



The Likelihood of Enrolling in College

Prepared by the Department of Research & Performance Management

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Key Findings on College-Going

- GPA is a powerful and robust predictor of college enrollment.
- Three demographic groups—males, Latino students, and economically disadvantaged students—are much less likely to enroll in college than their equally qualified counterparts.
- Total number of social-studies credits earned in high school is a sizeable predictor of college-going.
- Both honors-level and AP-level course-taking are significant predictors of enrolling in college.

Introduction

This paper presents the results from a project designed to identify student-level indicators that predict a student's likelihood of enrolling in college within a year after high-school graduation. Much of the literature on college-going indicators recommends that districts perform analyses using their own students, since a variety of factors ranging from the demographic composition of the district to the density of college options in the vicinity all affect students' likelihood of enrolling in college. The varying effects of such factors on college-going make it difficult if not impossible for researchers to zero in on a uniformly applicable set of indicators. Therefore, this project was undertaken to find out which student-level factors are linked to Shelby County Schools students' college-going.

Sample

The sample in this study consisted of the graduates from the class of 2013 who were enrolled in the District for at least 75% of each year of high school. This cohort was chosen mainly because 2012–13 was the last year before Shelby County Schools (SCS) and Memphis City Schools (MCS) merged. While the merged SCS had complete data on students from MCS, certain data from legacy SCS were not carried over in the merger process. Given the subsequent demerger, the large majority of students remaining in SCS are of MCS provenance, so the use of MCS's class of 2013 should still produce pertinent results.

That said, it would be advisable to repeat this study in the future with a cohort that has been in the merged SCS for all four years of high school. This would provide: 1) replication, which is always recommended in empirical analysis; 2) an update, to capture relevant changes within the District and the college market; and 3) an analysis that captures all the students in the District, not just a large majority of them.

The first cohort that would qualify for this analysis is the class of 2017, who are currently seniors in high school. By the fall of 2018, the analysis could commence, as these students would have been out of high school for a year, and there would also be enough lag-time for the college-enrollment database to capture their enrollments.

Variables

The outcome variable in this project was whether or not a student enrolled in college within a year after graduating from high school. This information was obtained from the National Student



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Clearinghouse (NSC), which gathers enrollment data from almost all colleges and universities in the nation.¹

As for the predictors, a number of academic, behavioral, and demographic variables were considered in the analysis. They can be classified into six general categories: 1) college-readiness, 2) grades, 3) courses, 4) attendance, 5) conduct, and 6) demographics. The specific variables included in each category are listed below.

1. College-Readiness

- Explore composite scale score
- Plan composite scale score
- ACT composite scale score

2. Grades

- Unweighted grade-point average (GPA)
- Number of course failures

3. Courses

- Algebra I in 8th grade
- Number of credits in each of the following areas:
 - AP level: Advanced Placement (AP), International Baccalaureate, AP-level Dual Enrollment
 - Honors level: Honors, honors-level Dual Enrollment
 - Language Arts
 - Mathematics
 - Science
 - Social Studies

4. Attendance

- Percentage of days present

5. Conduct

- Maximum level of severity of infractions
- Number of infractions
- Number of suspensions

¹ While the NSC is the best available source of information about American students' college-going, it should be noted that NSC data always slightly underrepresent actual college enrollments. First, a small percentage of postsecondary institutions do not participate in the NSC (including Memphis College of Art and the United States military academies). Second, some students elect to block their enrollment information from the clearinghouse, which they have the right to do under the Family Educational Rights and Privacy Act (FERPA). Third, the method NSC uses to match students' high school records with their college enrollments is very accurate, but it does not obtain a 100% match rate.



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6. Demographics

- Economic disadvantage: qualifying for free or reduced lunch
- Gender
- Race/Ethnicity

Method

The outcome of interest—whether or not a student enrolled in college within the year following high-school graduation—is dichotomous, making binary logistic regression a logical choice for the analysis². The primary analysis took all four years of high school into account in order to capture the most information about students' experience and performance leading up to the college decision. Year-by-year analyses provided additional information and are presented in a subsequent section of this report.

