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Exploring College Outcomes for Low-Income AP® Exam Takers with Fee Reductions

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Executive Summary

The focus of the study presented here is to explore college outcomes for students who come from traditionally lower-income backgrounds, reporting a household income of $30,000 or less, and who were awarded a fee reduction to take one or more Advanced Placement® (AP®) Exams, compared to students with a similar background and ability who did not participate in an AP Exam in that subject area or discipline. Matched samples of AP Exam taking and non-AP Exam taking students in each of five disciplines were created using student background variables, and these samples were compared on the following college outcomes: immediate enrollment in a four-year institution following high school graduation, persistence to the second year of study at the first-enrolled institution, graduation within four years of matriculation at any four-year institution, and graduation within six years of matriculation at any four-year institution. Results indicate that fee-reduction lower-income AP examinees, when compared to their non-AP Exam-taking peers, tend to have higher likelihood of enrolling, persisting, and graduating from four-year colleges.

Introduction

The College Board provides a fee reduction per exam for students with financial need. Many states use federal and state funding to further reduce the exam fee for these students. This reduced rate can encourage students to pursue a rigorous academic curriculum in high school and possibly earn college credit, which can help ease financial burden in postsecondary education (U.S. Department of Education, 2013). In the 2013 AP graduating class, over 27% of AP examinees received AP fee reductions (College Board, 2014). Much research on the effects of AP participation on students' college enrollment and success has explored wide samples of students with various backgrounds and access to resources. More recently, however, research has begun focusing on students with lower-income backgrounds and the relationship between Advanced Placement and their college outcomes. For instance, Wyatt and Mattern (2011, 2013) found that students from low-socioeconomic backgrounds who completed an AP Exam using a College Board–issued fee reduction had more positive college outcomes than students from low-socioeconomic backgrounds who did not, even after controlling for various student characteristics. The study presented here builds on those findings by creating matched samples, where AP-taking and non-AP-taking students are matched student-to-student on a set of background variables and then compared on various college outcomes to determine whether participating in AP Exams is associated with better college outcomes. Additional variables were taken into account in the models as well in order to account for differences between groups before making comparisons.

The Advanced Placement Program® provides students the opportunity to take rigorous, college-level courses while still enrolled in high school. AP students can demonstrate their acquired skills and knowledge by taking end-of-course exams and may earn college credit and/or placement depending on their exam performance. Universities and colleges that accept AP Exam scores for college credit and placement set a minimum score that must be achieved, and students meeting or exceeding that score are awarded credit and/or placement into courses upon entering the institution. Educators and researchers have studied the impact of the program for years, and results generally support the notion that students participating in AP Exams, particularly those who score a 3, 4, or 5, demonstrate more positive college outcomes than students who do not.

One key college outcome explored in AP research is college performance, as measured by overall grades or those grades that are course-specific, subject-specific, and/or year-specific. Research has shown that students who take an Advanced Placement Exam in high school tend to earn higher grades in college than students who do not, both in overall GPA (Hargrove, Godin, & Dodd, 2008; Keng & Dodd, 2008; Murphy & Dodd, 2009) and in subject-specific GPA (Godfrey, Matos-Elefonte, Ewing, & Patel, 2014; Kaliski & Godfrey, 2014; Keng & Dodd, 2008; Murphy & Dodd, 2009). Additional research shows that students who perform well on the AP Exam and place out of the corresponding introductory college course perform as well as or better in sequent courses than students who take the introductory course on the college campus (Dodd, Fitzpatrick, De Ayala, & Jennings, 2002; Keng & Dodd, 2008; Morgan & Ramist, 1998; Murphy & Dodd, 2009; Patterson & Ewing, 2013). But one of the most common college performance outcomes measured in AP research is first-year college GPA (FYGPA), which also tends to be higher for AP examinees (Hargrove et al., 2008; Keng & Dodd, 2008; Mattern, Shaw, & Xiong, 2009; Murphy & Dodd, 2009; Shaw, Mattern, & Marini, 2012; Ewing & Howell, 2015).

Another college outcome that educational researchers explore when studying effects of AP participation and performance is college enrollment. For instance, Chajewski, Mattern, and Shaw (2011) studied the relationship between AP Exam participation and a student's likelihood

of enrolling in a four-year college. After controlling for background variables, both demographic and academic, the researchers found that participation in at least one AP Exam substantially increased a student's odds of enrolling in a four-year college.

Perhaps one of the ultimate measures of college success is graduation with a bachelor's degree within four, five, and/or six years. Some research has focused on the relationship between AP participation or performance and students' likelihood of graduating with a bachelor's degree, finding again that AP participation and/or performance is positively related to college graduation rates (Hargrove et al., 2008; Dougherty, Mellor, & Jian, 2006). Mattern, Marini, and Shaw (2013) studied the relationship between AP Exam participation and performance and graduation from a four-year institution within four academic years. Using logistic regression and hierarchical generalized linear modeling (HGLM), they found that, even after accounting for academic background variables, students with AP Exam participation (and in particular, higher performance on said exams) were more likely to graduate from college within four years than non-AP students.

More recently, researchers have turned their attention to the relationship between AP Exam participation and performance and college outcomes for subgroups of AP examinees. In 2011, Wyatt and Mattern published a study on the relationship between AP participation and several college outcomes, specifically targeting low-SES students. Results indicated that students who received an AP fee reduction were more likely to enroll in four-year colleges, persist to second year, and earn a higher FYGPA than their non-AP-taking low-SES peers. In 2013, Wyatt and Mattern expanded this work by including covariates simultaneously and increasing the college outcomes to include transfer from two-year to four-year college, cumulative GPAs beyond first year, and graduation. Results again indicated a positive relationship between receiving AP fee reductions and the investigated college outcomes.

This study attempts to add to the field of knowledge by using matched samples of AP Fee Reduction students and similar non-AP participants, exploring college enrollment, persistence, and graduation in order to measure the magnitude of impact of AP on the low-SES student population.

Method

Data Sources

The samples used in this study were developed from two primary data sources. The first source of data comes from a database created by the College Board that contains AP, SAT®, and PSAT/NMSQT® scores, self-reported HSGPA, and demographic information for students scheduled to graduate from high school in 2007. The second source of data is from the National Student Clearinghouse (NSC), which tracks student enrollment and degree attainment for over 3,100 two- and four-year colleges and universities in the United States (a list of participating institutions is located at www.studentclearinghouse.org), equivalent to 91% of the U.S. college-going population. These data were merged and restricted to those students who attended a U.S. high school, took the SAT test, indicated a household income of $30,000 or less, and self-reported their HSGPA, gender, race/ethnicity, and parental education level. All AP students considered in this study took an exam or exams using an AP fee reduction.

These data sources were used to create samples in five subject areas: English, math, science, social science/history, and world languages. Each sample consisted of low-income students who either took an AP Exam in that subject area (e.g., English) or did not take an AP Exam in that subject area. It is worth noting that AP Exam takers and non-AP Exam takers in a given sample (e.g., English) may have taken an AP Exam in a different subject area (e.g., math). The AP takers

in the English sample had taken an AP Exam in either English Language or English Literature; the AP takers in the math sample had taken either Calculus AB, Calculus BC, Computer Science A, Statistics, or Computer Science AB; the AP takers in the science sample had taken Biology, Chemistry, Environmental Science, Physics B, Physics C: Electricity and Magnetism, or Physics C: Mechanics; the AP takers in the social science/history sample had taken Comparative Government and Politics, European History, Human Geography, Macroeconomics, Microeconomics, Psychology, United States Government and Politics, United States History, or World History; the AP takers in the world languages sample had taken either Chinese Language and Culture, French Language, French Literature, German Language, Italian Language and Culture, Japanese Language and Culture, Latin, Spanish Language, or Spanish Literature.

Variables

Household Income. Household income was obtained from self-reported data on the SAT Questionnaire (SAT-Q), which is completed during registration for the SAT. Only students indicating household incomes of $30,000 or less were included in the study.

Highest Parental Education. Parental education was also derived from self-reported data obtained from responses on the SAT-Q. Student responses were provided for both mother's and father's highest educational level. The highest degree (i.e., no high school diploma, high school diploma, associate degree, bachelor's degree, or graduate degree) of either parent was used to create this variable.

Gender. Students provided gender information (female or male) when they completed the SAT-Q.

Ethnicity. Students indicated their race/ethnicity on the SAT-Q. The categories include: (1) American Indian or Alaska Native; (2) Asian, Asian American, or Pacific Islander; (3) Black or African American; (4) Mexican or Mexican American; (5) Puerto Rican; (6) Other Hispanic, Latino, or Latin American; (7) White; and (8) Other. In this report, categories 4, 5, and 6 were combined into a single category titled "Hispanic." Categories 2 and 7 were combined into a category titled "Asian/White" and categories 1 and 8 were combined into a category titled "Other." As a result, four categories were created: Asian/White, Black, Hispanic, and Other.

PSAT/NMSQT® Scores. The PSAT/NMSQT test scores were obtained from the 2007 College Board cohort, which included students who graduated from high school in 2007 and had taken the PSAT/NMSQT at least once during their high school career in either sophomore or junior year. The 2007 PSAT/NMSQT consisted of three sections: critical reading, mathematics, and writing. Each section had a scale score range of 20 to 80 with one-point increments and the composite score was the sum of all three sections and had a range of 60 to 240.

SAT Scores. A student's most recent SAT scores were obtained from the 2007 College Board cohort, which included students who graduated from high school in 2007. Like the PSAT/NMSQT, the 2007 SAT consisted of three sections: critical reading, mathematics, and writing. Each section had a score scale ranging from 200 to 800 with 10-point increments. An SAT composite score was the sum of the scores for all three sections and, therefore, had a score scale range of 600 to 2400.

HSGPA. Cumulative high school GPA (HSGPA) was self-reported by students on the SAT-Q. Grades were reported in letter grades ranging from an F (below 65) to an A+ (97–100).

Four-Year College Enrollment. Fall 2007 college enrollment data were obtained through the NSC data. Students who enrolled in a four-year college in the fall immediately following high school graduation were coded "1," whereas those who didn't enroll were coded "0."

Persistence to Second Year. Four-year college students who were enrolled at their initial institution during their second academic year were coded "1," whereas those were not enrolled were coded "0." Students who did not initially enroll in a four-year institution were not assigned a persistence value. It should be noted that this variable is not an absolute measure of persistence, as a student may transfer to another institution and persist even though he or she was not retained by his or her original institution.

Graduation Within Four Years. Four-year college students who graduated with a bachelor's degree within four years were coded as "1," whereas those who enrolled initially but did not graduate during this time period were coded "0." This measure considered graduation from any four-year institution, not only the school at which the student was initially enrolled.

Graduation Within Six Years. As above except the time period is six years.

Average AP Score (Within the Discipline). The average AP score within each discipline (e.g., English) was created by calculating, for each student, the mean score for all exams taken within that discipline area. The mean score was then rounded to the nearest whole number.

English. Students who took an AP English Language or English Literature Exam(s) are coded "1," whereas students who did not take one of these AP Exams are coded "0,"

Math. Students who took an AP Calculus AB, Calculus BC, Computer Science A, Computer Science AB, or Statistics exam(s) are coded "1," whereas students who did not take one of these AP Exams are coded "0,"

Science. Students who took an AP Biology, Chemistry, Environmental Science, Physics B, Physics C: Electricity and Magnetism, or Physics C: Mechanics Exam(s) are coded "1," whereas students who did not take one of these AP Exams are coded "0."

Social Science/History. Students who took an AP Comparative Government and Politics, European History, Human Geography, Macroeconomics, Microeconomics, Psychology, United States Government and Politics, United States History, or World History Exam(s) are coded "1," whereas students who did not take one of these AP Exams are coded "0."

World Languages. Students who took an AP Chinese Language and Culture, French Language, French Literature, German Language, Italian Language and Culture, Japanese Language and Culture, Latin, Spanish Language, or Spanish Literature Exam(s) are coded "1," whereas students who did not take one of these AP Exams are coded "0."

One Other AP Area. Students in a given sample (e.g., English) who took one or more AP Exams in only one other AP discipline (e.g., math) are coded "1," whereas students who either did not take AP Exams in other disciplines or took other AP Exams in two, three, or four other disciplines are coded "0."

Two Other AP Areas. Students in a given sample (e.g., English) who took one or more AP Exams in exactly two other AP disciplines (e.g., math and science) are coded "1," whereas students who either did not take AP Exams in other disciplines or took other AP Exams in one, three, or four other disciplines are coded "0."

Three Other AP Areas. Students in a given sample (e.g., English) who took one or more AP Exams in exactly three other AP disciplines (e.g., math, science, and social science/history) are coded "1," whereas students who either did not take AP Exams in other disciplines or took other AP Exams in one, two, or four other disciplines are coded "0."

Four Other AP Areas. Students in a given sample (e.g., English) who took one or more AP Exams in exactly four other AP disciplines (e.g., math, science, social science/history, and world languages) are coded "1," whereas students who either did not take AP Exams in other disciplines or took other AP Exams in one, two, or three other disciplines are coded "0."

Creating Matched Samples

To create a matched sample of students who took an AP Exam in the given discipline and students who did not take an exam, six student variables were used: gender; race/ethnicity; highest level of parental education completed; and PSAT/NMSQT Critical Reading score, Math score, and Writing scores. Students' sophomore PSAT scores were maintained for matching. If unavailable, junior year scores were used instead. All three test scores (Critical Reading, Math, and Writing) from sophomore or junior year must have been present for possible inclusion in the matched sample.

Matched pairs were required to have identical race/ethnicity codes, gender, and highest level of parental education completed. PSAT/NMSQT scores had to be within two score points on each of the three test scores. The matching was performed in such a way to maximize the number of matches while minimizing the differences between the scores of the student pairs created. More information on the technical approach to create the matched samples can be found in Godfrey (2016).

Analyses

A series of descriptive analyses were conducted after the matches were complete. The first analysis was conducted to evaluate the quality of the match by comparing the pre- and post-match characteristics of AP Exam takers and the characteristics of each of the post-match samples. The second set of analyses compared the college outcomes of AP and non-AP Exam takers within a given sample (e.g., English). These outcomes included enrollment in a four-year college, persistence to second year, and graduation within four and six years. The third set of analyses compared the college outcomes of the AP Exam takers scoring 1 or 2 to the non-AP Exam takers to whom they were matched and the fourth set of analyses compared the college outcomes of the AP Exam takers scoring 3 or higher to the non-AP Exam takers to whom they were matched. The fifth set of analyses was designed to investigate the relationship between AP Exam participation in a given subject and college outcomes after controlling for academic variables and AP Exam participation in other disciplines.

