Senior Project
Department of Economics

"High School Impacts on the Black-White College Achievement Gap"

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Abstract:

Using approximately 9,500 students from a large Midwestern university, this research provides insights into why African Americans have lower college success rates than Whites. In the case of this specific institution, Blacks entering college between 2001 –2004 had a 13 percent six-year graduation rate when the student population had graduation rates of 35 percent. High school factors such as high school GPA, ACT score, income level, and the specific high schools students attended are used to discover the disparities in college success. Findings suggest that high school scores and the type of high school students attended influence graduation rates and college GPAs of students. With these results we are able to see why African Americans are falling behind, so we can inform policy to push Black students ahead.

Introduction:

Nationally, the college Black-White achievement gap is wide. The average six-year college graduation rate in the United States is 57 percent. Whites have a graduation rate of 60 percent while Black graduation rates are 42 percent, nearly a 20 percentage point difference (NCES 2010). The Midwestern university this study examines shows that the graduation rate disparity is slightly larger at a 25 percentage point difference. Figure 1 shows that only 13 percent of Blacks at this university graduate within six years and Whites graduate at a 38 percent rate, a 25 percentage point gap. There are also disparities in the college GPAs of students. Figure 2 reveals that first –year and second –year college GPAs for Blacks are 1.83 and 1.85 respectively. For White students, the college GPA averages 2.53 and 2.56 for their first and second-year GPA. According to this university's grading scale, Whites would earn between a C+ and B- while Blacks earned between a C- and C.

However, the disparities may not just be due to the college experience alone, but also high school factors. Black students have disproportionately lower standardized test scores and come from high schools that do not prepare them as equally well for college as high schools that White students attend. Nationally, Blacks received a score of 16.9 on the 2009 ACT college entrance exam test, while Whites received a 22.2 score (NCES 2009). These numbers are just the beginning of the disparities in high schools. "About 40% of white students graduated college-ready in the class of 2002, compared with 23% of African American ... students" (Greene and Winter 2002, p. 8). Greene and Winter (2002) classify college readiness by graduating from high school with credentials necessary to apply to a minimally selective college. The disparities between Black and White students that enroll in this Midwestern university can be seen in the figures in the Appendix. Black students enter this university with an average high

school GPA of 2.43 which is 0.52 grade points lower than the average White student who has an average high school GPA of 2.95. ACT results are similar, as Whites enter this university on average with an approximate score of 21 on the ACT, yet Blacks enter with an average ACT score of 16.33. Yet, the greatest disparity comes from the income background of these students. 68 percent of Black students are Pell eligible, which means they or their families are considered low-income and demonstrate financial need. In comparison, only 26 percent of White students enter this university have Pell eligibility, thus African American students come from more economically disadvantaged backgrounds when compared to Whites.

This issue magnifies as we see that persons holding a 4-year degree are public goods by working more, which leads to putting more money into the economy and also contribute more in taxes as well. A Bachelor's degree suggests that graduates acquire a greater degree of human capital – the skills and abilities needed to be productive in the labor market (Hoffman 1993). Increases in human capital suggest that Blacks will have an even higher earnings potential with this additional education.

In 2005, African Americans with a high school degree earned 1,433 dollars per month, those with some college earned 1,718 dollars per month, while Bachelor degree holders earned 3,110 per month (US Census Bureau 2005). Data from the Bureau of Labor Statistics (BLS) show that the African American unemployment rate is nearly twice as high as the unemployment of Caucasians, 15.8 percent compared to 8.5 percent for the month of December 2010 (Bureau of Labor Statistics 2011). However, in that same year, Blacks with a college degree averaged an unemployment rate of 7.9 percent. Increasing their human capital through attaining a four-year degree suggests that Blacks have a greater chance of establishing higher wages and lower unemployment rates (Bureau of Labor Statistics, 2010).

Purpose:

Economic studies available on high school impacts on college success are limited. This study will examine how high school factors impact the Black –White achievement gap at a large Midwestern university, using high school factors such as: high school GPA, ACT score, income status by their Pell Grant eligibility, and the types of high schools they attended. If controlling for these variables does not begin to close the achievement gap, then we suggest that there are other factors which impact college success besides these high school inputs. However, if the achievement gap begins to close then we suggest that the high school inputs do make a difference in the success between Blacks and Whites while in college.