Results: Four-Year Model

For the full four-year model, the following variables were not significantly related to enrolling in college the year after graduation: Explore, Plan, course failures, taking Algebra I in 8th grade, AP-level credits, language-arts credits, math credits, science credits, suspensions, and economic disadvantage. These variables were thus dropped, and the model was refitted using only the statistically significant variables in order to estimate their effect sizes, which are presented in Table 1 and discussed below.

A note on interpretation: The closer a variable's odds ratio is to 1, the less effect that variable has on the outcome. Odds ratios higher than one indicate a positive relationship with the outcome (i.e., when the variable increases, so does the likelihood of enrolling in college), and odds ratios less than one indicate a negative relationship with the outcome (i.e., when the variable increases, the likelihood of enrolling in college *decreases*).

A simple formula converts an odds ratio into a percentage increase or decrease in the likelihood of the outcome. This calculation has already been done in Table 1, but for reference, here is the formula:

- If the odds ratio is *greater* than one, subtract 1 from it and multiply by 100. This gives the percentage *increase* in the likelihood of enrolling in college for every unit increase in the predictor variable.
- If the odds ratio is *less* than one, subtract it from 1 and multiply by 100. This gives the percentage *decrease* in the likelihood of enrolling in college for every unit increase in the predictor variable.

College-Readiness

Of the three college-readiness assessments, only ACT score was significantly related to enrolling in college in the four-year model. Given that Explore is taken in 8th grade and Plan is taken in 10th grade, it is unsurprising that the ACT, which is taken in 11th and 12th grades and is an actual college-entrance exam, accounts for the college-readiness portion of the probability of going to college.

² For specifics about the modeling process, please contact the author at garrisonaw@scsk12.org.



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For every point increase in a student's ACT score, her odds of enrolling in college increased by a factor of 1.073 (controlling for the other significant variables). Put another way, each point increase in ACT score was associated with roughly a 7% increase in the likelihood of enrolling in college. Thus, holding all other factors constant, if Fatimah scores a 20 on the ACT while Kara scores a 19, Fatimah will be about 7% more likely to enroll in college than Kara.

Table 1. Predictors of enrolling in college within a year of graduating from high school (class of 2013)

Variable	Odds ratio	Likelihood of going to college	
		Percentage increase	Percentage decrease
ACT composite score	1.073	7.3	
Unweighted GPA	2.508	150.8	
Honors-level credits	1.047	4.7	
Social-studies credits	1.178	17.8	
Attendance rate	1.068	6.8	
Maximum severity level of infractions	0.920		8.0
Number of infractions	1.028	2.8	
Being female (as compared to male)	1.336	33.6	
Being Latino (as compared to African American)	0.436		56.4

N = 4,345. All variables were significant at $p < .001$ except for maximum severity level, which was significant at $p < .01$.

Grades

While number of course failures was not a significant predictor of college-going, unweighted GPA was a very strong predictor: Controlling for the other significant variables, a student's likelihood of enrolling in college increased by about 151% for every point increase in GPA. In other words, all other factors being equal, if Darius has a GPA an entire letter grade higher than Marco's, Darius will be 2½ times more likely to go to college than Marco.

Courses

For every additional honors-level course a student took, her odds of enrolling in college increased almost 5% (holding the other variables constant). And interestingly, there was a sizable effect for social-studies course-taking: For every additional social-studies course a student took, his odds of going to college increased by almost 18% (controlling for the other variables in the model).

This might be because students who are more college-minded tend to take more electives from the social-studies realm (e.g., history, social sciences). Or, initial college-mindedness aside, perhaps the content of social-studies courses helps students think more about the possibility of college. Or perhaps social studies is an area especially suited to preparing students for college, as the human condition is the focus of many foundation courses in college.

However, the association between social-studies course-taking and college-going might instead stem from the practice of putting academically struggling students in language arts and math intervention courses, leaving less room for electives of any kind, including social studies. Given that struggling students are less likely to enroll in college than their non-struggling counterparts, this could create



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an association between social studies and college-going that has less to do with the content of social studies and more to do with the ability to take electives. Of course, the real explanation could involve a combination of some or all of the above arguments.

Attendance

Attendance significantly predicted college enrollment: Controlling for the other significant variables, for every percentage-point increase in a student's attendance rate, her odds of enrolling in college within a year of graduating from high school increased almost 7%.