For this fifth set of analyses, a series of three logistic regressions were conducted for each outcome (e.g., college enrollment). The first regression controlled for other variables related to college outcomes: SAT scores and HSGPA. The second regression included AP participation in a given discipline (e.g., English) in addition to SAT scores and HSGPA, and the third model included participation in other AP disciplines in addition to SAT scores, HSGPA, and AP participation within the discipline being investigated. Participation in other disciplines was identified through a series of dummy-coded variables titled "One Other AP Area," "Two Other AP Areas," "Three Other AP Areas," And "Four Other AP Areas." Estimated four-year college enrollment rate, persistence rates, and graduation rates were calculated based on this (third)

model and presented graphically. The sixth set of analyses was similar to the fifth set of analyses except restricting to students who either scored a 1 or 2 in that discipline (e.g., English) and those non-AP Exam takers to whom they were matched. The seventh analysis was similar to that of the fifth and sixth but limiting to students scoring 3 or higher in that discipline and the non-AP Exam takers to whom they were matched.

Results

After the match, there were 23,416 students in the English sample, 14,592 in the math sample, 14,166 in the science sample, 25,634 in the social science/history sample, and 13,468 in the world languages sample. By design, half of the students in each sample took an AP Exam in that discipline and half did not take an exam in that discipline. Table 1 indicates that the pre- and post-match characteristics of AP English takers are very similar. The pre- and post-match characteristics of AP students in the other samples were also very similar, suggesting that the results of the analyses should be generalizable to all low-SES AP examinees in each of the disciplines studied. These results are displayed in Tables A1 through A4 of the Appendix.

Table 1.

Pre- and Post Match Characteristics for the English Sample

Variable		AP		Non-AP	
		Pre-Match	Post-Match	Pre-Match	Post-Match
Gender	Female	68.1	69.1	61.6	69.1
	Male	31.9	30.9	38.4	30.9
Ethnicity	Asian/White	33.8	34.3	41.3	34.3
	Black	19.3	19.4	28.4	19.4
	Hispanic	42.0	42.2	25.3	42.2
	Other	4.9	4.1	5.0	4.1
Parental Education	No High School Diploma	25.8	25.8	16.4	25.8
	High School Diploma	47.3	49.4	53.3	49.4
	Associate Degree	7.5	6.8	8.7	6.8
	Bachelor's Degree	12.8	12.3	14.6	12.3
	Graduate Degree	6.6	5.7	7.0	5.7
Household Income	Up to $10K	20.9	21.2	21.1	19.4
	$10K to $20K	48.5	48.3	42.0	44.1
	$20K to $30K	30.5	30.5	36.8	36.6
Mean Scores	PSAT/NMSQT	141.3	138.8	126.5	138.7
	SAT	1520	1497	1325	1436
	HSGPA	3.56	3.54	3.14	3.29

Table 2 compares the post-match characteristics for each of the samples. Within each AP subject area, the distribution by gender, ethnicity, and parental education were identical for AP and non-AP Exam takers due to the matching algorithm. PSAT/NMSQT scores, also used in the match, were not meaningfully different between the two groups.

Table 2.

Demographic and Academic Characteristics of the Matched Sample of AP and Non AP Exam Takers

Variable		English		Math		Science		Social Science/History		Language	
		AP	Non-AP	AP	Non-AP	AP	Non-AP	AP	Non-AP	AP	Non-AP
Gender	Female	69.1	69.1	59.5	59.5	61.8	61.8	65.8	65.8	68.6	68.6
	Male	30.9	30.9	40.5	40.5	38.2	38.2	34.2	34.2	31.4	31.4
Ethnicity	Asian/White	34.3	34.3	47.0	47.0	45.9	45.9	37.3	37.3	11.0	11.0
	Black	19.4	19.4	13.6	13.6	14.9	14.9	17.6	17.6	3.1	3.1
	Hispanic	42.2	42.2	35.9	35.9	35.3	35.3	41.2	41.2	84.5	84.5
	Other	4.1	4.1	3.4	3.4	3.9	3.9	3.8	3.8	1.4	1.4
Parental Education	No High School Diploma	25.8	25.8	26.6	26.6	26.3	26.3	25.9	25.9	44.7	44.7
	High School Diploma	49.4	49.4	46.7	46.7	46.1	46.1	48.1	48.1	37.1	37.1
	Associate Degree	6.8	6.8	6.3	6.3	6.6	6.6	6.9	6.9	3.8	3.8
	Bachelor's Degree	12.3	12.3	13.7	13.7	13.9	13.9	13.2	13.2	8.5	8.5
	Graduate Degree	5.7	5.7	6.7	6.7	7.0	7.0	6.0	6.0	6.0	6.0
Household Income	Up to $10K	21.2	19.4	19.6	17.6	20.4	18.3	20.3	19.2	20.8	21.4
	$10K to $20K	48.3	44.1	50.9	45.7	50.3	45.8	49.4	44.3	50.0	45.3
	$20K to $30K	30.5	36.6	29.4	36.7	29.3	36.0	30.4	36.5	29.2	33.3
Mean Scores	PSAT/NMSQT	138.8	138.7	144.0	143.9	142.1	142.0	138.6	138.5	130.8	130.7
	SAT	1497	1436	1575	1495	1552	1480	1500	1433	1401	1362
	HSGPA	3.54	3.29	3.67	3.36	3.61	3.36	3.51	3.28	3.41	3.23

Note. SAT scores, HSGPA, and household income were not used in the matching process.

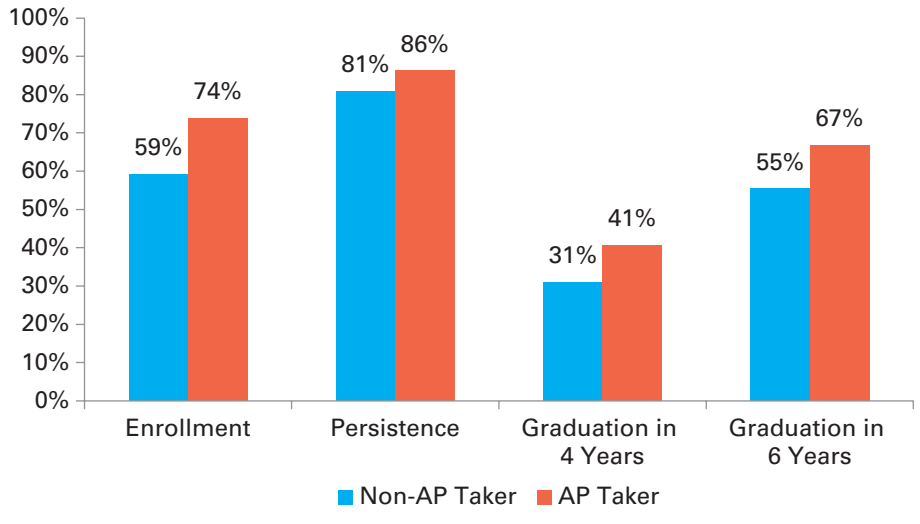
Across the AP subject areas, females accounted for a greater percentage of the sample than did males, ranging from a low of 59.5% in math to a high of 69.1% in English. Black or African American students accounted for between 13.6% and 19.4% of students in four of the samples and Hispanic students accounted for between 35.3% and 42.2% of students in four of the samples. For the world languages sample, Hispanics accounted for 84.5% of students. This was likely due to high participation rates in the AP Spanish Language Exam. All five samples were well represented among students coming from a household where the highest parental degree attained was no higher than a high school diploma and almost half (44.7%) of the world languages sample came from households where no parent graduated from high school. The distribution of household income, not used in the match, suggested slightly higher incomes for the non-AP students than the AP examinees across all five samples. PSAT/NMSQT scores, used in the match, were virtually identical for the AP and non-AP examinees. Mean PSAT/NMSQT composite scores were highest in the math and science samples and lowest in the world languages sample. Across all five samples, SAT scores and HSGPA, not used in the matching process, were higher for the AP examinees than for the non-AP takers. This may be due to more rigorous course taking by AP examinees and the contribution of such courses toward high school GPA and SAT scores.

English Sample

Figure 1 shows the enrollment, persistence, and graduation rates for the matched sample of English AP Exam takers and students not taking an English AP Exam. The AP Exam takers had a higher four-year enrollment rate (15 percentage points), higher rate of persisting to second year (5 percentage points), a higher four-year graduation rate (10 percentage points), and higher six-year graduation rate (12 percentage points).

Figure 1.

A comparison of all English AP examinees and their matched non-AP counterparts.

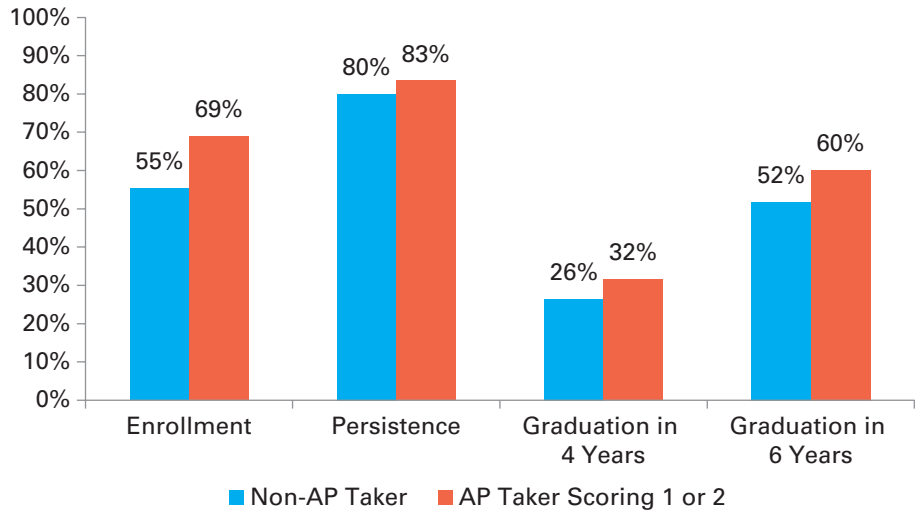


Note. The number of students in the enrollment sample was 23,416, and the number of students in the sample used to generate the percentage that persisted and graduated is 10,608.

Figure 2 displays the same information for AP Exam takers scoring 1 or 2 and the non-AP takers to whom they were matched. The AP examinees had a higher four-year enrollment rate (14 percentage points), slightly higher rate of persisting to second year (3 percentage points), higher four-year graduation rate (6 percentage points), and a higher six-year graduation rate (8 percentage points).

Figure 2.

A comparison of English AP examinees scoring 1 or 2 and their matched non-AP counterparts.



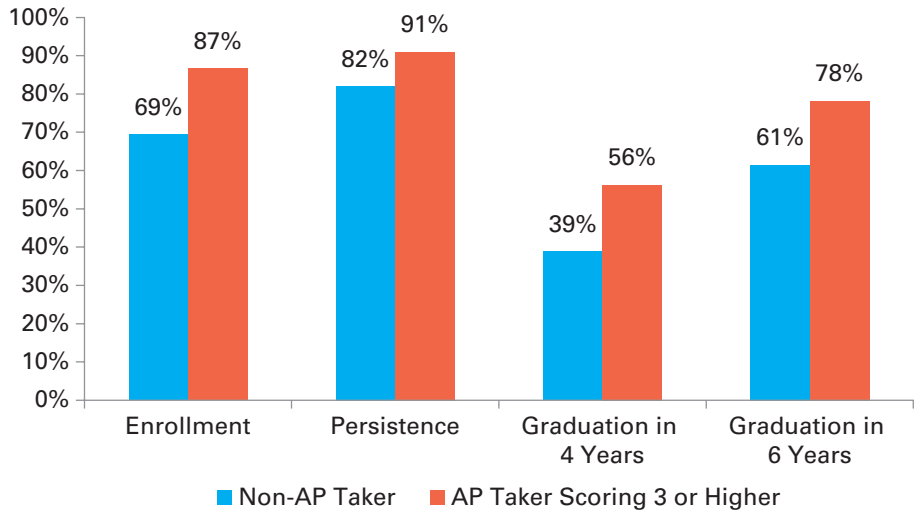
Note. The number of students in the enrollment sample was 16,972, and the number of students in the sample used to generate the percentage that persisted and graduated is 6,698.

Figure 3 displays the differences in four-year college enrollment rates, persistence, and graduation for those students who took an English AP Exam and scored 3 or higher and those non-AP Exam takers who were matched to them. The AP students had a higher four-year enrollment rate (18 percentage points), higher rate of persisting to second year (9 percentage points), higher four-year graduation rate (17 percentage points), and a higher six-year graduation rate (17 percentage points).

The English AP Exam takers and those not taking an English exam may have participated in AP in other subjects, and so the preceding analyses did not isolate the relationship between AP English Exam taking and college outcomes. In other words, AP Exam taking in other subjects may have contributed to the higher college attainment rates found for AP English students. The subsequent analysis was designed to address that issue using a series of logistic regressions. The first model included only using SAT scores and HSGPA, the second model added English AP Exam participation to these variables, and the third model added covariates to measure AP Exam participation in other subjects. These additional covariates included four dummy variables: one other AP area, two other AP areas, three other AP areas, and four other AP areas. The results from all three models are presented in Table A5 in the Appendix and estimates of four-year enrollment, persistence, and graduation rates based on parameters from the third model are presented in Figure 4.

Figure 3.

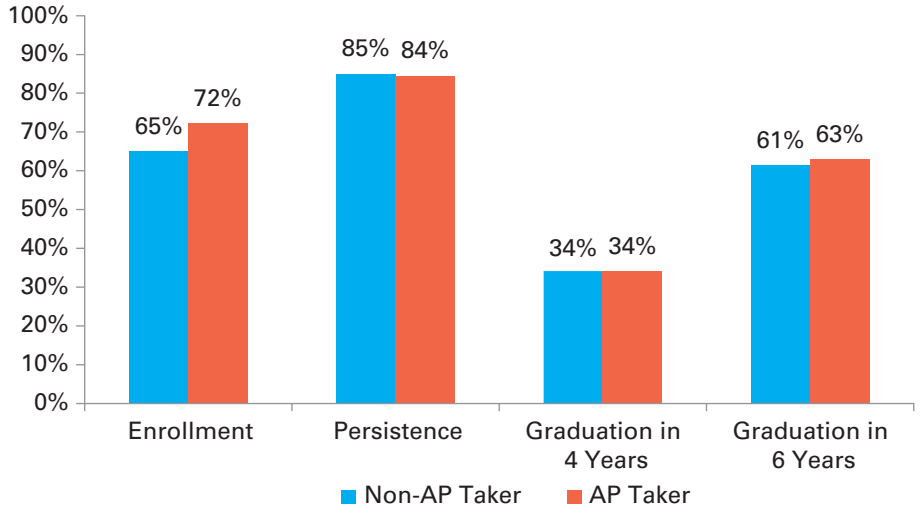
A comparison of English AP examinees scoring 3 or higher and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 6,444, and the number of students in the sample used to generate the percentage that persisted and graduated is 3,910.

