered consistently throughout the analyses is that there is more variation between the districts when the outcome is specific to university rather than postsecondary generally. In terms of the estimated odds ratios for the access and completion models and the hazard ratios for the persistence models, the range in the ratios was nearly twice as large when the outcome was specific to university regardless of whether the outcome was access, persistence, or completion. For example, the district odds ratios for postsecondary access generally ranged from 0.62-1.32, a range of about 0.7. However, when the outcome was university access specifically the range was 1.4, approximately twice as high. The district estimates for the persistence and completion analyses similarly show more variation between the districts when the outcome is specific to university students.

- *Average district rankings* – As discussed in the preceding section, the relationship between any particular district and postsecondary outcomes depends largely on what outcome is being considered. However, for the sake of simplicity we have attempted to synthesize all the rankings of the districts in order to arrive at average district rankings

across the postsecondary outcomes we studied. The rankings we used for this analysis came from the six final models, one for postsecondary generally and one for university specifically for access, persistence, and completion. These average rankings should be interpreted extremely cautiously for three reasons. First, oftentimes the differences between districts in terms of the rankings were not statistically significant and it is inadvisable to draw definitive conclusions from statistically insignificant differences. Second, for the analyses of persistence and completion the sample of students only definitively attended their district during their senior year, making it difficult to determine what influence the district they attended had on their postsecondary outcomes. Third, we are using both relative odds ratios and hazard ratios, depending on the analysis, in our average rankings. Thus, these average rankings are meant solely as a tentative evaluation of the performance of the study districts and are by no means definitive. With that being said, the results of these rankings are presented below and are followed by some highlights of this analysis.

Table 34: District Rankings across Analyses

	Post Acc	Univ Acc	Post Pers	Univ Pers	Post Comp	Univ Comp	Avg Rank
Klein	6	6	2	2	2	2	3.3
Pasadena	7	11	1	1	1	3	4.0
Clr Creek	2	7	3	4	5	8	4.8
Sprg Brch	1	9	8	3	4	5	5.0
Houston	11	1	4	11	3	1	5.2
Spring	4	5	6	5	6	6	5.3
Cy-Fair	3	3	10	8	8	7	6.5
Katy	10	4	7	9	7	4	6.8
Aldine	5	2	9	10	11	9	7.7
Alief	9	8	5	7	10	11	8.3
Humble	8	10	11	6	9	10	9.0

- *Small variation in mid-range* – The first result that should be mentioned is that five out of the eleven districts in the sample had an average ranking between 4.8 and 6.8. In our opinion it would be unwise to truly attempt to differentiate the performance of these five districts because of the relative similarity of their rankings.

- *Low performers* – However, it does appear that there are two districts that are more distinguishable from the rest on each end of the spectrum. Alief and Humble are the two lowest performing districts in the study by pretty significant margins. Because there are eleven districts in the study, the average performance is by definition sixth out of eleven. Alief and Humble on averaged ranked 8.3 and 9.0, respectively, and both districts ranked worse than the average (sixth) on five out of the six analyses. Overall, then, when controlling for the other variables included in the models, it appears that Alief and Humble are the two districts consistently struggling to prepare their students for success at the postsecondary level.

- *High performers* – On the opposite end of the spectrum, Klein and Pasadena appear to rank consistently higher than the other districts when student and district factors are controlled for in the models. Klein ranked no lower than sixth on any postsecondary outcome and was estimated to be the second highest performing district on all of the persistence and completion analyses. Pasadena was the lowest ranked district in terms of university access but was the highest ranked district on three of the four persistence and completion analyses. While the results of a single study cannot say definitively what the actual performance of these districts might be, Klein and Pasadena are the two highest ranked districts on average in this study accounting for other variables.