Conduct

In Memphis City Schools, transgressive behaviors were ranked on a scale of 1 (least severe) to 5 (most severe). Here are some examples of behaviors at each severity level:

1. cell phone violation; dress code violation; cutting class
2. continuously engaging in the same Level 1 offence; leaving campus without permission; gambling; tobacco possession
3. continuously engaging in the same Level 2 offence; non-gang-related fighting resulting in minor injury; potentially dangerous behavior
4. continuously engaging in the same Level 3 offence; bullying or harassment; extortion; vandalism; arson
5. continuously engaging in the same Level 4 offence; handgun possession; fighting that involves a weapon, is gang-related, or results in serious injury; possession of illegal drugs; sexual battery

The variable “maximum level of severity of infractions” represents the most severe level of all the infractions a student committed (if any). This variable was a significant negative predictor of college-going, such that for every increase in the maximum severity level of a student's infractions, his odds of going to college decreased by 8%, all other variables held constant. (Note that SCS does not currently classify infractions based on severity level, so this particular college-going indicator is not trackable for current students.)

Counterintuitively, *number* of infractions was a significant *positive* predictor of college-going. The effect, fortunately, was small: For every additional infraction, a student's likelihood of enrolling in college increased 3%, all other variables being equal. Still, this finding is not easy to explain. It is worth noting that in the year-specific analyses, this association is borne out for only two of the years; it is non-significant for the other two years. Also worth noting is that infractions can be quite minor, such as a cell phone or dress code violation. (Keep in mind that the severity of conduct is accounted for in the maximum-severity-level variable discussed above.)

Demographics

There was a strong effect for gender: Female graduates were about 34% more likely to go to college than their equally qualified male counterparts. This finding indicates a need to: 1) understand the barriers that SCS males face in going to college, and 2) to implement strategies designed to remove those barriers.



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Regression requires the use of a reference category for analyzing categorical variables such as race/ethnicity. Because they were the most populous group, African Americans were the reference category for race/ethnicity, and three groups were compared to them: 1) Latino students, 2) White students, and 3) Asian, Native-American, and Hawaiian/Pacific-Island students (combined because of their small numbers). Latino graduates were the only group whose likelihood of going to college differed significantly from African-American graduates (controlling for the other variables in the model). The difference was stark: Latino students were about 56% less likely to attend college than their equally qualified African-American counterparts. Put another way, Latino graduates were less than half as likely as African-American graduates to enroll in college, all other things being equal. This indicates a strong need to understand and then counteract the obstacles Latino students face in going to college.

Results: Year-Specific Models

For each year-specific model, certain variables were excluded because of their lack of pertinence to the given grade level; these exclusions are noted for each model. Note that variables in the four-year model were four-year totals, while the variables in the grade-specific models contain only the values for the given year.

Ninth Grade (2009–10)

Plan and ACT were excluded from this model, as they are taken after 9th grade. Number of AP-level credits was also excluded, as very few 9th-graders take AP-level courses.

The 9th-grade variables that were not significantly related to college enrollment were: course failures, taking Algebra I in 8th grade, math credits, science credits, social-studies credits, number of suspensions, and economic disadvantage. These variables were dropped, and the model was refitted using only the statistically significant variables, shown in Table 2.

Table 2. Ninth-grade predictors of enrolling in college within a year of graduating from high school (class of 2013)

Variable	Odds ratio	Likelihood of going to college	
		Percentage increase	Percentage decrease
Explore composite score	1.117	11.7	
Unweighted GPA	1.949	94.9	
Honors-level credits	1.172	17.2	
Language-arts credits	0.881		11.9
Attendance rate	1.034	3.4	
Maximum severity level of infractions	0.896		10.4
Number of infractions	1.050	5.0	
Being female (as compared to male)	1.357	35.7	
Being Latino (as compared to African American)	0.434		56.6

N = 4,079. All variables were significant at $p < .001$ except for language-arts credits, maximum severity level, and number of infractions, which were all significant at $p < .01$.