Figure 4.

Estimated college outcomes for English AP examinees and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



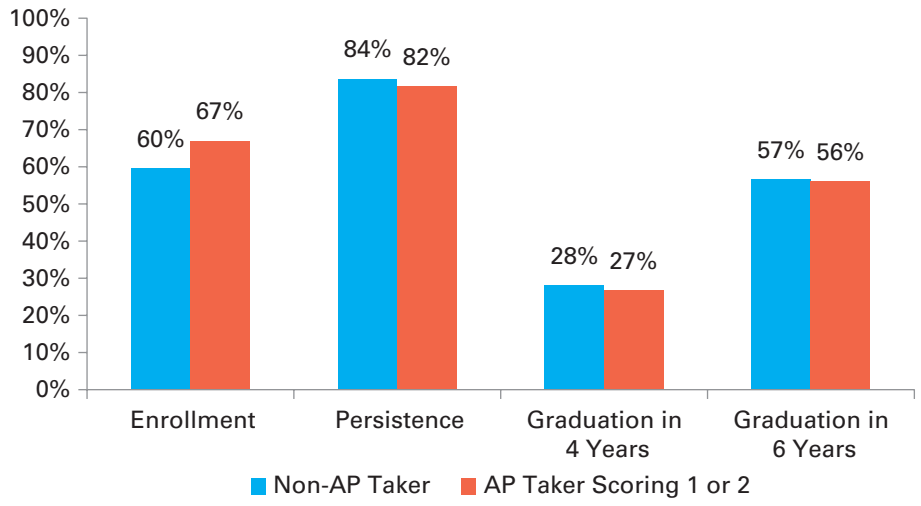
Note. Model Parameters are in Table A5. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.41 and 1467 for the enrollment model and 3.54 and 1545 for the persistence and graduation models.

Figure 4 indicates that for English AP Exam takers, the estimated four-year enrollment rate is higher (7 percentage points), persistence is slightly lower (1 percentage point), four-year graduation rate is the same, and six-year graduation rate is higher (2 percentage points) compared to non-AP Exam takers.

The same model-based approach used to create Figure 4 was also used for just those students averaging a 1 or 2 on the English AP Exam(s) and their non-AP counterparts to whom they were matched. These results are presented in Figure 5 and in Table A6 in the Appendix. Figure 5 indicates that the estimated four-year enrollment rate is higher for English AP Exam takers who scored less than 3 (7 percentage points), the persistence rate is slightly lower (2 percentage points), and four- and six-year graduation rates are slightly lower (1 percentage point) than matched non-AP Exam takers. Figure 6 and Table A7 show the same information for students who average 3 or higher on the English AP Exam(s). As compared to non-AP takers, the estimated four-year enrollment rate is higher (7 percentage points), persistence rate is slightly higher (2 percentage points), and four- and six-year graduation rates are higher (4 percentage points and 5 percentage points, respectively), for AP Exam takers scoring an average of 3 or higher.

Figure 5.

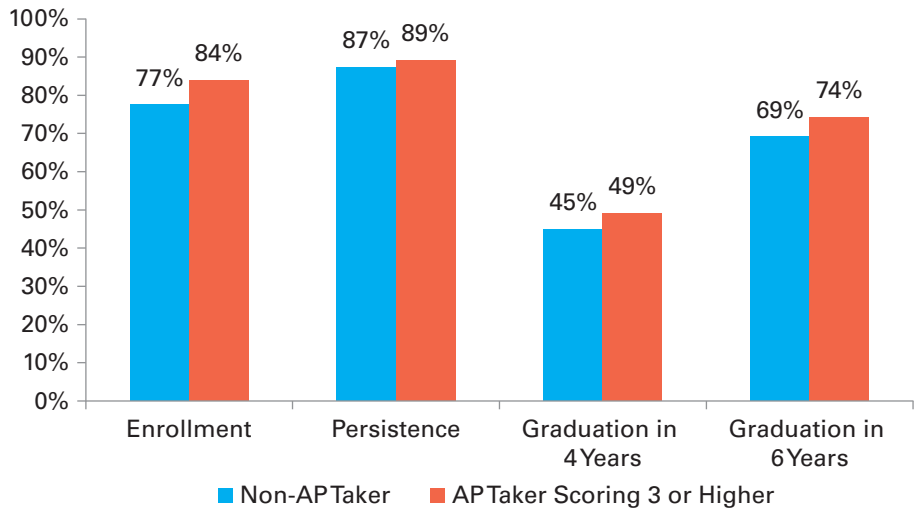
Estimated college outcomes for English AP examinees scoring 1 or 2 and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A6. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.33 and 1379 for the enrollment model and 3.44 and 1437 for the persistence and graduation models.

Figure 6.

Estimated college outcomes for English AP examinees scoring 3 or higher and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A7. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.64 and 1696 for the enrollment model and 3.69 and 1730 for the persistence and graduation models.

Math Sample

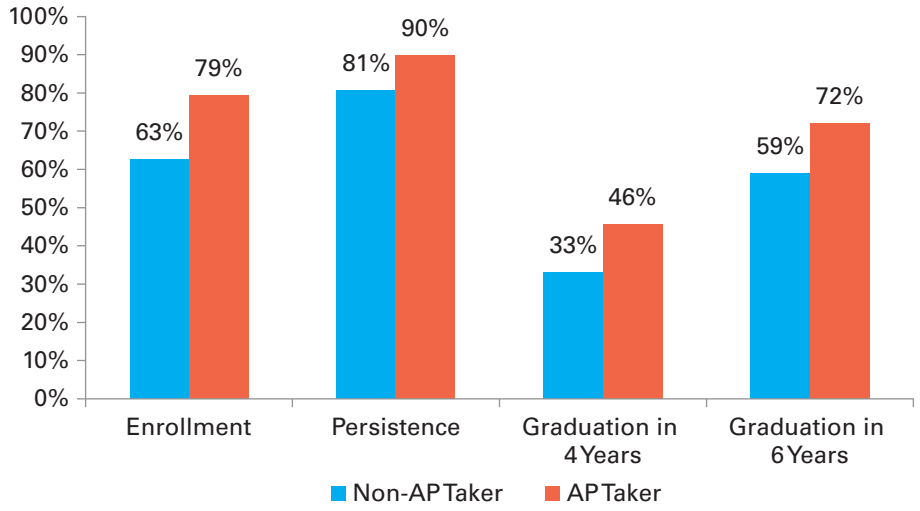
Figure 7 shows the enrollment, persistence, and graduation rates for the matched sample of math AP Exam takers and students not taking a math AP Exam. The AP Exam takers had a higher four-year enrollment rate (16 percentage points), higher rate of persisting to second year (9 percentage points), higher four-year graduation rate (13 percentage points), and higher six-year graduation rate (13 percentage points).

Figure 8 displays the same information for AP examinees scoring 1 or 2 and the non-AP Exam takers to whom they were matched. These AP examinees had a higher four-year enrollment rate (16 percentage points), a higher rate of persisting to second year (8 percentage points), higher four-year graduation rate (7 percentage points), and a higher six-year graduation rate (11 percentage points).

Figure 9 displays the differences in four-year college enrollment rates, persistence, and graduation for those students who took a math AP Exam and scored 3 or higher and those non-AP Exam takers who were matched to them. The AP examinees had a higher four-year enrollment rate (19 percentage points), higher rate of persisting to second year (10 percentage points), higher four-year graduation rate (22 percentage points), and higher six-year graduation rate (17 percentage points).

Figure 7.

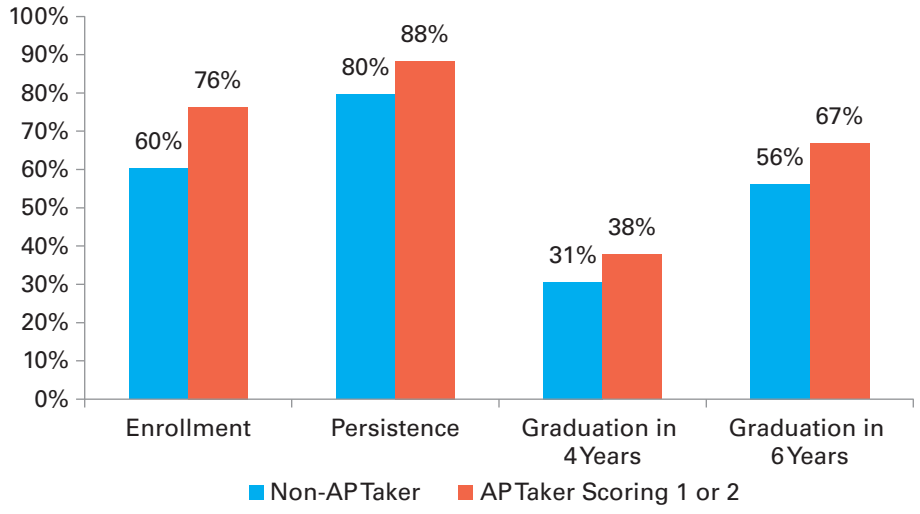
A comparison of all math AP examinees and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 14,592 and the number of students in the sample used to generate the percentage that persisted and graduated is 7,430.

Figure 8.

A comparison of math AP examinees scoring 1 or 2 and their matched non-AP counterparts.



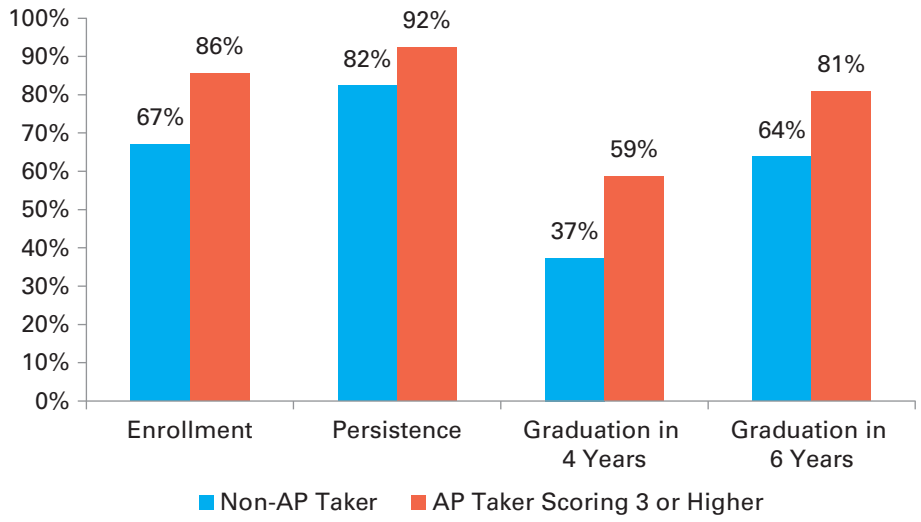
Note. The number of students in the enrollment sample was 9,772, and the number of students in the sample used to generate the percentage that persisted and graduated is 4,634.

The math analyses presented thus far have not isolated the relationship between math AP Exam taking and college outcomes as the math AP Exam takers may have taken AP Exams in other subjects. A series of logistic regressions was conducted on the math sample. The results from all three models are presented in Table A8, and estimates of four-year enrollment, persistence, and graduation rates based on parameters from the third model are presented in Figure 10.

Figure 10 indicates that the estimated four-year enrollment rate is higher for math AP Exam takers (8 percentage points), the persistence rate is higher (5 percentage points), and four- and six-year graduation rates were higher (4 percentage points for both) compared to non-AP Exam takers.

Figure 9.

A comparison of math AP examinees scoring 3 or higher and their matched non-AP counterparts.

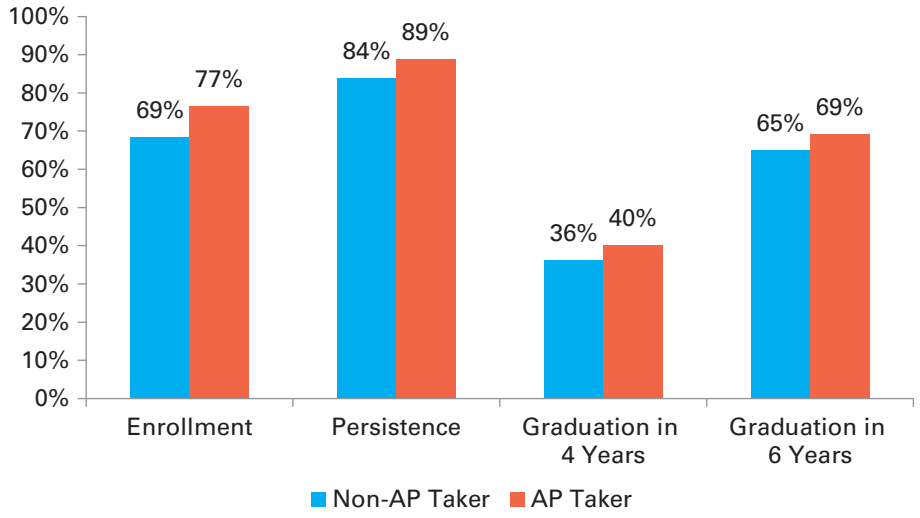


Note. The number of students in the enrollment sample was 4,820, and the number of students in the sample used to generate the percentage that persisted and graduated is 2,796.

The same model-based approach used to create Figure 10 was also used for just those students averaging a 1 or 2 on the math AP Exam(s) and their non-AP counterparts to whom they were matched. These results are presented in Figure 11 and in Table A9. Figure 11 indicates that the estimated rate of four-year enrollment is higher for math AP Exam takers who scored less than 3 (8 percentage points), persistence is higher (5 percentage points), four-year graduation is the same, and six-year graduation is higher (2 percentage points) than matched non-AP Exam takers. Figure 12 and Table A10 show the same information for students who average 3 or higher on the math AP Exam(s) and their matched counterparts. As compared to non-AP Exam takers, the estimated four-year enrollment rate for math AP Exam takers is higher (7 percentage points), persistence is higher (5 percentage points), and four- and six-year graduation rates are higher (11 percentage points and 8 percentage points, respectively).