- *Relationship between access, persistence, and completion* – One of the interesting results from averaging the district rankings is the relationship between access, persistence, and completion. While Klein and Pasadena were the two districts with the highest average rankings across the analyses, neither of these districts performed particularly well in regards to access, whether postsecondary or university, suggesting an inverse relationship between access on the one hand and persistence and completion on the other. This trend is reinforced by the results for HISD and Cypress-Fairbanks. Unlike the highest performing districts, Cypress-Fairbanks students performed quite well in regards to access but fared far worse in terms of persistence and completion. HISD had the highest relative performance for university access but the lowest performance in terms of university persistence. It may be the case that districts where fewer students enroll in postsecondary, such as Klein and Pasadena, will have higher rates of persistence and completion because only higher achieving students gain enroll in college or university. Conversely, when larger percentages of a district's graduates enroll, a smaller percentage may actually complete their postsecondary education.

- *HISD's ranking* – When the rankings on all of the postsecondary outcome variables are averaged together, HISD's average of 5.2 is now the fifth highest average ranking out of the eleven districts. Once again, this finding should be interpreted cautiously, especially given how closely HISD and many other districts rank. Yet the difference between HISD's relative rankings when no other variables are controlled for compared to its estimated rankings from the full models is remarkable. In the first model for each analysis when only the district indicators were included in the model, on average HISD ranked exactly ninth out of the eleven districts and never ranked higher than eighth on any postsecondary outcome. However, when all other variables were controlled for, HISD ranked 5.3 out of eleven on average and was estimated to be the highest performing district on two of the postsecondary outcomes–university access and university completion.

Student-Level Demographic Characteristics

- *Race/Ethnicity* – As we alluded to in the first section of the conclusion, the relationship between race/ethnicity and postsecondary outcomes depends both on the racial subgroup

in question and the outcome variable of interest, and some groups perform much more consistently than others. The performance of Hispanics in relation to whites appears to be the most stable across outcomes. Hispanics performed lower than their white peers when controlling for all other variables on every postsecondary outcome, regardless of whether the outcome was specific to postsecondary generally or university. Asian students were significantly more likely than whites both to gain access to postsecondary institutions and to persist through them, but were significantly less likely than their white peers to successfully complete postsecondary within six years. The relative performance of African-Americans compared to whites was by far the most inconsistent across outcome variables. African-Americans were just as likely as whites to gain access to postsecondary generally and were twice as likely to gain access to university when accounting for all other variables. However, African-Americans were at the greatest risk of dropping out of postsecondary and university before completing their degree out of any racial subgroup and were significantly less likely to successfully complete their degree. Overall, then, we would say that special attention should be paid to Hispanics in regard to postsecondary access, Hispanics and African-Americans in regards to postsecondary persistence, and all ethnic subgroups apart from whites in regards to postsecondary completion.

- *Socioeconomic status* – Socioeconomic status was one of the most consistently influential variables on postsecondary outcomes. In all of the final models, economically disadvantaged students were estimated to perform statistically significantly worse than their more advantaged peers. Interestingly, the place where socioeconomics appeared to play the smallest role was in relation to university access, but even in that analysis low-income students were significantly less likely than their peers to gain access to a university. In sum, low-income status at the K-12 level as defined by eligibility for the federal government's free or reduced-price lunch program significantly decreases a student's odds of accessing, persisting through, and successfully completing postsecondary.

- *Language proficiency status* – The relationship between language proficiency status and postsecondary outcomes was one of the most interesting and inexplicable relationships in our analyses. As we expected prior to this research, being classified as having limited English proficiency (LEP) significantly reduces a student's chances of gaining access to a postsecondary institution generally or a university specifically. LEP students are also significantly less likely than their peers to persist through postsecondary institutions. LEP students are probably less likely to complete university, although the extreme small number of LEP students that gained access to a university prevented us from detecting a statistically significant difference. Contrary to our expectations, however, there appear to be no significant differences between LEP and non-LEP students in regards to a student's likelihood of persisting through university specifically or completing some type of postsecondary degree or certificate. It is difficult to say why this relationship might exist. It is possible that having limited English proficiency significantly decreases a student's odds of accessing postsecondary, but simultaneously those students that do access some type of postsecondary institution may be either more resilient or exceptionally strong in other subjects such as math or science. These are merely some of

the possible explanations, however, and we cannot confirm or refute these explanations given the data we have for this study.

- *Special education status* – Special education status was also one of the more stable variables in our analyses. The performance of special education students was estimated to be lower than their peers for all outcome variables, although the estimates were not always found to be statistically significant given the small sample of special education students in certain analyses. It appears as though being classified as special education at the K-12 level has a significantly detrimental impact on one's likelihood of having successful postsecondary outcomes.