Literature Review:

Summers and Wolfe (1977) were among the first to take an in-depth study of factors leading to student success and the educational achievement gap. They tracked the progress of elementary students' test scores over a three-year period and studied various factors that heavily impacted changes in student composite test scores over that time. Using a standard linear regression model, this analysis studied factors that impacted achievement such as: genetic endowment and socioeconomic status (GSES), non-teacher school quality (SQ) and peer group characteristics (PG).

Their findings suggest that males grew one month less than females in achievement scores over three years. However, Whites and Blacks had similar patterns in achievement when controlling for every ten-point increase in IQ score. The PG characteristics suggested that Black and non-Black students had the largest educational achievement in schools that were 40 to 60 percent African American. However, Brown (2008) finds that students attending 50 percent or

greater Black/Hispanic high schools are at a disadvantage in mathematic standardized tests. Students of all races that Brown (2008) surveyed (Caucasian, African American, Asian, and Hispanic) performed worse in majority Black / Hispanic high schools. Caucasian and Black students attending 50 percent or greater Black/ Hispanic high schools performed 3.88 points lower on average than schools with less than 50 percent minority students. Caucasian and Hispanic students that attended majority Black/Hispanic schools were on average 4.01 points below students at other high schools with fewer minorities. Lastly, Caucasian and Asians from majority Black/ Hispanic high schools performed 3.63 points below students from high schools with less 50 percent or greater high schools.

Cohn, Cohn, Balch and Bradely (2004) explain discrepancies in the minority-White achievement gap in first semester college GPAs. They studied a scholarship program at The University of South Carolina where students needed to obtain at least a 3.0 first semester college GPA to retain their scholarship. From their sample, they find that non-white students in college perform lower than White students in earning a 3.0 first semester college GPA, after controlling for students' high school GPA, SAT score and high school class rank. Moreover, they show that a minimum SAT score of 1100 and a minimal high school class rank in the 77th percentile are the best predictors of receiving a 3.0 GPA needed to maintain the scholarship. Only 14 percent of non-white male students had an 1100 SAT score while 18 percent of non-White females were at or above an 1100 SAT.

Similarly, Light and Strayer (2002) examine the determinants of high school students' decision to attend and graduate from college based on the perceived gains of a college education. From a nationally representative data set, Light and Strayer (2002) find that 66 percent of minority students forgo college. Of those that do attend college, only 31 percent of minorities

graduate, much lower than the 45 percent graduation rates of Whites. The results of college entrance exams reveal that half of minority students score in the bottom two quartiles of the Armed Forces Qualification Test (AFQT) standardized test and have a 25 percent graduation rate, while 60 percent of Whites score in the top quartile and have a 53 percent graduation rate. "It appears that minorities are under-represented…among college graduates because their low test scores, which, to some extent are likely to reflect prior disadvantages with respect to school quality and family resources" (Light and Strayer 2002, p. 39). Yet, they find that when controlling for students' academic background, minorities do graduate at similar or even higher rates than Whites. For all students attending highly selective schools and receiving top-quartile scores on the AFQT, minorities graduate at 3 percentage points higher than Whites.

Pike and Saupe (2002) analyze whether the high school one attended can explain some of the disparity in the collegiate achievement gap. Pike and Saupe (2002) examined high school characteristics such as: private vs. public high schools, number of students from a given high school attending a specific college, and types of classes student takes while in high school (advanced placement vs. core curriculum). They conclude that high school characteristics and students' background did explain one-third of the variance in graduation rates, suggesting that high school impacts do matter.

Fletcher and Tienda (2010) analyze nearly 200,000 entering college freshmen at four public colleges in Texas between the years of the early 1990s – 2003 to test how high school factors impact college achievement across racial and ethnic groups. They find that when controlling for high schools, enrolled school year, SAT scores, and high school rank of students, minorities close the achievement gap, and at the most selective institutions outperform White students on the first-semester GPA by as much as .071 grade points. Still, by the sixth semester,

Caucasian students outperform those same Black students on average by as much as .238 grade points and have higher four-year graduation rates than Blacks by 6 percent. Their findings are not conclusive to why the change in the achievement gap occurs for the sixth semester GPA and four-year graduation rate. However, at the least selective college they study, University of Texas at San Antonio (USTA), Fletcher and Tienda (2010) find that the achievement gap is eliminated for each outcome.

In conclusion, most of the literature has found that high school characteristics and backgrounds are important predictors of the college achievement gap. Fletcher and Tienda (2010) state, "... differences in college preparedness associated with high school quality carry over to college careers..." (P. 155).