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Tenth Grade (2010–11)

Explore and ACT were excluded from this model, as Plan is the college-readiness exam taken in 10th grade. The number of AP-level credits among 10th-graders was low, so this variable was excluded as well. Also, taking Algebra I in 8th grade was excluded, since it was captured in the 9th-grade model, which was closer in time to 8th grade.

The following 10th-grade variables were not significantly related to college-going: math credits, science credits, and number of suspensions. These variables were thus dropped, and the model was refitted using only the statistically significant variables, presented in Table 3.

Table 3. Tenth-grade predictors of enrolling in college within a year of graduating from high school (class of 2013)

Variable	Odds ratio	Likelihood of going to college	
		Percentage increase	Percentage decrease
Plan composite score	1.128	12.8	
Unweighted GPA	1.551	55.1	
Number of course failures	0.847		15.3
Honors-level credits	1.242	24.2	
Language-arts credits	0.897		10.3
Social-studies credits	1.131	13.1	
Attendance rate	1.033	3.3	
Maximum severity level of infractions	0.909		9.1
Number of infractions	1.066	6.6	
Being economically disadvantaged (as compared to not)	0.845		15.5
Being female (as compared to male)	1.481	48.1	
Being Latino (as compared to African American)	0.406		59.4

N = 4,626. All variables were significant at $p < .001$ except for course failures and maximum severity level (significant at $p < .01$) and language-arts credits, social-studies credits, and economic disadvantage (significant at $p < .05$).

Eleventh Grade (2011–12)

Explore and Plan were excluded from this model, as ACT is the college-readiness exam taken in 11th grade. Taking Algebra I in 8th grade was also excluded, since it was captured in the 9th-grade model, which was closer in time to 8th grade.

The 11th-grade variables not significantly associated with going to college were: course failures, language-arts credits, math credits, science credits, number of infractions, and number of suspensions. These were dropped, and the model was refitted with just the statistically significant variables, shown in Table 4.

Twelfth Grade (2012–13)

Explore and Plan were excluded from this model, as ACT is the relevant college-readiness exam for seniors. Taking Algebra I in 8th grade was also excluded, since it was captured in the 9th-grade model, which was closer in time to 8th grade.



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The 12th-grade variables not significantly associated with enrolling in college were: math credits, science credits, social-studies credits, maximum severity level of infractions, number of infractions, and number of suspensions. These variables were thus dropped, and the model was refitted with just the statistically significant variables, shown in Table 5.

Table 4. Eleventh-grade predictors of enrolling in college within a year of graduating from high school (class of 2013)

Variable	Odds ratio	Likelihood of going to college	
		Percentage increase	Percentage decrease
ACT composite score	1.104	10.4	
Unweighted GPA	1.755	75.5	
AP-level credits	1.143	14.3	
Honors-level credits	1.156	15.6	
Social-studies credits	1.229	22.9	
Attendance rate	1.032	3.2	
Maximum severity level of infractions	0.917		8.3
Being economically disadvantaged (as compared to not)	0.821		17.9
Being female (as compared to male)	1.368	36.8	
Being Latino (as compared to African American)	0.390		61.0
Being White (as compared to African American)	0.686		31.4

N = 4,744. All variables were significant at $p < .001$ except for AP-level credits, economic disadvantage, and White, which were all significant at $p < .05$.

Table 5. Twelfth-grade predictors of enrolling in college within a year of graduating from high school (class of 2013)

Variable	Odds ratio	Likelihood of going to college	
		Percentage increase	Percentage decrease
ACT composite score	1.112	11.2	
Unweighted GPA	1.918	91.8	
Number of course failures	0.809		19.1
AP-level credits	1.233	23.3	
Honors-level credits	1.149	14.9	
Language-arts credits	1.165	16.5	
Attendance rate	1.047	4.7	
Being economically disadvantaged (as compared to not)	0.841		15.9
Being female (as compared to male)	1.319	31.9	
Being Latino (as compared to African American)	0.436		56.4

N = 4,788. All variables were significant at $p < .001$ except for course failures (significant at $p < .01$) and language-arts credits and economic disadvantage (significant at $p < .05$).