- *Gifted status* – The relationship between being classified as gifted and talented before or during high school and postsecondary outcomes was also quite interesting. Gifted students appear to be slightly less likely than their peers to enroll in a postsecondary institution and slightly more likely to access a university, although the estimate for university access was not quite statistically significant. There were no significant differences between gifted and non-gifted students in regards to persistence, nor were there any significant differences when the outcome was postsecondary completion generally. However, the one analysis where gifted students appeared to be at a significant advantage was in terms of successfully completing a bachelors degree. Gifted students are estimated to be approximately 1.23 times more likely than non-gifted students to complete university.

- *Gender* – Interestingly, gender was also one of the most consistently significant variables throughout our analyses. While prior research does indicate that females are often outperforming their male peers, the magnitude and consistency of these gender disparities were both surprising and alarming. Males performed worse than their female peers on every postsecondary outcome, even when controlling for race, socioeconomic status, academic preparation, and all of the other variables in the model. The gender disparity is perhaps most severe in regards to postsecondary completion. Females are approximately 1.5 times more likely than males to complete postsecondary generally and university specifically, even though males also gain access to postsecondary institutions at a significantly lower rate than females.

District-Level Demographic Characteristics

- *Percent minority* – While the relationship between the percent of minority students in the district and postsecondary outcomes was fairly consistent, the direction of the relationship was not what we had expected prior to conducting this research. In no analysis did the percent of minority students in the district increase a student's risk of a negative postsecondary outcome. Higher percentages of minority students actually increase any given student's likelihood of gaining access to a postsecondary institution and persisting through. We had previously predicted that high percentages of minority students may indicate potentially damaging forms of racial segregation and isolation. However, it may be the case that few districts in the study experienced this type of

extreme segregation. The increases in the percentage of minority students may thus be a positive influence as higher levels of diversity prepares students for future success in postsecondary institutions. This would indeed be a heartening conclusion, although more research would need to be conducted in order to reach such a conclusion with a high degree of assurance.

- *Percent LEP* – The influence of the percent of students classified as LEP and postsecondary outcomes was also unexpected. We did not predict that there would be a strong influence of this variable since the overall variation between districts in regards to the percentage of their student body classified as LEP was not very great, and this variable was not very influential in regards to postsecondary access generally and university access specifically. However, higher percentages of LEP students in the district do appear to significantly reduce the risk of a student dropping out of postsecondary or university and significantly increase the likelihood that a student will successfully complete postsecondary or university. It is difficult to say why this relationship might be occurring.

- *Percent economically disadvantaged* – The percent of the students in the district classified as economically disadvantaged had the most consistently harmful impact on student postsecondary outcomes out of any of the district-level student characteristic variables. This variable was found to have a statistically significantly negative impact on access, persistence, and completion, regardless of whether the outcome variable was specific to university or not. While it may not be entirely surprising that this is the case, the finding is still quite remarkable. Higher percentages of lower-income students decrease the likelihood that any given student, regardless of her personal economic status, will experience positive postsecondary outcomes.

- *Percent special education* – Through the first five analyses, it appeared as though the percent of students in the district classified as special education only had an influence on access. While higher percentages of special education students had a negative influence on a student's likelihood of gaining access to a postsecondary institution and a significantly positive influence on one's likelihood of accessing a university, no significant relationship was discovered between percent special education in a district and either of the persistence outcomes or postsecondary completion. However, this variable was found to significantly increase a student's likelihood of successfully completing university and earning a bachelor's degree.

- *Percent gifted* – Prior to actually running the analyses, we also predicted that there would not be a strong influence of the percent of students classified as gifted on postsecondary outcomes. This is definitely not what we found. The influence of this variable was precisely the opposite of the influence of percent economically disadvantaged. The percent of gifted students had a significant and positive influence on every postsecondary outcome, regardless of whether it was for postsecondary generally or university specifically. Once again, this aggregate influence is controlling for the influence of an individual student's gifted status, meaning that a higher percentage of gifted students in the district increases the likelihood of positive postsecondary

outcomes for all students, regardless of their personal gifted status. This variable was even more influential when the outcome was persistence or completion than when it was for access.