Data Sources and Description

This paper examines the 6-year graduation rates and college GPAs of African American and White students at a large Midwestern university. Majority of the data has been compiled through Institutional Research at this specific institution. Additional information on the high schools that students attended was gathered from: Private School Review, Public School Review, and GreatSchools.org.

Approximately 9,500 observations of incoming college freshmen from the fall of 2001 through 2004 were used for this study. The outcomes that test how impactful high school factors were are: six-year college graduation rates and the first and second-year college GPA. The factors used to test how high school impacts affect these outcomes are: gender, race, income (according to Pell eligibility level), high school GPA, ACT score, public or private high school

institution, and the racial composition of the high schools. In the appendix, all of the variables are described in Chart 1, and Table 1 reveals the means of each of these variables.

Model Specification:

A linear probability model and a one-way fixed-effect model will be used to test the hypothesis that high school factors significantly impact college graduation rates and college GPAs of students and help to explain Black-White achievement gap. The first linear probability model will control for individual background characteristics: gender, race, HSGPA, ACT, and income level. The subscript (*i*) represents the individual student. Individuals' characteristics are represented in Vector X:

(1) Outcome$_i$= βX$_i$ + ε

Added to the first regression of the linear probability model are two characteristics of the high schools: racial composition of the high school and whether the high school is public or private. The two high school characteristics are represented in vector H:

(2) Outcome$_i$ = βX$_i$ + βH$_i$ + ε

The following model uses a one-way fixed-effect and controls for the high schools that students come from. Therefore the racial composition and the public or private designation of high schools are not included because it is already accounted for in the fixed-effect model. The fixed-effect is represented by ∂ where (*h*) is the high school that students attend:

(3) Outcome$_{ih}$ = βX$_{ih}$ + ∂$_h$ + ε

Fletcher and Tienda (2010) use a similar model in their research to assess the achievement gap between minorities and Caucasian students at four Texas colleges. The

selectivity and size of one of the institutions they observed, University of Texas at San Antonio (UTSA), is similar to that of the university that this study is examining. We hope to compare the results of this study to the results of UTSA which found that differences in the four-year graduation rate, first-semester GPA, and sixth-semester GPA were essentially non-existent for Blacks and Whites when controlling for students' personal background, academic background, the year they enrolled in college and the high school they attended.

Results

This study found that discrepancies in the Black-White achievement gap shrink greatly when including high school impacts, where students' individual characteristics were controlled for in model one. The first – year college GPA for Black students was only .001 grade points lower than White student GPAs. Second–year college GPA results suggest that there is no discernable difference in the college GPA between Blacks and Whites. This already suggests that when controlling for students' background there is only a slight recognizable difference between White and Black student GPAs. Yet, when we look at the six-year graduation rate of students, we see that Blacks fall behind and graduate at 6.3 percentage points lower than White students. This is an extraordinary drop considering that when we measure graduation rates in the aggregate, there is a 25 percentage point difference in graduation rates of Whites and Blacks at this university.

In the second model specification, we add two high school characteristics; whether the schools' racial composition is 50 percent or greater minority and whether or not the high school is public or private. When these school specifications are added to the individuals' background, we see that first –year college GPAs of Black students are the same as Whites. Using this same

specification for second– year GPA, White students' college GPAs are only .001 grade points higher than Blacks. We then see that the six-year graduation rate disparity actually closes further to a 4.6 percentage point difference.

The last model uses a fixed-effect technique which controls for students' individual characteristics and the high schools they come from. With the fixed-effect model, the estimate for Black students is not statistically significant which we interpret as there being no difference in the first –year college GPA of Black and White students. The results are not statistically significant for the second-year college GPA, so we suggest that there is no difference in college GPAs of students that come from the same high school with the similar backgrounds. Six-year graduation rate results are insignificant as well, further suggesting that the Black-White achievement gap is eliminated once controlling for the individuals' background and the high school fixed-effects.

Conclusion

This study sought to find reasons for high school factors that impacted the Black-White achievement gap at a large Midwestern university. We analyzed approximately 9,500 students entering this university between 2001 – 2004 using the students' gender, race, high school GPA, ACT, income level and the high schools they come from. When just looking at the observations alone, we see that Blacks enter this university with lower test scores, high school GPAs and come from high schools that do not prepare them as well for college as high schools that Caucasian students come from.