Figure 10.

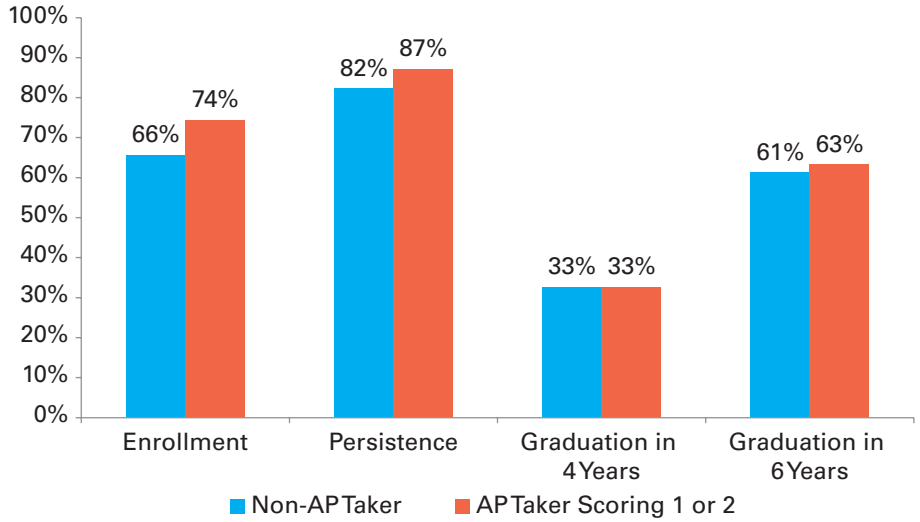
Estimated college outcomes for math AP examinees and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A8. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.52 and 1535 for the enrollment model and 3.61 and 1597 for the persistence and graduation models.

Figure 11.

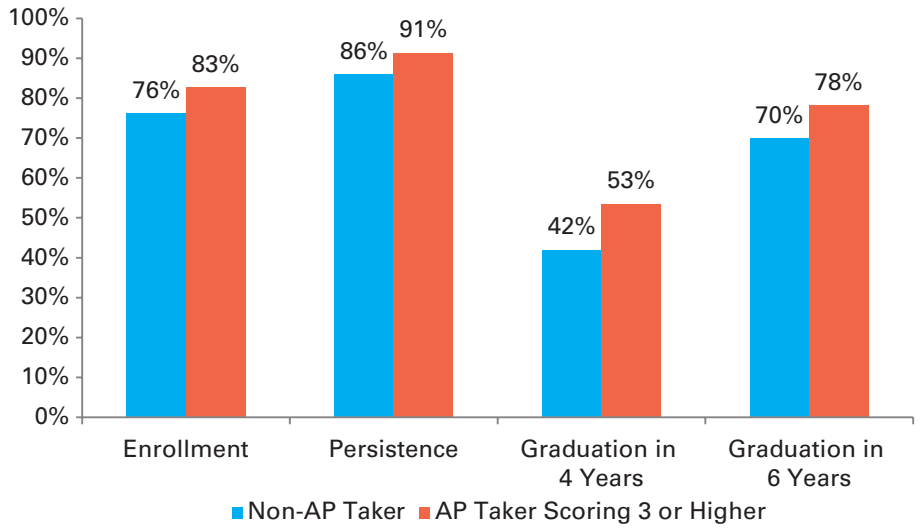
Estimated college outcomes for math AP examinees scoring 1 or 2 and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A9. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.45 and 1465 for the enrollment model and 3.55 and 1521 for the persistence and graduation models.

Figure 12.

Estimated college outcomes for math AP examinees scoring 3 or higher and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A10. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.64 and 1677 for the enrollment model and 3.70 and 1724 for the persistence and graduation models.

Science Sample

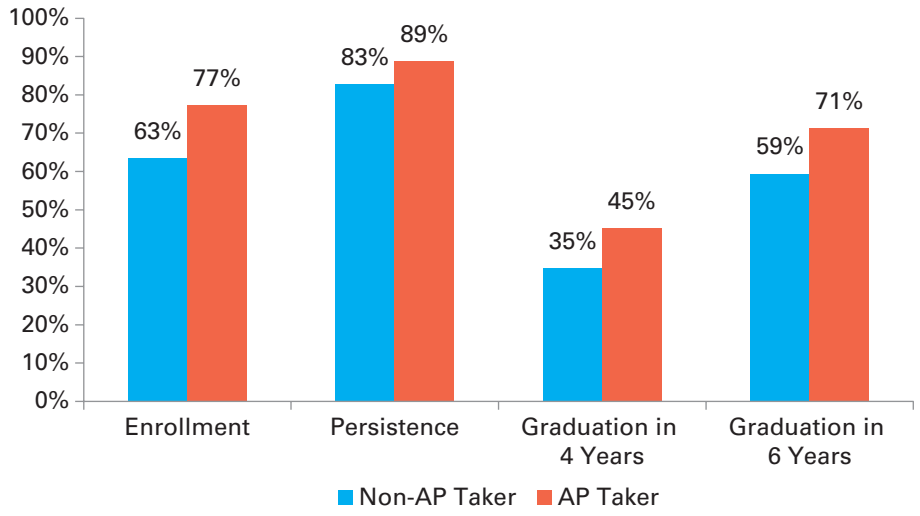
Figure 13 shows the enrollment, persistence, and graduation rates for the matched sample of science AP Exam takers and students not taking a science AP Exam. The AP Exam takers had a higher four-year enrollment rate (14 percentage points), higher rate of persisting to second year (6 percentage points), higher four-year graduation rate (10 percentage points), and higher six-year graduation rate (12 percentage points).

Figure 14 displays the same information for AP examinees scoring 1 or 2 and the non-AP Exam takers to whom they were matched. The AP examinees had a higher four-year enrollment rate (12 percentage points), higher rate of persisting to second year (4 percentage points), higher four-year graduation rate (6 percentage points), and higher six-year graduation rate (9 percentage points).

Figure 15 displays the differences in four-year college enrollment, persistence, and graduation for those students who took a science AP Exam and scored 3 or higher and the non-AP Exam takers who were matched to them. The AP examinees had a higher four-year enrollment rate (17 percentage points), higher rate of persisting to second year (8 percentage points), higher four-year graduation rate (18 percentage points), and higher six-year graduation rate (16 percentage points).

Figure 13.

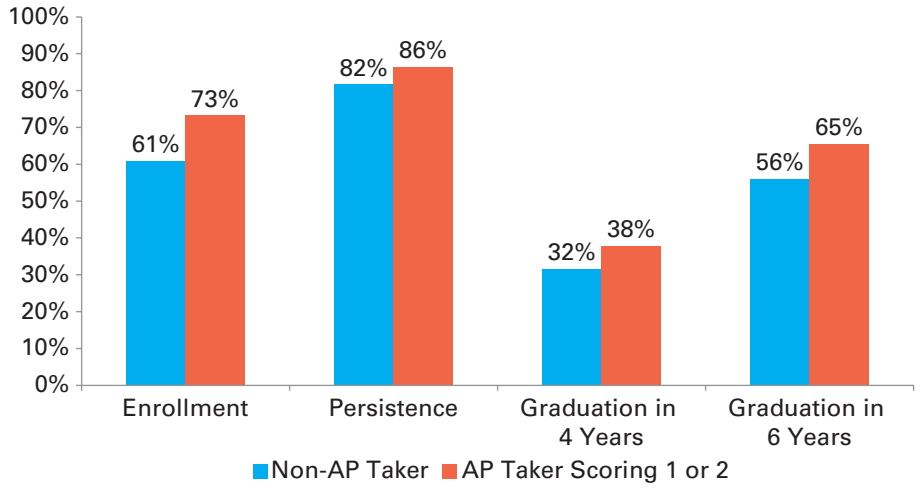
A comparison of all science AP examinees and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 14,166, and the number of students in the sample used to generate the percentage that persisted and graduated is 7,104.

Figure 14.

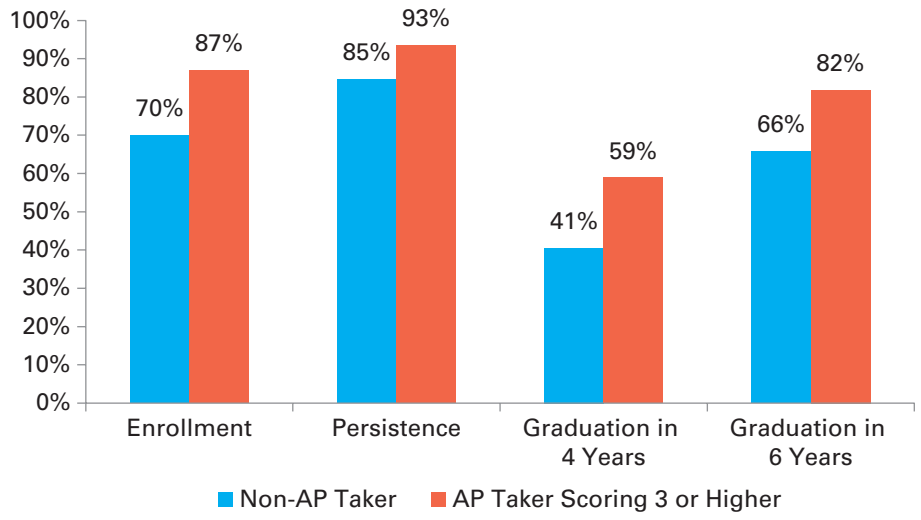
A comparison of science AP examinees scoring 1 or 2 and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 10,086, and the number of students in the sample used to generate the percentage that persisted and graduated is 4,608.

Figure 15.

A comparison of science AP examinees scoring 3 or higher and their matched non-AP counterparts.



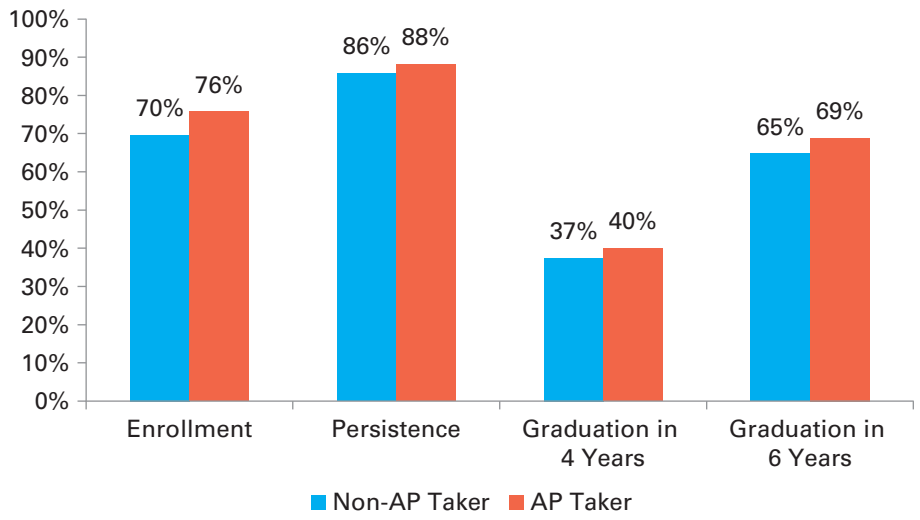
Note. The number of students in the enrollment sample was 4,080, and the number of students in the sample used to generate the percentage that persisted and graduated is 2,496.

The science analyses presented thus far have not isolated the relationship between AP Exam taking and college outcomes as the science AP Exam takers may have taken AP Exams in other subjects. A series of logistic regressions was conducted on the science sample. The results from all three models are presented in Table A11 and estimates of four-year enrollment, persistence, and graduation rates based on parameters from the third model are presented in Figure 16.

Figure 16 indicates that for science AP Exam takers, the estimated four-year enrollment rates are higher (6 percentage points), persistence to second-year rates are slightly higher (2 percentage points), and four- and six-year graduation rates are higher (3 percentage points and 4 percentage points, respectively) compared to non-AP Exam takers.

Figure 16.

Estimated college outcomes for science AP examinees and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.

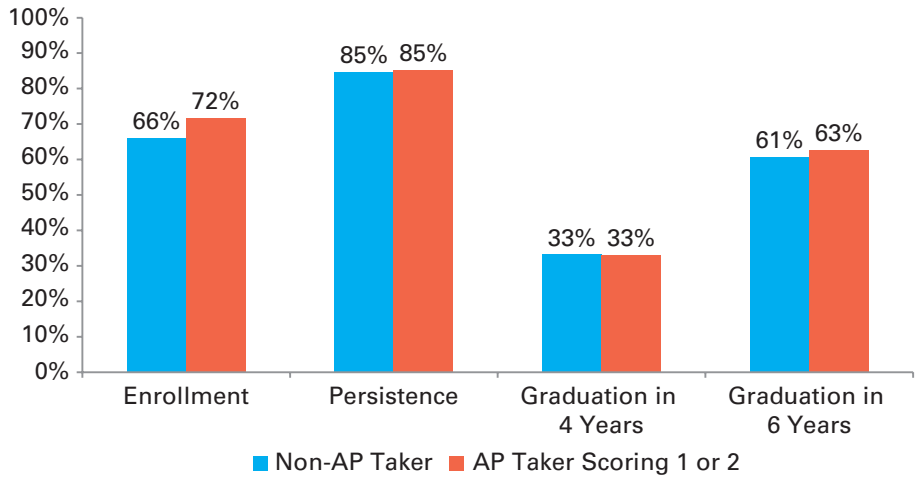


Note. Model Parameters are in Table A11. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.49 and 1516 for the enrollment model and 3.59 and 1586 for the persistence and graduation models.

The same model-based approach used to create Figure 16 was also used for just those students averaging a 1 or 2 on the science AP exam(s) and their non-AP counterparts to whom they were matched. These results are presented in Figure 17 and in Table A12. Figure 17 indicates that the estimated four-year enrollment rate is higher for science AP Exam takers who scored less than 3 (6 percentage points), the persistence rate is the same, four-year graduation rate is the same, and the six-year graduation rate is slightly higher (2 percentage points). Figure 18 and Table A13 show the same information for students who average 3 or higher on the science AP Exam(s). As compared to non-AP students, the estimated four-year enrollment rate is higher (7 percentage points), the persistence rate is higher (6 percentage points), and the four- and six-year graduation rates are higher (8 percentage points and 9 percentage points, respectively).

Figure 17.