Academic Preparation

- *Scores on state accountability assessments (TAKS)* – Because of the way the cohorts were defined in the study, TAKS scores were only used for our analysis of postsecondary access for Cohort 1 and we can say nothing about the relationship between TAKS scores and postsecondary persistence or completion. However, we did find that scoring at the level of college-readiness as defined by TEA's standards did result in a significant increase in students' odds of accessing postsecondary institutions generally as well as universities specifically. Additionally, there was a significant impact for scoring at the college-ready level for each subject tested by TAKS. However, we did not find any additional impact of being college-ready on all four TAKS subjects simultaneously above and beyond the influence of being college-ready on the individual subjects.

- *Advanced courses* – The advanced courses variable in the model represented the number of total credits a student earned during their entire high school tenure in classes that were both defined as advanced by TEA and in one of the core subject areas (math, science, social studies, English/language arts, and foreign language). The relationship between this variable and postsecondary outcome was also quite interesting. We found no relationship between advanced coursework and the likelihood that students will enroll in any postsecondary institution and a small but statistically significant relationship between advanced coursework and university access. However, advanced coursework significantly reduced the likelihood that students would exit postsecondary and substantially increased the odds that students would earn a postsecondary credential. While advanced coursework is not as significant for access, it appears to be quite influential in preparing students for success once they reach postsecondary.

- *Dual-credit course* – While advanced coursework did exert a positive influence on postsecondary outcomes, the dual-credit coursework variable was even more strongly related to our outcomes of interest in every analysis. The dual-credit variable was found to be statistically significant in every postsecondary model and the actual estimate of the variable was also found to be greater than that for advanced coursework in all models. This is a somewhat surprising for two reasons. First, advanced courses, such as AP and IB, have been a prominent component of postsecondary academic preparation for decades while dual-credit is a more novel approach. Second, districts have much more leeway in defining dual-credit courses, creating partnerships with local community colleges and universities to develop these courses, and actually offering them to students. It appears that dual-credit courses may be even more influential than advanced coursework in preparing students for postsecondary. Expanding dual-credit course offerings to students, especially those that are less likely to gain access to, persist through, and complete postsecondary may be a promising practice.

- *Attendance* – The final variable included in the analyses that we categorized as academic is the percent of total days for which a student was enrolled that they actually attended high school. While we originally included this variable primarily as a control, we were surprised to see the consistent and positive relationship between this variable and postsecondary outcomes. High school attendance was found to significantly increase a student's positive postsecondary outcomes in regardless of which outcome variable. This influence could be caused by a number of factors. One explanation would be that the additional education a student receives during high school increases their chances of enjoying positive postsecondary outcomes. Another explanation could be that students who develop positive attendance habits during high school may continue those habits during postsecondary and attend their college or university classes at higher rates. Either way, students that attend high school for a higher percentage of days are more likely to experience positive postsecondary outcomes and, conversely, students who attend less during high school may be at increased risk of failing to access, persist through, and complete their postsecondary education.

Chapter Eleven

Limitations and Future Research

While the limitations section of a report is often the least enjoyable to read, we believe it is possibly the most important section of the report. As in any research, the current study suffers from some limitations and it is crucial to interpret the results cautiously and appropriately. These limitations will be discussed in greater detail below. Additionally, one of the overriding limitations of this research stems from the nature of the majority of quantitative research generally. Quantitative research such as the current study is effective in identifying the direction and strength of relationships between variables but is often ill-suited to help us understand why these relationships are occurring. For example, socioeconomic status was found to significantly decrease a student's chances of enjoying positive postsecondary outcomes, but the potential causes of this finding are endless. Low-income students could be more likely to attend schools with less experienced guidance counselors, they could be less familiar with navigating student financial aid at the postsecondary level, they could have fewer peers and role models that have successfully completed their postsecondary education, or they could be less likely than more affluent students to be willing to take out student loans to pay for their degree. Any or all of these factors and many others could be at play, yet none of these causal mechanisms could be discovered with a research design such as the one in the current study. Future research would be needed to identify the mechanisms at play in any of the relationships we identified. Additional limitations and suggestions for future research are presented below.