These findings are similar to that of Fletcher and Tienda (2010) for UTSA. In their first model, when examining the minority-White achievement gap at UTSA, they suggest that first-

semester GPAs of minority students trail whites by .235 grade points; however, after controlling the year students entered college, class rank, high school GPA and SAT/ACT scores, and high school fixed-effects, there was no difference in the first-semester GPA, sixth semester GPA or four-year college graduation rate. Similarly, this study of the Midwestern university found that after including the students' ACT, high school GPA, and income level, we saw that the Black-White achievement gap had been eliminated as well.

Since findings reveal that there are no differences between Black and White college performances when controlling for high school impacts, we suggest that Blacks disproportionately have lower test scores and come from schools that do not prepare them as well for college because they succeed as much as whites do when they come from the same high schools and have similar backgrounds.

University Policy Implications

This university has an opportunity to increase the success of Black students and decrease the achievement gap if this college intervenes with poor performing students at poor performing high schools in low-income areas. Since high school GPA was significant in the linear probability models and fixed-effect model, the university can implement tutoring programs that help students that have lower high school GPAs, similar to what the average Black student might have coming into this Midwestern university.

This university can also expand its pipeline programs in low-income high schools with poor performing students, where students in the pipeline programs take college courses while in high school and graduate from high school with enough credits to earn an Associate's degree.

This helps in reaching more African American students while in high school and preparing them to succeed and graduate from college.

Lastly, one area that hinders African Americans at this institution is their ACT score. Figure 4 in the appendix shows the ACT score by race of entering college freshmen. The average ACT score for a Black student is 16.33, this suggests that Black students will be more prone to taking remedial college courses. The minimal score on the English section of the ACT needed to test out of remedial English classes is a 22, and for the math portion a score of 18 is needed. The university's policy increases the costs of gaining a four-year degree for these students by requiring them to take remedial classes which are not designated academic credit, or, take an additional standardized test to be placed into a Mathematics or English course that gives them academic credit towards graduating. If the student does not receive a high enough score on the test, then they are already behind in graduating within six-years since they are spending additional time taking classes that do not count for graduating credit. As well, the financial costs of college increases as students are required to pay for the remedial courses.

If high schools that these poor performing students come from implement some type of ACT preparation in class, then students would have better chances of increasing their ACT score. Or, high schools could offer ACT preparation to student so that students are better prepared for the ACT.

Future Studies and Limitations

Future studies should look at how high schools can better prepare traditionally low academically performing college students. Findings can suggest what characteristics high schools possess that produce successful minority college students, which would strengthen high

schools that serve dense populations of low-income Black students in hopes of producing even greater numbers of successful African American college students.

This study lacks the number of students that were designated "Other" race, so the results for this population were not always statistically significant. As well, if more observations from previous year can be collected, a two-way fixed-effect model on high schools and the students' enrollment year would be helpful. According to Collegemeasures.org, six-year graduation rates of Black students at this Midwestern university have declined 8.5 percentage points between 2003 through 2008. However, during that same time period, six-year graduation rates of Whites were unchanging, effectively expanding the achievement gap at this university over that five year period. A two-way fixed-effect would control for students enrolling in the university during the same year and from the same high schools along with their individual background characteristics. Findings would suggest whether there are changes in the background characteristics of Black students that may have led to lower graduation rates of Blacks over that time period.

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Appendix

Chart 1: Explanation of Variables

CGPA1: The dependent variable "CGPA1" represents the first-year college GPA which ranges from 0-4.0 grade points.
CGPA2: The dependent variable "CGPA2" represents the second-year college GPA which ranges from 0-4.0 grade points.
Graduated: This dependent variable is a dummy variable that will either be (1) signifying that the student did graduate within six-years, or (0) signifying that the student did not graduate within six-years.
Male: The "Male" dummy variable will either be (1) if the observed student is a male and (0) if the student is non-male. Literature suggests that females have higher success rates in college than men (Fletcher and Tienda, 2010; Cohn et. al. 2004; Summers and Wolfe 1977). Thus we expect the male estimate to be negative, signifying that males have a lower probability of graduating from college.
White: The dummy variable "White" will either be (1) if an observed student denotes themselves as White. If the observed student denotes themselves as non-White then the dummy variable is (0). Previous literature suggests that Caucasians in the aggregate outperform minorities and thus we suggest that this dummy variable should be positive (Fletcher and Tienda 2010; Cohn et. al. 2004; Light and Strayer 2002). However, we will be using this variable as the reference variable and will not be included in the regression results.
Black: The dummy variable "Black" will either be (1) if an observed student denotes themselves as Black or African American. If the observed student denotes themselves as non-Black then the dummy variable is (0). According to the literature, Black students on average underperform

other racial demographics, so we expect this group to be negative (Fletcher and Tienda, 2010; Cohn et. al. 2004; Light and Strayer, 2002).