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Highlights from the Year-Specific Findings

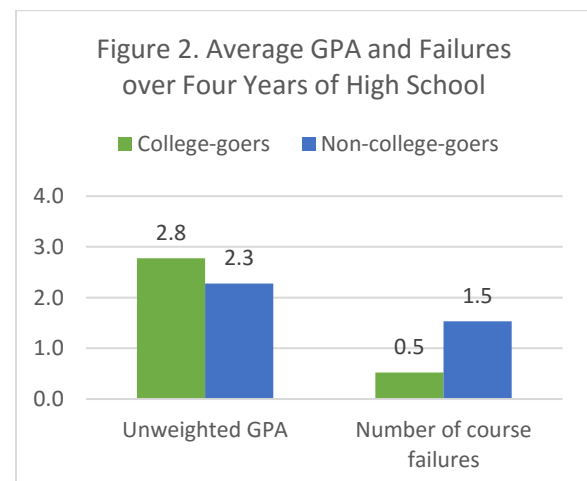
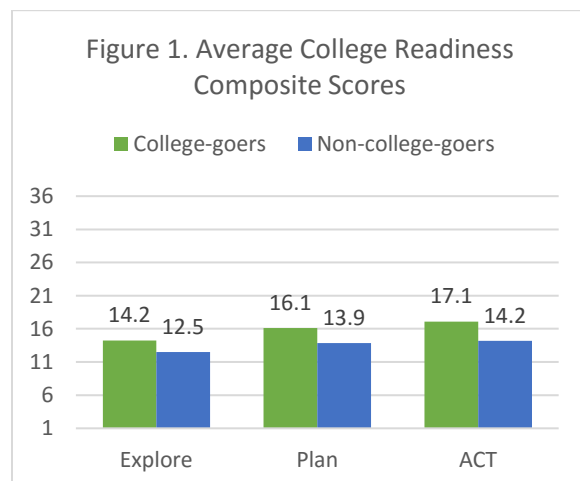
Robust predictors. The variables that were statistically significant in all five models (the overall model and each year-specific model) were: GPA, college-readiness score (ACT, Plan, or Explore), honors-level credits, attendance, being female, and being Latino. Their relationships to the outcome were consistent over all five models, both in direction and, somewhat more variably, strength. As such, they can all be considered robust predictors (positive or negative, depending on the variable) of college-going.

AP-level credits. Number of AP-level credits was not a significant predictor of college-going in the four-year model, but it is likely that the effect was simply washed out when looking at all four years of high school at once. In both 11th and 12th grade, when most AP-level courses are taken, number of AP-level credits was positively, significantly, and substantially related to enrolling in college (other variables held constant). This signifies that AP-level course-taking is indeed a predictor of enrolling in college. (Recall that AP-level credits were not included in the 9th- and 10th-grade models because of the small number of students who took AP-level courses in those grades.)

Economic disadvantage. Economic disadvantage, though not significant in the four-year model, was a significant negative predictor in three of the year-specific models. This indicates that economically disadvantaged students were less likely to go to college than their equally qualified non-disadvantaged counterparts. In other words, economic disadvantage can be considered a negative predictor of college-going.

Profiles of College-Goers versus Non-College-Goers

This section provides visual comparisons between the class of 2013 graduates who did and did not enroll in college within a year after graduation. As shown in Figure 1, those who enrolled in college had averaged about two to three points higher on college-readiness exams than those who did not enroll in college. The disparity widened a little with each subsequent test, from Explore in 8th grade to Plan in 10th grade to ACT in 11th or 12th grade. Similarly, the college-goers had an average GPA half a letter grade higher and failed an average of one course less than the non-college-goers, as shown in Figure 2.