- *The absence of school-level variables* – The primary purpose of the current research was to investigate the relationships between the district a student attended and her chances of experiencing positive postsecondary outcomes. We attempted to arrive at a more accurate understanding of these relationships by controlling for a host of variables, both at the student level and at the district level. By doing so we also explored the influence of these individual- and district-level variables on postsecondary outcomes. However, one of the most obvious omissions of this report was the absence of school-level variables. While we provided some preliminary data for the ten largest high schools in HISD we did not include any school, teacher, or principal variables in the model. It is highly likely, if not guaranteed, that the school a student attends, the quality, experience, and certification status of the teachers, and factors related to school leadership all influence the likelihood of postsecondary access, persistence, and completion. Future research could more fully develop the models in the study to include school-level characteristics, both to determine the relationship between these variables and postsecondary outcomes and to arrive at a more accurate understanding of the relative performance of districts.

- *School performance* – Related to the previous point is the fact that the current study was not intended to study the relative performance of different schools. This analysis was beyond the scope of the current report as there are more than 60 high schools in the eleven study districts alone. However, there is likely a great deal of variation between the high schools in a district in regards to postsecondary outcomes. The relative performance of HISD high schools specifically could be more deeply explored to

identify those schools that are positively influencing student postsecondary outcomes as well as those schools that are struggling to do so.

- *The absence of other academic indicators* – The only variables included in our analyses related to academic performance were attendance, dual-credit coursework, advanced coursework, and TAKS scores for the access models. This is an extremely short list of academic variables, and including other variables may have changed many estimates of other variables, perhaps significantly. For example, the study did not include SAT or ACT scores of students nor did it include students' high school GPA (this is currently not collected at the state-level). It is extremely likely that all of these variables influence postsecondary outcomes. Future research could also expand the models to include these additional indicators of academic preparedness.

- *Dual-credit courses* – As mentioned in the introductory chapters, all dual-credit courses provide students with an opportunity to earn college credit while still attending high school. However, the category of dual-credit courses is broad and encompasses a variety of possible courses. For example, psychology, music theory, architectural drafting are all approved dual-credit courses. Some dual-credit courses are more academic in the traditional sense (core subjects) while others are more geared towards technical training and the workforce. Thus, future research could investigate whether different types of dual-credit courses influence postsecondary outcomes in potentially different ways.

- *Developmental education at the postsecondary level* – The current report only contained a brief description of the rates at which students were assigned to take developmental education coursework once they reached the postsecondary level. Future research could expand upon this in two ways. First, developmental education could be used as an outcome variable to better understand what variables at the K-12 level predict whether or not a student will be assigned to developmental education. Additionally, developmental education can be included as a predictor variable in the models on persistence and completion to determine whether assignment to developmental education has a positive, negative, or no influence on a student's postsecondary outcomes.

- *Sample restricted to in-state postsecondary institutions* – One of the most significant limitations of the current study is the fact that only Texas postsecondary institutions were included in the analyses. This was an inevitable limitation given the lack of access the research team had to national data of postsecondary institutions, as well as the general lack of cross-state data on postsecondary enrollment. However, the Texas Education Research Centers are currently in the process of gaining access to data from the National Student Clearinghouse which collects postsecondary data for students across the country. Future research should explore whether the postsecondary access, persistence, and completion rates for schools and districts are significantly different when national postsecondary data are included in the analyses.

- *Aggregation of postsecondary institutions* – In the current study, postsecondary institutions were disaggregated by type, but all institutions within that category were

essentially treated as identical. While the community college a student attends is largely due to their proximity to the college, this is not always true at the university level. There is a much greater perceived variation in the quality of universities compared to colleges. In the future, it may be beneficial to identify the "top-tier" universities in the state and investigate what districts or schools are out-performing their peers in helping their students gain access to, persist through, and successfully complete their education at these universities.