Other: The dummy variable of Other signifies that a student is of a race that is neither Black nor White. These minority races include Hispanic, Asian Pacific Islander, and American Indian students. Thus, if the variable is (1) then the observed student is of Other race, if the observed student is not of Other race then they are represented by (0). According to the literature, minority students on average underperform majority racial demographics, so we expect this group to have a negative coefficient (Fletcher and Tienda, 2010; Cohn, Elchan et. al. 2004; Light and Strayer, 2002).

Race Comp: This dummy variable represents the racial composition of the high schools students come from before entering college. If the dummy variable is (1) then it denotes that a student went to a high school that had 50 percent or greater minorities and if the variable is reported as (0) the student went to a school that was less than 50 percent minority. Summers and Wolfe (1977) reported that elementary students performed best on achievement tests at schools that were 40 percent – 60 percent African American. However, Brown (2008) found that high schools which were 50 percent or greater minority underperformed schools that had less than 50 percent minority student schools on mathematical standardized test. Thus, we are unsure of the predicted sign.

Pub: This dummy variable suggests that students come from a public or private high school. If "Pub" is (1) then the student is from a public high school, but if Pub is (0) then the student entering the university is from a private high school. According to Pike and Saupe (2002), students that attend public high schools have a lower probability of graduating from a university in relation to students that went to a private high school. Thus we expect this coefficient to be

negative.

HSGPA: HSGPA is the high school GPA of students entering this Midwestern university. High school GPA ranges from .728 grade points to a 4.0 GPA. Cohn et. al. (2004) suggests that when students receive a higher high school Rank they have a greater chance of college success. Since high school rank is highly correlated with high school GPAs, we suggest that the coefficient for this variable is positive, as the high school GPA increases the students will have greater success in college.

ACT: The ACT score implies that students have retained a certain standard of knowledge from their high schools. The ACT standardized test compares students' knowledge nationally by using a standard score between 1-36. According to Cohn et. al. (2004), and Light and Strayer (2002), the higher students' test scores, then there is a greater likelihood that students will succeed in college. Therefore, we predict that the ACT coefficient is positive, the closer an ACT score draws toward a score of 36, the more likely a student is to succeed college.

Pell: Pell represents if an entering student is eligible for a Pell Grant, which is a federally funded grant that assists in funding low-income students' college education. This dummy variable is (1) if student is Pell Grant eligible and (0) if the student is non-Pell Grant eligible. We suggest that the sign on Pell is ambiguous, because the financial costs of attending college are lowered; however Light and Strayer (2002) suggest that students from families with limited resources contributes to lower rates of college success compared to families with greater from higher incomes.

Variable	N	Mean	Std Dev	Minimum	Maximum
CGPA1	9448	2.432971	1.0634	0	4.0000000
CGPA2	8858	2.464774	0.9887	0	4.0000000
Graduated	9460	35.22198	47.768	0	1.0000000
MALE	9460	51.14164	49.989	0	1.0000000
White	9460	80.43340	39.673	0	1.0000000
Black	9460	13.90063	34.597	0	1.0000000
Other[1]	9460	2.949260	16.919	0	1.0000000
Pell	9460	32.63214	0.4688	0	1.0000000
HSGPA	9460	2.876827	0.6347	0.7280000	4.0070000
ACT	9460	20.11818	4.1043	8.0000000	34.000000
Race Comp	9460	11.02537	31.322	0	1.0000000
Pub	9460	88.94291	31.361	0	1.0000000