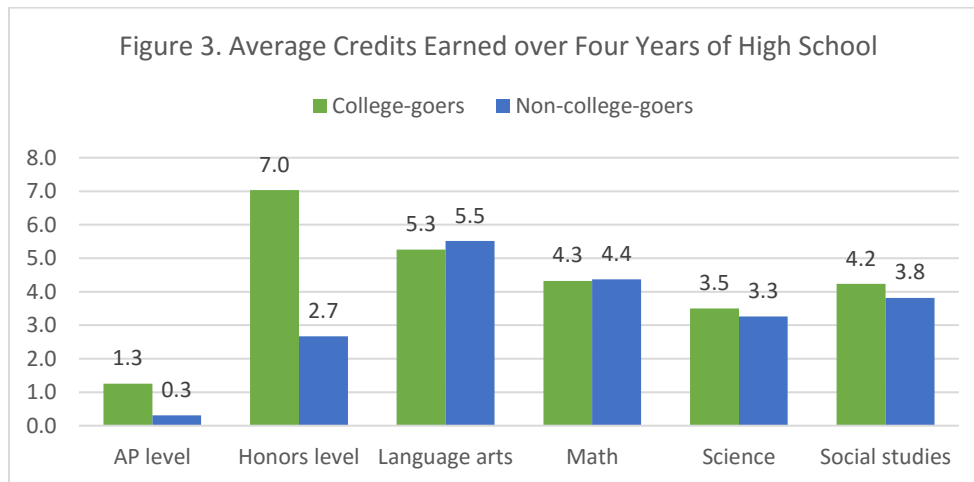




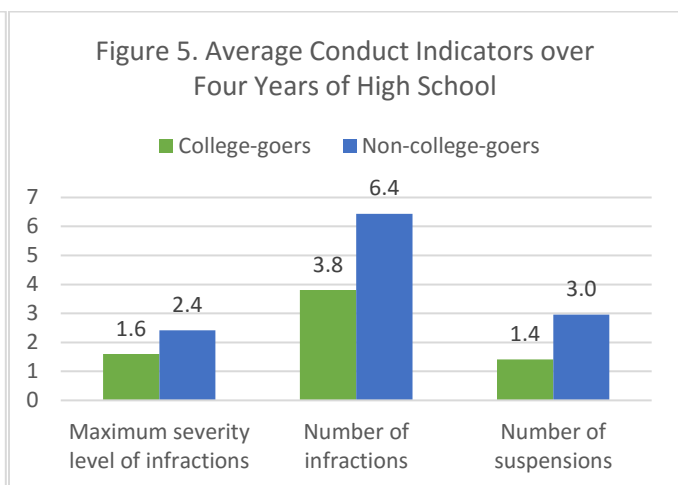
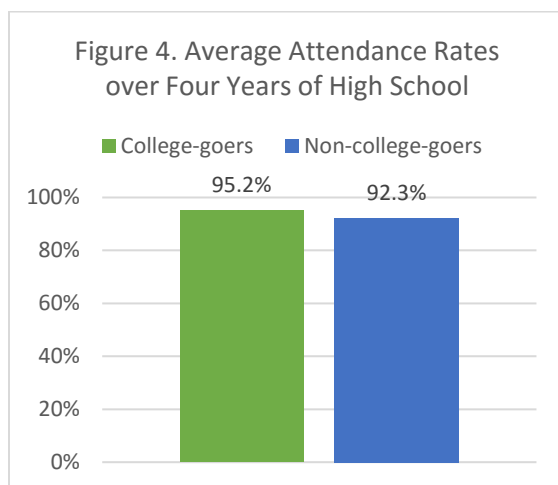
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Figure 3 presents the course-taking differences between the college enrollees and the non-enrollees. Note that the college-goers earned an average of one AP-level credit and more than four honors-level credits than their non-college-going counterparts earned.



As shown in Figure 4, the students who enrolled in college had an average attendance rate almost three percentage points higher than those who did not enroll in college. As for conduct, depicted in Figure 5, the college-goers committed infractions that were, on average, fewer in number and less severe than those committed by the non-college-goers. The college-goers also averaged a lower number of suspensions over their four years of high school than did the non-college-goers (though this factor was not significant in the analyses).



Finally, Figure 6 indicates the college enrollment rates of the 2013 graduates by their demographic characteristics and by whether or not they took Algebra I in 8th grade. Though not a significant predictor when controlling for the other variables in the model, taking Algebra I in 8th grade nonetheless was associated with a much higher college-enrollment rate. Indeed, the students who