- *Charter schools* – No charter schools or charter districts were included in the current study. This decision was made because many of the most prominent charter schools in the state did not even exist during the 2003-04 year, preventing their inclusion in the study. However, using different cohorts in future studies could allow researchers to include charter schools in the analyses. This would be especially fitting in a separate study on the influence of high schools specifically on postsecondary outcomes, or charter districts could be included in the analyses and compared to other traditional districts.

- *Postsecondary transfer patterns* – Another important omission of the current study relates to the transfer patterns of postsecondary students. As we know, not all students who intend to earn a bachelor's degree begin their education at a university. Decent numbers of students begin at a community college and later transfer to a university. Studying whether or not community colleges are functioning as gateways to universities could be extremely important. This is particularly true for those students who we know completed an associate degree, the educational program that is designed to prepare students for university success. Little research has currently been conducted to determine whether completing an associate degree increases a student's chances of transferring to a university and successfully completing a bachelor's degree.

- *Influence of state accountability assessments* – Given the way in which we defined the cohorts for the current study, TAKS scores were only used to predict whether or not a student would gain access to a postsecondary institution. However, the fact that TEA has defined a certain performance threshold as "college-readiness" indicates that there should be a relationship between scoring at the college-readiness level and persisting through and successfully completing one's postsecondary education. The one difficulty in this research is the fact that the state is currently preparing to significantly alter its accountability assessments, but the new tests are actually designed to be even more predictive of future postsecondary success. Future research should explore whether performance on the state's new accountability assessments is as predictive of postsecondary success as the state intends it to be.

- *Small number of cohorts* – The final limitation we will mention is the related to the actual sample of students included in the analyses. First, because two separate cohorts were used in the study, future research should use a single cohort and track these students all the way through high school and into six years of postsecondary. Second, because only two cohorts were included in the current study, the conclusions regarding the influence of any of the variables or districts in the study can truly only be held for

the current cohort. It is possible that using a different cohort of students would have resulted in significantly different estimates of many of the variables and different understandings of the relative performance of the districts. Future research should use multiple cohorts simultaneously to develop a richer and more nuanced understanding of district performance over time.

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Appendix A – Definition of Variables

- (District Name) – The district indicator variables represent which district the student attended during high school. By definition, each student is only defined as attending one of the eleven districts for each analysis.
- Race – We used a number of dichotomous indicator variables (Asian, African-American, and Hispanic) for race. White students were excluded from the analysis and used as the reference category. The Native American subgroup was excluded from our analyses due to small sample size.
- Male – Dichotomous indicator variables were used for gender. The variable for females was excluded from the analysis and serves as the reference category. The male variable represents the difference in the likelihood of the outcome occurring for males compared to females.
- Econ Dis – This variable represents students eligible for free-or-reduced-price lunch (FRL) as defined by federal guidelines and the Texas Education Agency (TEA). Cohort 1 students were classified based on data from their freshman year while Cohort 2 students were classified based on data from their senior year.
- LEP – This variable includes all students that were identified as being Limited English Proficient. Cohort 1 students were classified based on data from their freshman year while Cohort 2 students were classified based on data from their senior year.
- Gifted – This includes all students identified as enrolled in a gifted program during their freshman year of high school. Cohort 1 students were classified based on data from their freshman year while Cohort 2 students were classified based on data from their senior year.
- Special Ed – This includes all students identified as enrolled in a special education program during their freshman year of high school. Cohort 1 students were classified based on data from their freshman year while Cohort 2 students were classified based on data from their senior year.
- TAKS(subject)CR – These variables represented whether a student scored at the level of "college readiness" as defined by TEA on the Texas Assessment of Knowledge and Skills. These variables are dichotomous indicators.
- Total Advanced Core – This variable represents the number of advanced courses in core subjects (math, ELA, science, social studies, and foreign language) that students took and passed during any time in high school. Because it is a continuous variable, its estimates are interpreted as the difference in the likelihood of the outcome occurring for every additional advanced course completed.
- Total Dual-Credit - This variable represents the number of non-advanced, dual-credit courses that students took and passed during any time in high school. Because it is a continuous variable, its estimates are interpreted as the difference in the likelihood of the outcome occurring for every additional advanced course completed.
- District(variable)% - These variables indicate the percentage of the entire district's student body that is classified in a particular way. These variables range from 0-100%.