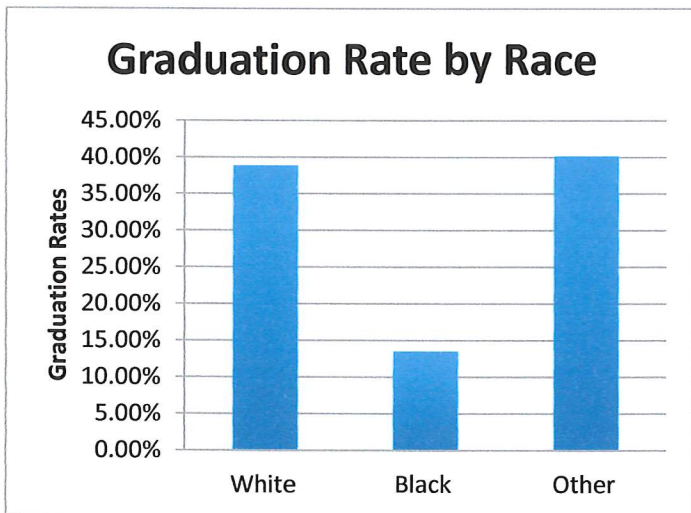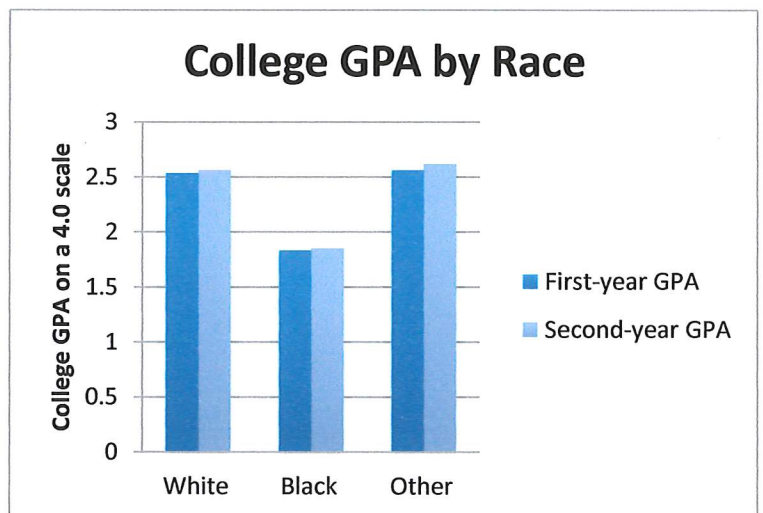Figure 1: Six-year Graduation Rates by Race

Figure 2: first and second-year College GPA by Race

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[1] The sample of students of Other races/ethnicities is a disproportionately small number in observations compared to Black and White students. Due to this, Other students will not be heavily focused upon.
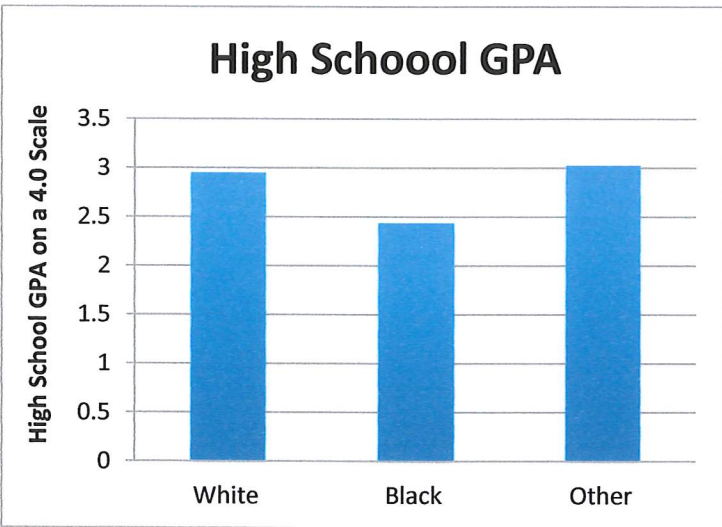
High Schoool GPA