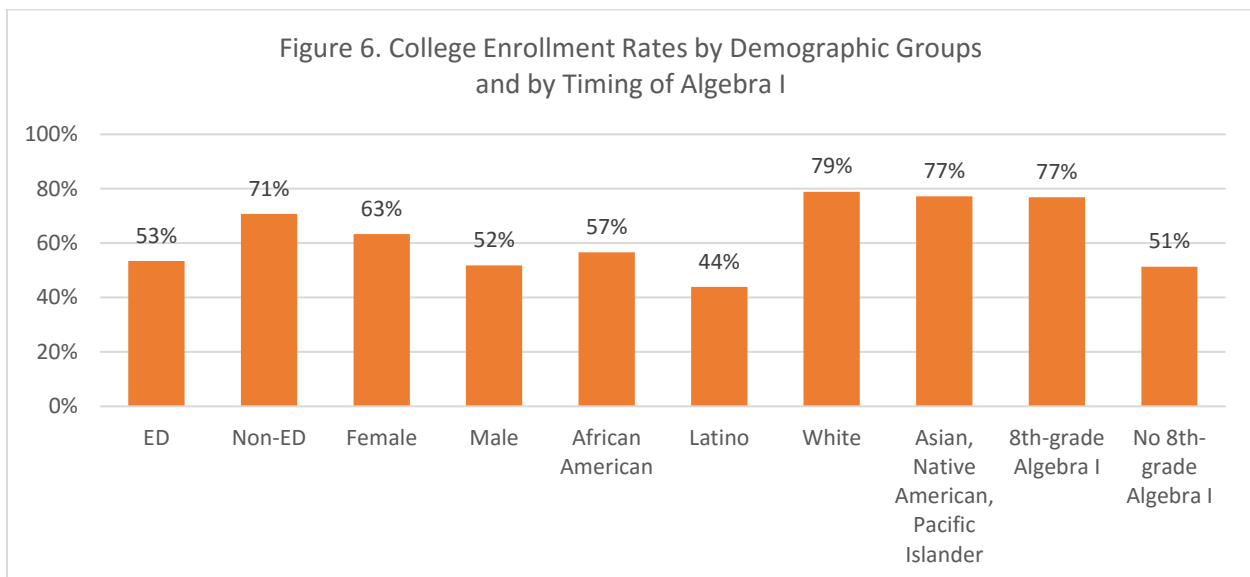
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took Algebra I in 8th grade enrolled in college at rate 26 percentage points higher than did the students who delayed taking Algebra I until high school.

In keeping with the model findings presented earlier, certain demographic groups had much higher college enrollment rates than others. Economically disadvantaged (ED) students enrolled in college at a much lower rate than their non-disadvantaged counterparts; males had a lower rate than females; Latinos had a lower rate than African Americans and a much lower rate than Whites and the combined group of Asians, Native Americans, and Hawaiian/Pacific Islanders.

African Americans also had a lower college-enrollment rate than Whites and the combination group, as Figure 6 shows. Recall, however, that African Americans' college-going likelihood was not significantly different from that of Whites or the combination group. So, although African-American students enrolled in college at a rate 20+ percentage points lower than that of Whites and the combination group, the groups' likelihoods of enrolling in college were not significantly different when controlling for the other variables in the model. This means that when factors such as academic performance, advanced course-taking, economic status, behavior, attendance, and so forth are taken into account, the differences in college-going disappear. In other words, African Americans and Whites with the same academic, economic, and behavioral profiles were, on average, equally likely to go to college. And the same goes for African Americans and the combined group of Asians, Native Americans, and Hawaiian/Pacific Islanders. Should the District be concerned about the 20+ percentage-point gap in actual college enrollment? Most certainly. But what this study shows is that this gap is attributable to academic, economic, and behavioral factors—many of which the District can influence in a positive way.





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Recommendations

The findings from this study point to some next steps the District can take to help increase students' chances of enrolling in college after graduation:

- Do further research to understand why males, Latinos, and economically disadvantaged students enroll in college at much lower rates than their equally qualified counterparts. Once the barriers are identified, enact strategies to counteract them.
- Expand offerings of and recruitment into advanced courses, since both AP-level and honors-level course-taking increased the likelihood of enrolling in college, even when controlling for college-readiness scores, grades, attendance, behavior, and demographics.
- Continue strategies to increase student attendance.
- In fall of 2018, replicate this study using the class of 2017. Use those findings in combination with the findings presented here to establish cut-points for the robust indicators to create a college-going indicator system.