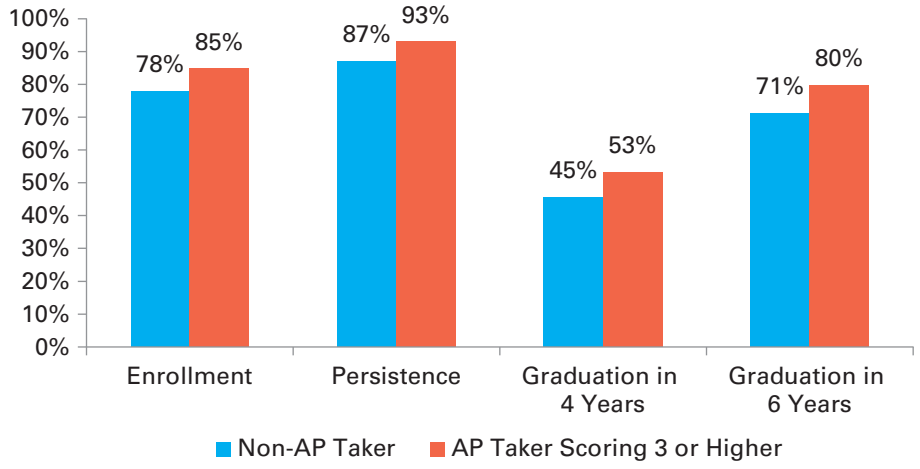
Estimated college outcomes for science AP examinees scoring 1 or 2 and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A12. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.42 and 1439 for the enrollment model and 3.52 and 1501 for the persistence and graduation models.

Figure 18.

Estimated college outcomes for science AP examinees scoring 3 or higher and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



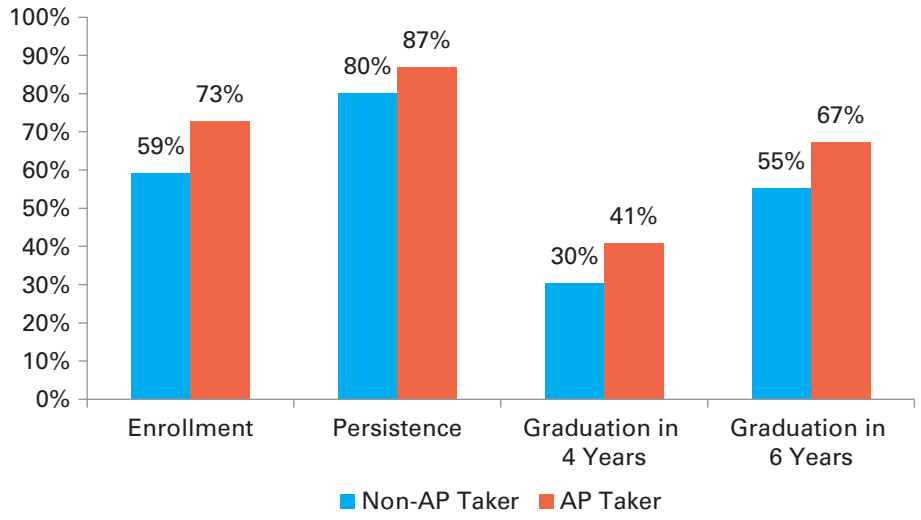
Note. Model Parameters are in Table A13. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.67 and 1707 for the enrollment model and 3.73 and 1743 for the persistence and graduation models.

Social Science/History Sample

Figure 19 shows the enrollment, persistence, and graduation rates for the matched sample of social science/history AP Exam takers and students not taking an AP Exam in social science or history. The AP Exam takers had a higher four-year enrollment rate (14 percentage points), higher rate of persisting to second year (7 percentage points), higher four-year graduation rate (11 percentage points), and higher six-year graduation rate (12 percentage points).

Figure 19.

A comparison of all social science/history AP examinees and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 25,634, and the number of students in the sample used to generate the percentage that persisted and graduated is 11,450.

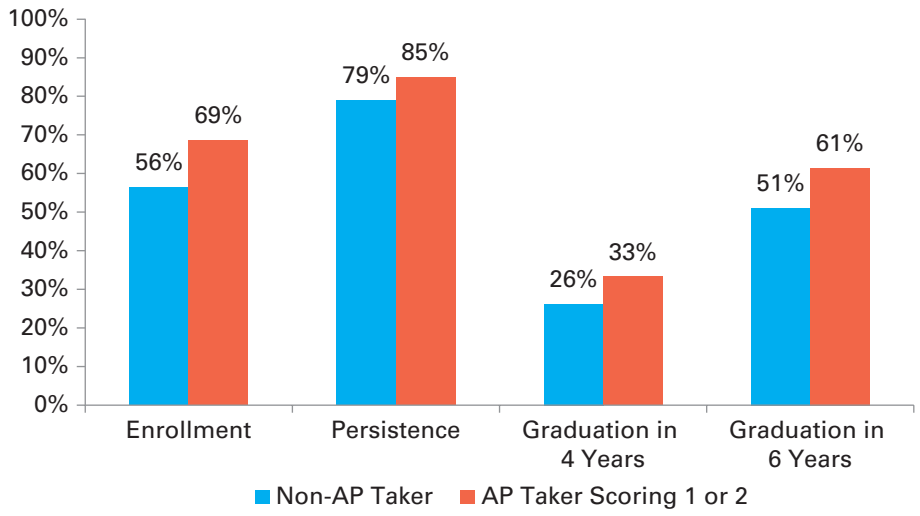
Figure 20 displays the same information for AP examinees scoring 1 or 2 and the non-AP Exam takers to whom they were matched. The AP examinees had a higher four-year enrollment rate (13 percentage points), higher rate of persisting to second year (6 percentage points), higher four-year graduation rate (7 percentage points), and higher six-year graduation rate (10 percentage points).

Figure 21 displays the differences in four-year college enrollment rates, persistence, and graduation for those students who took a social science/history AP Exam and scored 3 or higher and those non-AP Exam takers who were matched to them. The AP examinees had a higher four-year enrollment rate (18 percentage points), higher rate of persisting to second year (8 percentage points), higher four-year graduation rate (17 percentage points), and higher six-year graduation rate (16 percentage points).

The social science/history analyses presented thus far have not isolated the relationship between social science/history AP Exam taking and college outcomes as the social science/history AP Exam takers may have taken an exam in another subject. A series of logistic regressions was conducted on this sample to account for participation in AP Exams in other subjects. These results are presented in Table A14 and estimates of four-year enrollment, persistence, and graduation rates based on parameters from the third model are presented in Figure 22.

Figure 20.

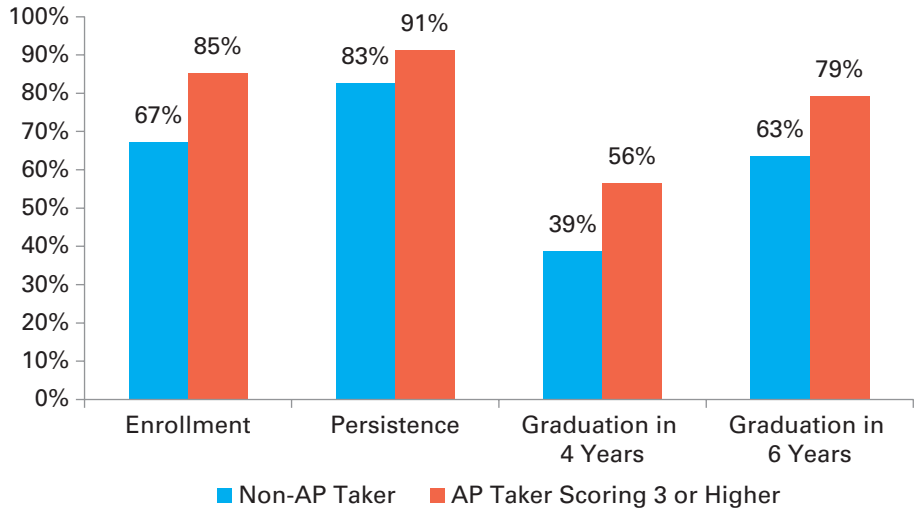
A comparison of social science/history AP examinees scoring 1 or 2 and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 19,086, and the number of students in the sample used to generate the percentage that persisted and graduated is 7,642.

Figure 21.

A comparison of social science/history AP examinees scoring 3 or higher and their matched non-AP counterparts.

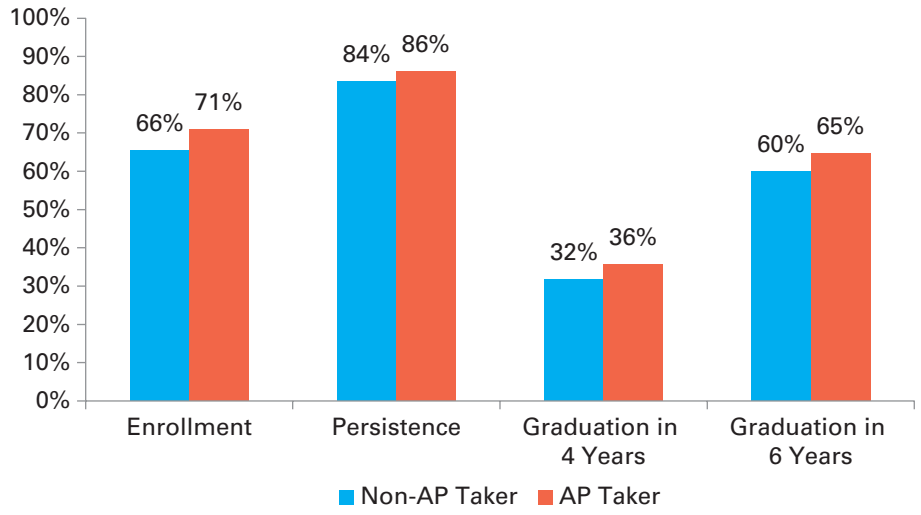


Note. The number of students in the enrollment sample was 6,548, and the number of students in the sample used to generate the percentage that persisted and graduated is 3,808.

Figure 22 indicates that the estimated four-year enrollment rate is higher for social science/history AP Exam takers (5 percentage points), the persistence rate is slightly higher (2 percentage points), and four- and six-year graduation rates are higher (4 percentage points and 5 percentage points, respectively).

Figure 22.

Estimated college outcomes for social science/history AP examinees and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.

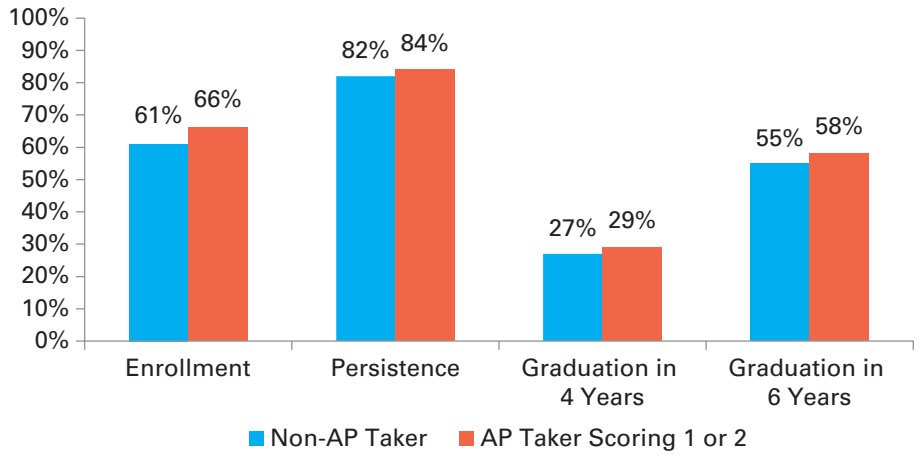


Note. Model Parameters are in Table A14. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.40 and 1466 for the enrollment model and 3.53 and 1547 for the persistence and graduation models.

The same model-based approach used to create Figure 22 was also used for just those students averaging a 1 or 2 on the social science/history AP Exam(s) and their non-AP counterparts to whom they were matched. These results are presented in Figure 23 and in Table A15. Figure 23 indicates that the estimated four-year enrollment rate is higher for social science/history AP Exam takers who scored less than 3 (5 percentage points), persistence rate is slightly higher (2 percentage points), four-year graduation rate is slightly higher (2 percentage points), and six-year graduation rate is higher (3 percentage points). Figure 24 and Table A16 show the same information for students who average 3 or higher on the social science/history AP Exam(s). As compared to non-AP Exam takers, the estimated four-year enrollment rate is higher (7 percentage points), the persistence rate is slightly higher (3 percentage points), and the four- and six-year graduation rates are higher (7 percentage points and 8 percentage points, respectively).

Figure 23.

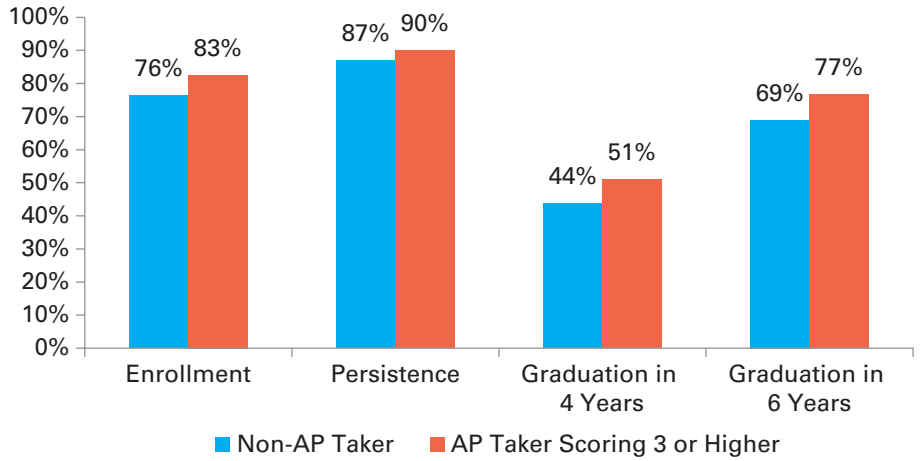
Estimated college outcomes for social science/history AP examinees scoring 1 or 2 and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A15. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.32 and 1393 for the enrollment model and 3.45 and 1457 for the persistence and graduation models.

Figure 24.