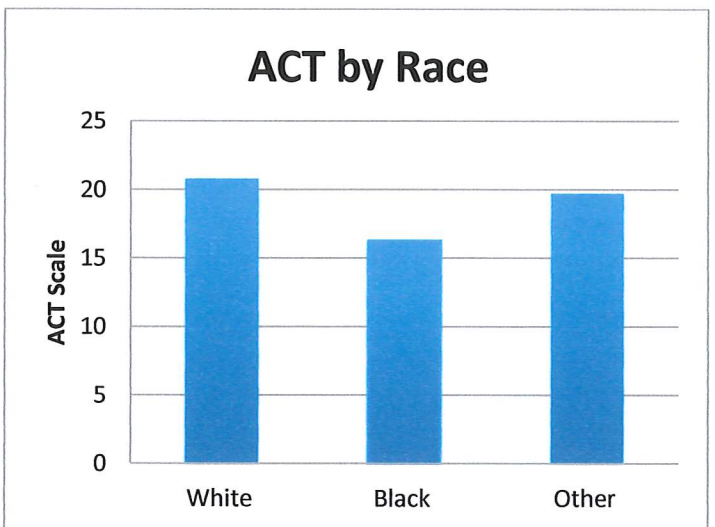ACT by Race

Figure 3: Percent Pell Eligible by Race

Percent Eligible for Pell by Race
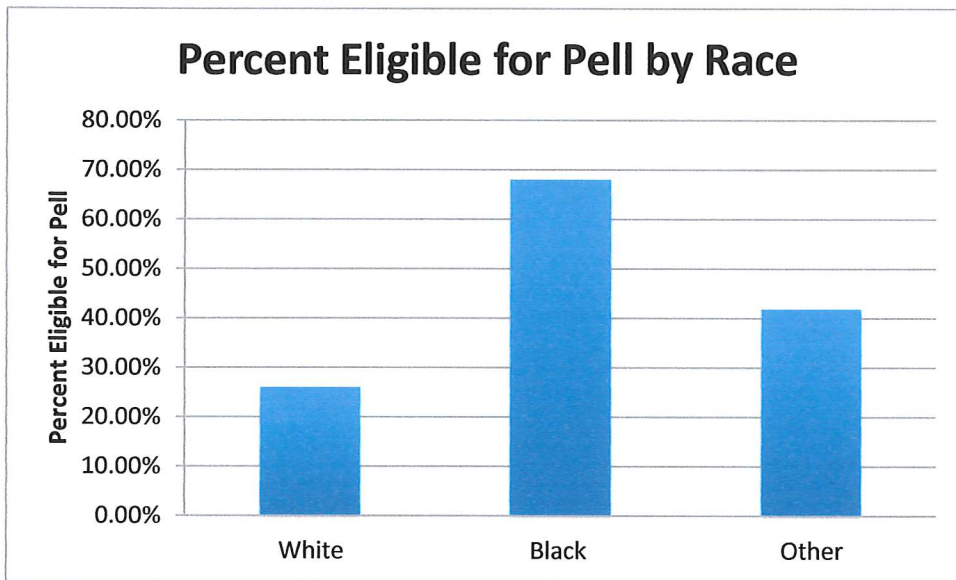
Table 2: Linear Probability Model of Individual Characteristics

Variables	CGPA1	CGPA2	6-year Graduation Rates
Intercept	-0.13347	-0.1192	-51.29315 ***
	(0.056)	(0)	(2.780)
MALE	-0.00094***	-0.00091***	0.00954
	(0)	(0)	(0.009)
Black	-0.00146***	-0.00163***	-0.06318 ***
	(0)	(0)	(0.0143)
Other	0.000131	0.000522***	0.00675
	(0)	(0)	(0.0264)
Pell	-0.15568***	-0.11684***	-6.47477 ***
	(0.020)	(0.019)	(1.010)
HSGPA	0.79568***	0.75566***	27.78697 ***
	(0.018)	(0.0174)	(0.903)
ACT	0.01968***	0.02425***	0.45034 ***
	(0.002)	(0.002)	(0.142)
	R-square .3153	R-square .3437	R-square .1794

*Significant at the 10 percent level ** Significant at the 5 percent level *** Significant at the 1 percent level

Table 3: Linear Probability Model of Individual Characteristics with High School Characteristics

Variables	CGPA1	CGPA2	6-year Graduation Rates
Intercept	-0.02361	0.01878	-45.23345 ***
	(0.062)	(0.058)	(3.064)
MALE	-0.00094 ***	-0.00091 ***	0.00940
	(0)	(0)	(0.009)
Black	-0.00083 ***	-0.00103 ***	-0.04272 ***
	(0)	(0)	(0.015)
Other	0.000381	0.000762	0.01491
	(0)	(0)	(0.026)
Pell	-0.13719 ***	-0.10025 ***	-5.81001 ***
	(0.020)	(0.019)	(1.015)
HSGPA	0.80636 ***	0.76586 ***	28.18338 ***
	(0.018)	(0.017)	(0.904)
ACT	-0.00162 ***	0.02217 ***	0.36953 **
	(0.002)	(0.002)	(0.143)
Race Comp	-0.00162 ***	-0.00160 ***	-0.05415 ***
	(0)	(0)	(0.016)
Pub	-0.00158 ***	-0.00138 ***	-0.06179 ***
	(0)	(0)	(0.014)
	R-square .3195	R-square .3479	R-square .1815

*Significant at the 10 percent level ** Significant at the 5 percent level *** Significant at the 1 percent level

Variables	CGPA1		CGPA2		6-year Graduation Rates	
Intercept	-0.29733 (0.505)		-0.29025 (0.459)		-68.037 (24.943)	***
MALE	-0.00094 (0)	***	-0.00084 (0)	***	0.01240 (0.009)	
Black	-0.00091 (0)		-0.00014 (0)		-0.0251 (0.019)	
Other	0.000132 (0)		0.000272 (0)		-0.0084 (0.027)	
Pell	-0.09295 (0.021)		-0.0553 (0.020))	***	-3.2424 (1.062)	***
HSGPA	0.864924 (0.019)	***	0.828937 (0.018)	***	30.8035 (0.964)	***
ACT	0.008922 (0.003)	***	0.013161 (0.002)	***	-0.0656 (0.1518)	
	R-square .3621		R-square .3919		R-square .2320	

*Significant at the 10 percent level   ** Significant at the 5 percent level   *** Significant at the 1 percent level

SAS code 1

```
Data test;
set work.mvpall;
CGPA1 = Year_1_GPA;
CGPA2 = Year_2_GPA;
if Housing = '1' then Res = 1*100;
Else Res = 0;
if Pell_Eligible = '1' then Pell = 1;
Else Pell = 0;
HSGPA = high_school_gpa;
if HSGPA = 0 then delete;
if HSGPA < 4.01;
HS_Rank = (high_school_rank  / high_school_class_size);
if Public_Private = '1' then Pub = 1*100;
else Pub = 0;
if Race= 'White, Non-Hispanic' then White=1*100;
Else White=0;
if Race= 'African American' then Black=1*100;
else black=0;
if    Race= 'Hispanic' then Hispanic=1*100;
else Hispanic=0;
if    Race= 'Asian/Pacific Island' then Asian=1*100;
else Asian=0;
if    Race= 'Amer Indian' then Am_Indian=1*100;
else Am_Indian=0;
if Hispanic = 1*100 or Asian = 1*100 or Hispanic = 1*100 then other = 1*100;
else other = 0;
if Sex= 'MALE' then MALE=1*100;
else MALE=0;
if Year_6_Completed = '1' then G6=1*100;
```

```
else G6=0;
if Year_5_Completed = '1' then G5=1*100;
else G5=0;
if Year_4_Completed = '1' then G4=1*100;
else G4=0;
if Year_3_Completed = '1' then G3=1*100;
else G3=0;
if Year_2_Completed = '1' then G2=1*100;
else G2=0;
If G6=1*100 or G5=1*100 or G4=1*100 or G3=1*100 or G2=1*100 Then
Graduated=1*100;
Else Graduated=0;
if    High_School_code=. then delete;
if    High_School_code=1288878 then delete;
if  ACT = . then delete;
if  Pell =. then delete;
if  Sex = u then delete;
if  Public_Private =. then delete;
If  Race_Comp =. then delete;
if  Race_Comp = 1 then Race_Comp = 1*100;
Else Race_Comp = 0;

proc means;
var CGPA1 CGPA2 Graduated Male White Black Other Pell HSGPA ACT Race_Comp
Pub;
run;


Proc Reg;
Model Graduated = Male Black Other Pell HSGPA ACT;
Model Graduated = Male Black Other Pell HSGPA ACT Race_Comp Pub;
Model CGPA1 = Male Black Other Pell HSGPA ACT;
Model CGPA1 = Male Black Other Pell HSGPA ACT Race_Comp Pub;
Model CGPA2 = Male Black Other Pell HSGPA ACT;
Model CGPA2 = Male Black Other Pell HSGPA ACT Race_Comp Pub;
run;

proc sort data = test;
by High_School_code;
run;

data panel;
  set test;
  count + 1;
  by High_School_code;
  if first.High_School_code then count = 1;
  if last.High_School_code then maxvalue=1;
  if count=maxvalue then delete;
run;

Proc panel data = panel;
ID    High_SChool_code count;
MODEL Graduated = Male Black Other Pell HSGPA ACT/ fixone;
MODEL CGPA1 = Male Black Other Pell HSGPA ACT/ fixone;
MODEL CGPA2 = Male Black Other Pell HSGPA ACT/ fixone;
TITLE one-way fixed effect;
run;
```