Estimated college outcomes for social science/history AP examinees scoring 3 or higher and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



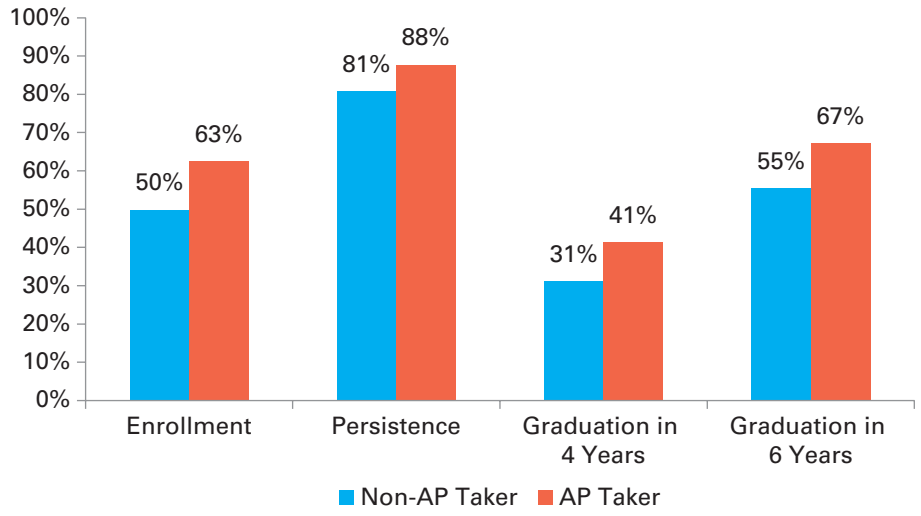
Note. Model Parameters are in Table A16. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.61 and 1679 for the enrollment model and 3.68and 1729 for the persistence and graduation models.

World Languages Sample

Figure 25 shows the enrollment, persistence, and graduation rates for the matched sample of AP Exam takers and students not taking an AP Exam in world languages. The AP Exam takers had a higher four-year enrollment rate (13 percentage points), higher rate of persisting to second year (7 percentage points), higher four-year graduation rate (10 percentage points), and higher six-year graduation rate (12 percentage points).

Figure 25.

A comparison of all world languages AP examinees and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 13,468, and the number of students in the sample used to generate the percentage that persisted and graduated is 4,578.

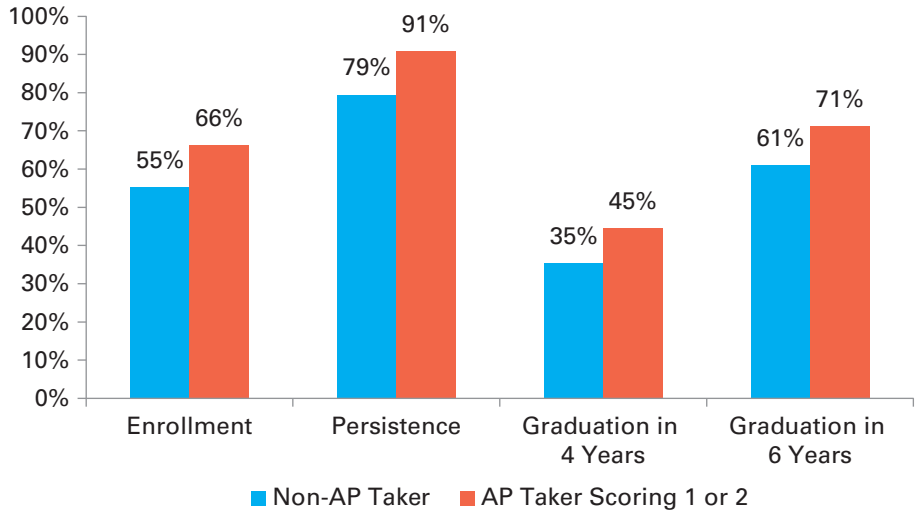
Figure 26 displays the same information for AP examinees scoring 1 or 2 and the non-AP Exam takers to whom they were matched. The AP Exam takers had a higher four-year enrollment rate (11 percentage points), higher rate of persisting to second year (12 percentage points), higher four-year graduation rate (10 percentage points), and higher six-year graduation rate (10 percentage points).

Figure 27 displays the differences in four-year college enrollment rates, persistence, and graduation for students who took a world languages AP Exam and scored 3 or higher and those non-AP Exam takers who were matched to them. The AP Exam takers had a higher four-year enrollment rate (14 percentage points), higher rate of persisting to second year (6 percentage points), higher four-year graduation rate (10 percentage points), and higher six-year graduation rate (12 percentage points).

The analyses presented thus far have not isolated the relationship between world languages AP Exam taking and college outcomes as the world languages AP Exam takers may be more likely to take AP Exams in other subjects. A series of logistic regressions was conducted on this sample. The results from all three models are presented in Table A17 and estimates of four-year enrollment, persistence, and graduation rates based on parameters from the third model are presented in Figure 28.

Figure 26.

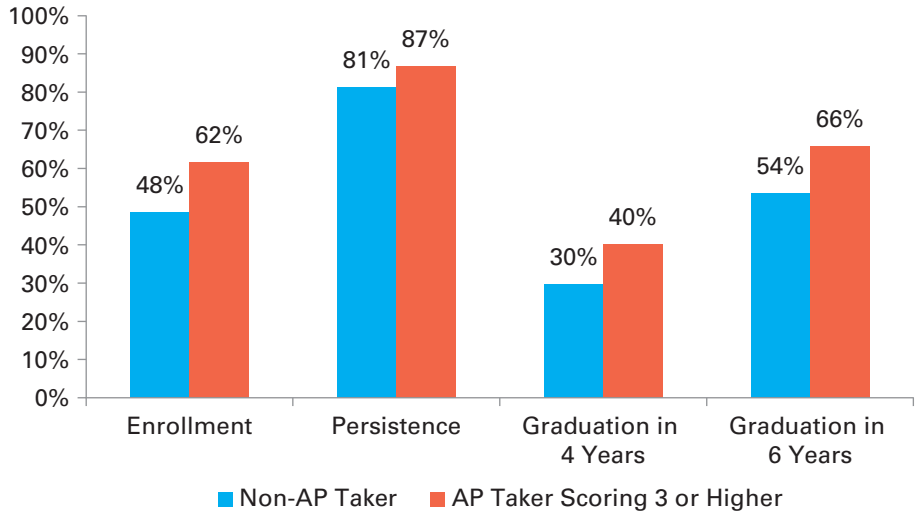
A comparison of world languages AP examinees scoring 1 or 2 and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 2,684, and the number of students in the sample used to generate the percentage that persisted and graduated is 1,112.

Figure 27.

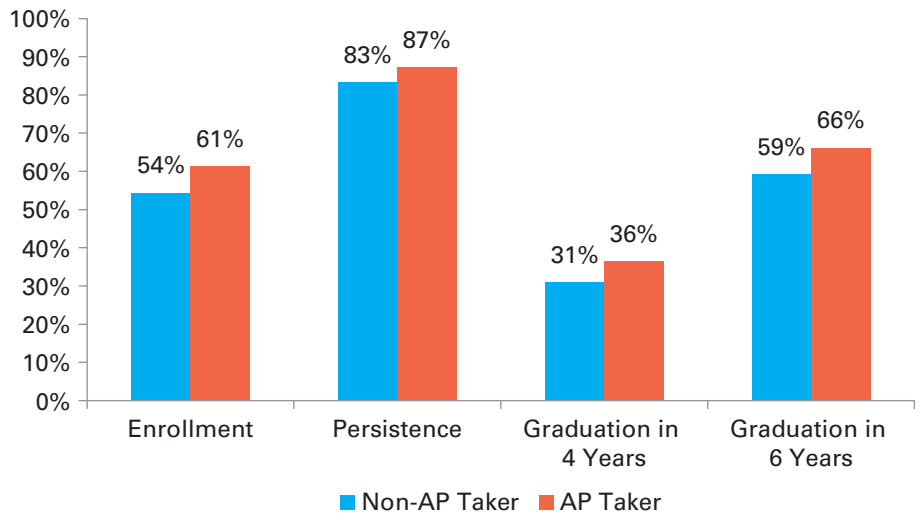
A comparison of world languages AP examinees scoring 3 or higher and their matched non-AP counterparts.



Note. The number of students in the enrollment sample was 10,784, and the number of students in the sample used to generate the percentage that persisted and graduated is 3,466.

Figure 28.

Estimated college outcomes for world languages AP examinees and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



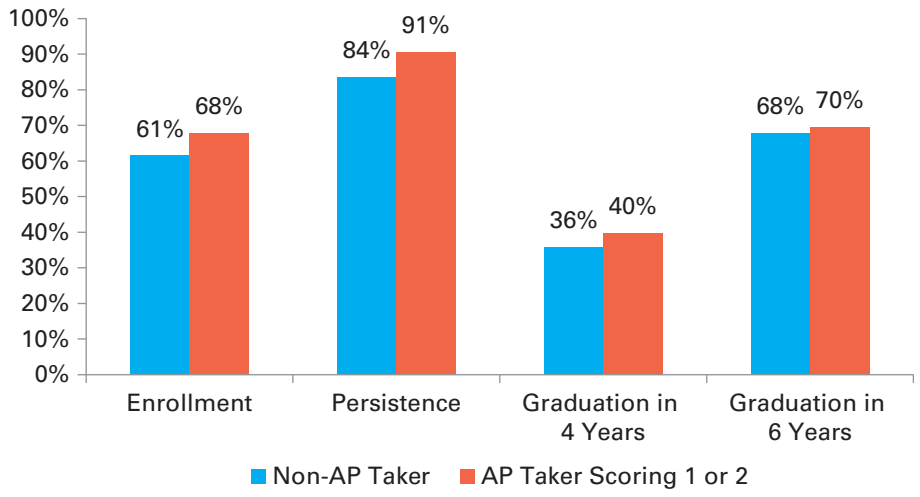
Note. Model Parameters are in Table A17. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.32 and 1382 for the enrollment model and 3.53 and 1534 for the persistence and graduation models.

Figure 28 indicates that for world languages AP Exam takers, the estimated four-year enrollment rates are higher (7 percentage points), slightly higher for persistence (4 percentage points), and higher four- and six-year graduation rates (5 percentage points and 7 percentage points, respectively) than for non-AP Exam takers.

The same model-based approach used to create Figure 28 was also use for just those students averaging a 1 or 2 on the world languages AP exam(s) and their non-AP counterparts to whom they were matched. These results are presented in Figure 29 and in Table A18. Figure 29 indicates that the estimated four-year enrollment rate is higher for world languages AP Exam takers who scored less than 3 (7 percentage points), the persistence rate is higher (7 percentage points), the four-year graduation rate is higher (4 percentage points), and the six-year graduation rate is slightly higher (2 percentage points). Figure 30 and Table A19 show the same information for students who average 3 or higher on the world languages AP Exam(s). As compared to non-AP Exam takers, the estimated four-year enrollment rate is higher (7 percentage points), the persistence rate is slightly higher (2 percentage points), the four-year graduation rate is higher (5 percentage points), and the six-year graduation rate is higher (8 percentage points).

Figure 29.

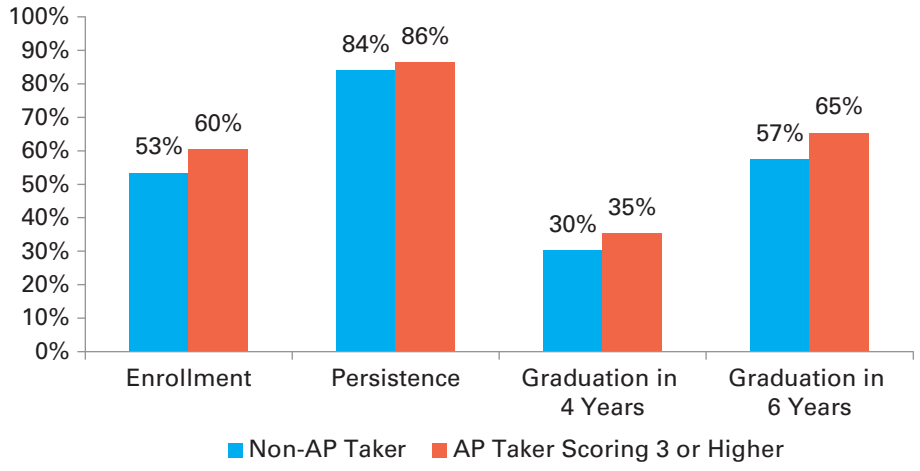
Estimated college outcomes for world languages AP examinees scoring 1 or 2 and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A18. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.33 and 1386 for the enrollment model and 3.54 and 1551 for the persistence and graduation models.

Figure 30.

Estimated college outcomes for world languages AP examinees scoring 3 or higher and their matched non-AP counterparts: Accounting for other AP participation, SAT score, and HSGPA.



Note. Model Parameters are in Table A19. Mean HSGPA and SAT scores were used to produce this estimate. The mean HSGPA and SAT scores were 3.32 and 1381 for the enrollment model and 3.53 and 1528 for the persistence and graduation models.

Discussion

The first three graphs for each discipline area represent the mean differences in the four college outcome variables, comparing AP Exam takers to their matched non-AP counterparts in each discipline area. These results indicate that students who take AP Exams tend to enroll in four-year institutions of higher education, persist to their second year at that institution, and then graduate (both within four years and/or six years) with a bachelor's degree more often than similar non-AP Exam takers with respect to gender, race/ethnicity, parental education level, and PSAT/NMSQT scores. When taking a closer look at AP average performance, breaking students down into two groups of scores of 2 or lower and 3 or higher, these same findings generally hold, with differences in observed outcomes greater for students scoring a 3 or higher, on average, in the discipline as compared to their non-AP matches.

The second three figures for each discipline represent the percentage of students enrolling, persisting, and graduating in each group, AP and matched non-AP, after controlling for participation in additional AP disciplines, SAT score, and HSGPA. These results indicate that, again, students who take an AP Exam tend to enroll, persist, and graduate at a greater rate than their matched non-AP counterparts. It should be noted that when control variables are added even after groups are matched, most of the percentage differences in postsecondary outcomes are statically different. However, a vast majority of the percentage differences that are statistically different are less than five percentage points, indicating that the large sample sizes used are picking up relatively small effects. Whether these small differences are practically meaningful is open to discussion. These results are consistent with previous research showing that AP examinees tend to have greater college outcomes than non-AP taking students.

One college outcome that has notably consistent differences between the two groups is enrollment in a four-year institution. Across all disciplines, even after accounting for additional AP participation, SAT scores, and HSGPA, AP examinees enroll in four-year colleges at a greater rate than their matched non-AP counterparts. These results hold for both AP examinees scoring 1 or 2 and examinees scoring a 3 or higher, with higher performing students tending to outperform their non-AP counterparts to a slightly larger degree. One discipline where differences are small or negligible after accounting for participation in other AP disciplines, SAT scores, and HSGPA is English. While English AP examinees still enroll in four-year institutions at a greater rate than their non-AP counterparts, the differences in persistence and graduation are negligible. AP English Language and English Literature exams generally have high participation rates, and these results may reflect a larger spread of student ability, different course enrollment culture, or other differences. Results from the other disciplines suggest a consistent positive relationship between AP participation and enrollment, persistence, and graduation within both four and six years above and beyond the effect of participation in other AP disciplines.

There are a few limitations of this study that are worth noting here. In the process of matching students, one issue is that two students may have been matched using different grade level PSAT/NMSQT scores. For example, an AP-taking student with a junior-year PSAT/NMSQT score may have been matched to a very similar non-AP student who took the PSAT/NMSQT in his sophomore year. More often than not, students matched were done so using the same grade level scores. Some additional exploration into this concern was conducted for each discipline and no patterns, such as systematic matching of one grade level for AP examinees to a different grade level for non-AP examinees, were detected. It should also be noted that students were matched on observable or measureable traits in an effort to

create balanced samples and remove some selection bias from analyses. However, there are unobserved traits, such as grit, motivation, and confidence that may play a role in students' likelihood of participating in AP. These traits were not measured nor included in the match, and this matching approach does not replace a randomized control trial, where causal inferences are better made.

Additional limitations in this study include sample limitations. Only SAT takers with at least one PSAT/NMSQT score in either their sophomore or junior year of high school, who attended institutions participating in NSC, are included in the study. While these samples are fairly large, they are not all-inclusive of all high school students in the United States. Similarly, persistence and graduation were only measured for students who had a record of enrollment in a four-year institution. Students who only attended a two-year institution or delayed college enrollment were not included in this study.

There are several possibilities for future research regarding the relationship between AP Exam participation and performance and subsequent college outcomes for this population of low-income students. Additional research could further explore various combinations of AP Exam disciplines or specific exams of interest. Model-based results may also benefit from including school-level effects, at both the secondary and postsecondary level. It is also worth noting that several AP Exams are undergoing a redesign, and it would be informative to explore any changes in the relationship between these exams and college outcomes.

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Table A1.

Pre- and Post-Match Characteristics for the Math Sample

Variable	Category	AP		Non-AP	
		Pre-Match	Post-Match	Pre-Match	Post-Match
Gender	Female	57.9	59.5	64.2	59.5
	Male	42.1	40.5	35.8	40.5
Ethnicity	Asian/White	47.4	47.0	39.4	47.0
	Black	13.2	13.6	28.6	13.6
	Hispanic	35.2	35.9	26.8	35.9
	Other	4.2	3.4	5.2	3.4
Parental Education	No HS Diploma	27.1	26.6	16.5	26.6
	HS Diploma	44.3	46.7	53.3	46.7
	Associate	6.8	6.3	8.8	6.3
	Bachelor's	14.1	13.7	14.5	13.7
	Graduate	7.7	6.7	6.9	6.7
Household Income	Up to $10K	19.8	19.6	21.0	17.6
	$10K to $20K	50.9	50.9	42.2	45.7
	$20K to $30K	29.3	29.4	36.9	36.7
Mean Scores	PSAT/NMSQT	147.0	144.0	127.0	143.9
	SAT	1602	1575	1331	1495
	HSGPA	3.69	3.67	3.16	3.36

Table A2.

Pre- and Post-Match Characteristics for the Science Sample

Variable	Category	AP		Non-AP	
		Pre-Match	Post-Match	Pre-Match	Post-Match
Gender	Female	60.5	61.8	63.7	61.8
	Male	39.5	38.2	36.3	38.2
Ethnicity	Asian/White	46.1	45.9	39.7	45.9
	Black	14.8	14.9	28.3	14.9
	Hispanic	34.2	35.3	26.9	35.3
	Other	4.9	3.9	5.1	3.9
Parental Education	No HS Diploma	26.2	26.3	16.6	26.3
	HS Diploma	44.5	46.1	53.2	46.1
	Associate	7.2	6.6	8.8	6.6
	Bachelor's	14.2	13.9	14.6	13.9
	Graduate	8.0	7.0	6.9	7.0
Household Income	Up to $10K	20.4	20.4	20.9	18.3
	$10K to $20K	50.6	50.3	42.3	45.8
	$20K to $30K	29.0	29.3	36.8	36.0
Mean Scores	PSAT/NMSQT	144.6	142.1	127.6	142.0
	SAT	1576	1552	1337	1480
	HSGPA	3.63	3.61	3.17	3.36

Table A3.

Pre- and Post-Match Characteristics for the Social Science/History Sample

Variable	Category	AP		Non-AP	
		Pre-Match	Post-Match	Pre-Match	Post-Match
Gender	Female	64.5	65.8	62.8	65.8
	Male	35.5	34.2	37.2	34.2
Ethnicity	Asian/White	36.8	37.3	40.0	37.3
	Black	17.4	17.6	29.5	17.6
	Hispanic	41.0	41.2	25.5	41.2
	Other	4.7	3.8	5.0	3.8
Parental Education	No HS Diploma	26.1	25.9	16.4	25.9
	HS Diploma	46.2	48.1	53.9	48.1
	Associate	7.3	6.9	8.8	6.9
	Bachelor's	13.6	13.2	14.2	13.2
	Graduate	6.9	6.0	6.7	6.0
Household Income	Up to $10K	20.1	20.3	21.4	19.2
	$10K to $20K	49.4	49.4	41.6	44.3
	$20K to $30K	30.5	30.4	37.0	36.5
Mean Scores	PSAT/NMSQT	141.2	138.6	125.8	138.5
	SAT	1524	1500	1314	1433
	HSGPA	3.53	3.51	3.13	3.28

Table A4.

Pre- and Post-Match Characteristics for the World Languages Sample

Variable	Category	AP		Non-AP	
		Pre-Match	Post-Match	Pre-Match	Post-Match
Gender	Female	67.8	68.6	62.6	68.6
	Male	32.2	31.4	37.4	31.4
Ethnicity	Asian/White	11.1	11.0	44.7	11.0
	Black	3.4	3.1	28.7	3.1
	Hispanic	83.8	84.5	21.2	84.5
	Other	1.6	1.4	5.4	1.4
Parental Education	No HS Diploma	44.0	44.7	14.8	44.7
	HS Diploma	36.3	37.1	53.4	37.1
	Associate	4.2	3.8	9.0	3.8
	Bachelor's	8.8	8.5	15.5	8.5
	Graduate	6.6	6.0	7.3	6.0
Household Income	Up to $10K	20.8	20.8	20.6	21.4
	$10K to $20K	49.8	50.0	42.6	45.3
	$20K to $30K	29.4	29.2	36.8	33.3
Mean Scores	PSAT/NMSQT	132.4	130.8	129.9	130.7
	SAT	1418	1401	1367	1362
	HSGPA	3.43	3.41	3.21	3.23

Table A5.

Model Parameters for Four-Year College Outcomes: English AP and Non-English AP Takers

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.5126**	-4.4842**	-4.3164**
HSGPA	.6650**	.5985**	.5758**
SAT Composite	.00206**	.00204**	.00193**
English		.4548**	.3379**
One Other AP Area			.1851**
Two Other AP Areas			.2103**
Three Other AP Areas			.3738**
Four Other AP Areas			.3558**
AIC	27,224	26,995	26,953
Change in AIC		-229	-42
Classification Accuracy	69.5%	70.1%	70.2%
Persistence to Second Year			
Intercept	-1.5763**	-1.5313**	-1.0562**
HSGPA	.5441**	.5058**	.4472**
SAT Composite	.000864**	.000846**	.000535**
English		.2467**	-.0421
One Other AP Area			.3657**
Two Other AP Areas			.6608**
Three Other AP Areas			.9743**
Four Other AP Areas			.5436**
AIC	9,234	9,214	9,120
Change in AIC		-20	-94
Classification Accuracy	83.5%	83.5%	83.5%
Four-Year College Graduation			
Intercept	-6.6102**	-6.5774**	-6.3476**
HSGPA	.8322**	.8018**	.7725**
SAT Composite	.00194**	.00193**	.00176**
English		.1886**	.0256
One Other AP Area			.2613**
Two Other AP Areas			.3301**
Three Other AP Areas			.4796**
Four Other AP Areas			.4516**
AIC	12,598	12,581	12,543
Change in AIC		-17	-38
Classification Accuracy	68.5%	68.4%	68.2%
Six-Year College Graduation			
Intercept	-4.6974**	-4.6603**	-4.4021**
HSGPA	.7915**	.7502**	.7152**
SAT Composite	.00155**	.00153**	.00133**
English		.2728**	.0663
One Other AP Area			.3623**
Two Other AP Areas			.4814**
Three Other AP Areas			.5465**
Four Other AP Areas			.5318**
AIC	13,140	13,101	13,028
Change in AIC		-39	-73
Classification Accuracy	65.8%	65.8%	66.4%

Note. *N* = 23,416 for enrollment and 10,608 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A6.

Model Parameters for Four-Year College Outcomes: English AP Takers Scoring Less than 3 and Their Counterparts Who Did Not Take AP English

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.4156**	-4.3930**	-4.2698**
HSGPA	.6479**	.5898**	.5724**
SAT Composite	.00203**	.00201**	.00192**
English		.4050**	.3202**
One Other AP Area			.1696**
Two Other AP Areas			.1437**
Three Other AP Areas			.2742**
Four Other AP Areas			.2948*
AIC	20,981	20,838	20,822
Change in AIC		-143	-16
Classification Accuracy	66.1%	66.9%	66.9%
Persistence to Second Year			
Intercept	-1.0995**	-1.0846**	-.5757*
HSGPA	.4397**	.4207**	.3568**
SAT Composite	.000778**	.000770**	.000433*
English		.1259	-.1407
One Other AP Area			.3737**
Two Other AP Areas			.7471**
Three Other AP Areas			.8913**
Four Other AP Areas			.4178
AIC	6,267	6,265	6,200
Change in AIC		-2	-65
Classification Accuracy	81.7%	81.7%	81.7%
Four-Year College Graduation			
Intercept	-6.1006**	-6.0969**	-5.8723**
HSGPA	.8126**	.8015**	.7712**
SAT Composite	.00162**	.00162**	.00144**
English		.0715	-.0734
One Other AP Area			.3266**
Two Other AP Areas			.3156**
Three Other AP Areas			.4168**
Four Other AP Areas			.4699**
AIC	7,592	7,593	7,573
Change in AIC		1	-20
Classification Accuracy	71.5%	71.5%	71.4%
Six-Year College Graduation			
Intercept	-4.5071**	-4.4962**	-4.2488**
HSGPA	.7260**	.7005**	.6646**
SAT Composite	.00158**	.00157**	.00135**
English		.1737**	-.0253
One Other AP Area			.4520**
Two Other AP Areas			.5057**
Three Other AP Areas			.4726**
Four Other AP Areas			.4852**
AIC	8,684	8,675	8,620
Change in AIC		-9	-55
Classification Accuracy	62.5%	62.3%	63.4%

Note. *N* = 16,972 for enrollment and 6,698 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A7.

Model Parameters for Four-Year College Outcomes: English AP Takers Scoring 3 or Higher and Their Counterparts Who Did Not Take AP English

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.0326**	-4.3985**	-4.1173**
HSGPA	.7273**	.6246**	.5918**
SAT Composite	.00223**	.00190**	.00171**
English		.6684**	.4172**
One Other AP Area			.2608**
Two Other AP Areas			.4564**
Three Other AP Areas			.6505**
Four Other AP Areas			.5127**
AIC	6,245	6,151	6,125
Change in AIC		-94	-26
Classification Accuracy	78.7%	78.8%	78.9%
Persistence to Second Year			
Intercept	-2.8868**	-2.4068**	-1.9816**
HSGPA	.7937**	.7105**	.6672**
SAT Composite	.00111**	.000873**	.000583*
English		.5118**	.1844
One Other AP Area			.3870**
Two Other AP Areas			.5033**
Three Other AP Areas			1.0407**
Four Other AP Areas			.5916*
AIC	2,956	2,934	2,910
Change in AIC		-22	-24
Classification Accuracy	86.6%	86.6%	86.6%
Four-Year College Graduation			
Intercept	-6.8244**	-6.5188**	-6.2609**
HSGPA	.8647**	.7990**	.7739**
SAT Composite	.00203**	.00188**	.00170**
English		.3748**	.1700*
One Other AP Area			.1853
Two Other AP Areas			.3677**
Three Other AP Areas			.5566**
Four Other AP Areas			.4277*
AIC	5,001	4,974	4,958
Change in AIC		-27	-16
Classification Accuracy	63.7%	63.6%	64.0%
Six-Year College Graduation			
Intercept	-5.1848**	-4.7534**	-4.4418**
HSGPA	.9374**	.8585**	.8275**
SAT Composite	.00152**	.00131**	.00110**
English		.4896**	.2591**
One Other AP Area			.1823
Two Other AP Areas			.4262**
Three Other AP Areas			.6114**
Four Other AP Areas			.5242*
AIC	4,456	4,417	4,400
Change in AIC		-39	-17
Classification Accuracy	72.1%	72.3%	72.4%

Note. N = 6,444 for enrollment and 3,910 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A8.

Model Parameters for Four-Year College Outcomes: Math AP and Non-Math AP Takers

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.5075**	-4.3148**	-4.1342**
HSGPA	.6819**	.5725**	.5429**
SAT Composite	.00203**	.00198**	.00184**
Math		.5639**	.4135**
One Other AP Area			.2278**
Two Other AP Areas			.3177**
Three Other AP Areas			.4256**
Four Other AP Areas			.4046**
AIC	16,118	15,921	15,876
Change in AIC		-197	-45
Classification Accuracy	72.6%	73.1%	73.2%
Persistence to Second Year			
Intercept	-1.4846**	-1.2351**	-1.0572**
HSGPA	.5212**	.4133**	.3785**
SAT Composite	.00089**	.00081**	.00066**
Math		.5967**	.4321**
One Other AP Area			.3258**
Two Other AP Areas			.3129**
Three Other AP Areas			.5814**
Four Other AP Areas			.2911
AIC	6,073	6,002	5,980
Change in AIC		-71	-22
Classification Accuracy	85.2%	85.2%	85.2%
Four-Year College Graduation			
Intercept	-6.3519**	-6.2440**	-6.1295**
HSGPA	.7423**	.6910**	.6716**
SAT Composite	.00200**	.00196**	.00187**
Math		.2717**	.1716**
One Other AP Area			.0932
Two Other AP Areas			.2419**
Three Other AP Areas			.2816**
Four Other AP Areas			.2648*
AIC	9,188	9,162	9,155
Change in AIC		-26	-7
Classification Accuracy	65.4%	65.6%	65.8%
Six-Year College Graduation			
Intercept	-4.5939**	-4.4686**	-4.3432**
HSGPA	.7787**	.7179**	.6909**
SAT Composite	.00156**	.00151**	.00139**
Math		.3308**	.1874**
One Other AP Area			.2523**
Two Other AP Areas			.3363**
Three Other AP Areas			.4764**
Four Other AP Areas			.1981
AIC	8,935	8,897	8,869
Change in AIC		-38	-28
Classification Accuracy	68.5%	68.5%	68.7%

Note. *N* = 14,592 for enrollment and 7,430 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A9.

Model Parameters for Four-Year College Outcomes: Math AP Takers Scoring Less than 3 and Their Counterparts Who Did Not Take AP Math

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.4472**	-4.3068**	-4.1529**
HSGPA	.6583**	.5577**	.5322**
SAT Composite	.00206**	.00203**	.00191**
Math		.5332**	.4165**
One Other AP Area			.1954**
Two Other AP Areas			.2478**
Three Other AP Areas			.3417**
Four Other AP Areas			.3068*
AIC	11,331	11,204	11,188
Change in AIC		-127	-16
Classification Accuracy	70.2%	70.7%	70.9%
Persistence to Second Year			
Intercept	-1.0479**	-.8816**	-.6414
HSGPA	.4138**	.3164**	.2718**
SAT Composite	.000834**	.000785**	.000611**
Math		.5575**	.3782**
One Other AP Area			.2980**
Two Other AP Areas			.3894**
Three Other AP Areas			.5573**
Four Other AP Areas			.4470
AIC	4,022	3,980	3,968
Change in AIC		-42	-12
Classification Accuracy	83.9%	83.9%	83.9%
Four-Year College Graduation			
Intercept	-5.9212**	-5.8896**	-5.7417**
HSGPA	.6810**	.6579**	.6286**
SAT Composite	.00184**	.00183**	.00170**
Math		.1280	.00152
One Other AP Area			.1839
Two Other AP Areas			.2904**
Three Other AP Areas			.4124**
Four Other AP Areas			.2956
AIC	5,618	5,616	5,607
Change in AIC		-2	-9
Classification Accuracy	67.1%	66.9%	66.9%
Six-Year College Graduation			
Intercept	-4.4914**	-4.4306**	-4.2554**
HSGPA	.7639**	.7210**	.6870**
SAT Composite	.00150**	.00148**	.00133**
Math		.2440**	.0891
One Other AP Area			.2594**
Two Other AP Areas			.3321**
Three Other AP Areas			.5378**
Four Other AP Areas			.2722
AIC	5,829	5,817	5,797
Change in AIC		-12	-20
Classification Accuracy	65.7%	65.3%	65.8%

Note. *N* = 9,772 for enrollment and 4,634 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A10.

Model Parameters for Four-Year College Outcomes: Math AP Takers Scoring 3 or Higher and Their Counterparts Who Did Not Take AP Math

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.0987**	-4.5377**	-4.1867**
HSGPA	.7448**	.6143**	.5763**
SAT Composite	.00221**	.00199**	.00174**
Math		.6250**	.3988**
One Other AP Area			.3020**
Two Other AP Areas			.4912**
Three Other AP Areas			.6302**
Four Other AP Areas			.6280**
AIC	4,783	4,721	4,695
Change in AIC		-62	-26
Classification Accuracy	77.3%	77.8%	77.8%
Persistence to Second Year			
Intercept	-2.2658**	-1.6275**	-1.4971**
HSGPA	.7581**	.6251**	.6061**
SAT Composite	.000858**	.000597*	.000452
Math		.6955**	.5448**
One Other AP Area			.4167*
Two Other AP Areas			.2072
Three Other AP Areas			.6650**
Four Other AP Areas			.0737
AIC	2,050	2,022	2,016
Change in AIC		-28	-6
Classification Accuracy	87.3%	87.3%	87.3%
Four-Year College Graduation			
Intercept	-6.6140**	-6.1615**	-6.0584**
HSGPA	.8493**	.7443**	.7360**
SAT Composite	.00196**	.00177**	.00170**
Math		.5195**	.4626**
One Other AP Area			-.0276
Two Other AP Areas			.2148
Three Other AP Areas			.0893
Four Other AP Areas			.2416
AIC	3,568	3,532	3,534
Change in AIC		-36	2
Classification Accuracy	63.0%	64.4%	64.4%
Six-Year College Graduation			
Intercept	-4.4129**	-3.9096**	-3.8102**
HSGPA	.8106**	.7013**	.6851**
SAT Composite	.00142**	.00121**	.00109**
Math		.5547**	.4341**
One Other AP Area			.2648*
Two Other AP Areas			.3990**
Three Other AP Areas			.3785*
Four Other AP Areas			.1043
AIC	3,107	3,074	3,070
Change in AIC		-33	-4
Classification Accuracy	73.6%	73.7%	73.8%

Note. *N* = 4,820 for enrollment and 2,796 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A11.

Model Parameters for Four-Year College Outcomes: Science AP and Non-Science AP Takers

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.3259**	-4.2707**	-4.0452**
HSGPA	.6294**	.5665**	.5311**
SAT Composite	.00204**	.00201**	.00186**
Science		.4431**	.3076**
One Other AP Area			.1798**
Two Other AP Areas			.2798**
Three Other AP Areas			.4420**
Four Other AP Areas			.3401**
AIC	15,726	15,604	15,565
Change in AIC		-122	-39
Classification Accuracy	72.2%	72.3%	72.7%
Persistence to Second Year			
Intercept	-1.4419**	-1.3509**	-1.0918**
HSGPA	.5883**	.5369**	.4918**
SAT Composite	.00075**	.00071**	.00055**
Science		.3413**	.1965*
One Other AP Area			.2178*
Two Other AP Areas			.2966**
Three Other AP Areas			.6386**
Four Other AP Areas			.0855
AIC	5,637	5,616	5,594
Change in AIC		-21	-22
Classification Accuracy	85.8%	85.8%	85.8%
Four-Year College Graduation			
Intercept	-6.4135**	-6.3675**	-6.2249**
HSGPA	.8388**	.8086**	.7837**
SAT Composite	.00185**	.00183**	.00173**
Science		.2001**	.1076
One Other AP Area			.1025
Two Other AP Areas			.2504**
Three Other AP Areas			.2951**
Four Other AP Areas			.1776
AIC	8,764	8,751	8,744
Change in AIC		-13	-7
Classification Accuracy	65.5%	65.8%	65.9%
Six-Year College Graduation			
Intercept	-4.5846**	-4.5202**	-4.3522**
HSGPA	.8128**	.7684**	.7373**
SAT Composite	.00149**	.00145**	.00133**
Science		.3014**	.1867**
One Other AP Area			.1729*
Two Other AP Areas			.3334**
Three Other AP Areas			.3748**
Four Other AP Areas			.1539
AIC	8,520	8,491	8,473
Change in AIC		-29	-18
Classification Accuracy	68.8%	68.6%	68.5%

Note. *N* = 14,166 for enrollment and 7,104 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A12.

Model Parameters for Four-Year College Outcomes: Science AP Takers Scoring Less Than 3 and Their Counterparts Who Did Not Take AP Science

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.2746**	-4.2403**	-4.0237**
HSGPA	.6065**	.5555**	.5260**
SAT Composite	.00208**	.00205**	.00190**
Science		.3745**	.2651**
One Other AP Area			.1294*
Two Other AP Areas			.2145**
Three Other AP Areas			.4107**
Four Other AP Areas			.2292
AIC	11,835	11,769	11,749
Change in AIC		-66	-20
Classification Accuracy	69.2%	69.7%	70.0%
Persistence to Second Year			
Intercept	-.9782**	-.9371**	-.5476
HSGPA	.5374**	.5059**	.4495**
SAT Composite	.000531**	.000509**	.000260
Science		.2154**	.0408
One Other AP Area			.2160
Two Other AP Areas			.3666**
Three Other AP Areas			.7408**
Four Other AP Areas			.2162
AIC	3,960	3,955	3,935
Change in AIC		-5	-20
Classification Accuracy	84.1%	84.1%	84.1%
Four-Year College Graduation			
Intercept	-6.1337**	-6.1258**	-5.9437**
HSGPA	.8160**	.8041**	.7787**
SAT Composite	.00171**	.00170**	.00157**
Science		.0839	-.00954
One Other AP Area			.1040
Two Other AP Areas			.2777**
Three Other AP Areas			.2603*
Four Other AP Areas			.2504
AIC	5,561	5,561	5,559
Change in AIC		0	-2
Classification Accuracy	67.4%	67.5%	67.5%
Six-Year College Graduation			
Intercept	-4.3942**	-4.3663**	-4.1400**
HSGPA	.7786**	.7484**	.7120**
SAT Composite	.00142**	.00140**	.00123**
Science		.2141**	.0875
One Other AP Area			.2288*
Two Other AP Areas			.3607**
Three Other AP Areas			.3945**
Four Other AP Areas			.2565
AIC	5,811	5,802	5,790
Change in AIC		-9	-12
Classification Accuracy	65.5%	65.2%	65.0%

Note. *N* = 10,086 for enrollment and 4,608 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A13.

Model Parameters for Four-Year College Outcomes: Science AP Takers Scoring 3 or Higher and Their Counterparts Who Did Not Take AP Science

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.0181**	-4.4518**	-4.1206**
HSGPA	.7183**	.6029**	.5436**
SAT Composite	.00224**	.00198**	.00177**
Science		.6670**	.4579**
One Other AP Area			.3565**
Two Other AP Areas			.4972**
Three Other AP Areas			.5342**
Four Other AP Areas			.6612**
AIC	3,890	3,832	3,817
Change in AIC		-58	-15
Classification Accuracy	79.1%	79.2%	79.6%
Persistence to Second Year			
Intercept	-2.0582**	-1.4055*	-1.3714*
HSGPA	.7320**	.6092**	.5891**
SAT Composite	.000864**	.000570	.000518
Science		.7313**	.6666**
One Other AP Area			.2456
Two Other AP Areas			.1812
Three Other AP Areas			.4056
Four Other AP Areas			-.2155
AIC	1,676	1,652	1,654
Change in AIC		-24	2
Classification Accuracy	89.0%	89.0%	89.0%
Four-Year College Graduation			
Intercept	-6.6541**	-6.2996**	-6.1455**
HSGPA	.8847**	.8096**	.7842**
SAT Composite	.00191**	.00175**	.00164**
Science		.4135**	.3107**
One Other AP Area			.1149
Two Other AP Areas			.2416
Three Other AP Areas			.3779**
Four Other AP Areas			.1013
AIC	3,206	3,186	3,186
Change in AIC		-20	0
Classification Accuracy	62.3%	63.2%	63.6%
Six-Year College Graduation			
Intercept	-4.4815**	-3.9890**	-3.8359**
HSGPA	.8932**	.7971**	.7730**
SAT Composite	.00130**	.00107**	.000965**
Science		.5626**	.4624**
One Other AP Area			.0588
Two Other AP Areas			.3078*
Three Other AP Areas			.3638*
Four Other AP Areas			-.0106
AIC	2,710	2,680	2,679
Change in AIC		-30	-1
Classification Accuracy	74.7%	74.9%	75.0%

Note. *N* = 4,080 for enrollment and 2,496 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A14.

Model Parameters for Four-Year College Outcomes: Social Science/History AP and Non-Social Science/History AP Takers

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.6324**	-4.6103**	-4.4126**
HSGPA	.6442**	.5948**	.5608**
SAT Composite	.00218**	.00215**	.00203**
Social Science/History		.4019**	.2483**
One Other AP Area			.2336**
Two Other AP Areas			.2966**
Three Other AP Areas			.4522**
Four Other AP Areas			.3968**
AIC	29,857	29,660	29,585
Change in AIC		-197	-75
Classification Accuracy	69.3%	70.0%	70.0%
Persistence to Second Year			
Intercept	-1.5677**	-1.5166**	-1.1856**
HSGPA	.5865**	.5461**	.4993**
SAT Composite	.00077**	.00071**	.00054**
Social Science/History		.3693**	.1907**
One Other AP Area			.1227
Two Other AP Areas			.3966**
Three Other AP Areas			.7257**
Four Other AP Areas			.1277
AIC	9,936	9,888	9,843
Change in AIC		-48	-45
Classification Accuracy	83.6%	83.6%	83.6%
Four-Year College Graduation			
Intercept	-6.5678**	-6.5461**	-6.3851**
HSGPA	.8347**	.8076**	.7842**
SAT Composite	.00191**	.00187**	.00178**
Social Science/ History		.2620**	.1730**
One Other AP Area			.1041
Two Other AP Areas			.1560*
Three Other AP Areas			.2753**
Four Other AP Areas			.2183
AIC	13,635	13,598	13,592
Change in AIC		-37	-6
Classification Accuracy	68.0%	68.0%	68.2%
Six-Year College Graduation			
Intercept	-4.6169**	-4.5933**	-4.3822**
HSGPA	.8363**	.8028**	.7692**
SAT Composite	.00140**	.00135**	.00123**
Social Science/History		.3367**	.1993**
One Other AP Area			.1648**
Two Other AP Areas			.3285**
Three Other AP Areas			.3749**
Four Other AP Areas			.2474
AIC	14,214	14,148	14,121
Change in AIC		-66	-27
Classification Accuracy	65.9%	65.9%	66.1%

Note. *N* = 25,634 for enrollment and 11,450 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A15.

Model Parameters for Four-Year College Outcomes: Social Science/History AP Takers Scoring Less Than 3 and Their Counterparts Who Did Not Take AP Social Science/History

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-4.5041**	-4.4863**	-4.3001**
HSGPA	.6251**	.5834**	.5541**
SAT Composite	.00214**	.00211**	.002**
Social Science/History		.3427**	.2135**
One Other AP Area			.1787**
Two Other AP Areas			.2468**
Three Other AP Areas			.4437**
Four Other AP Areas			.3497**
AIC	23,404	23,291	23,246
Change in AIC		-113	-45
Classification Accuracy	66.3%	67.1%	67.2%
Persistence to Second Year			
Intercept	-.9487**	-.9213**	-.5978*
HSGPA	.5223**	.4897**	.4446**
SAT Composite	.00047**	.00043**	.00026
Social Science/History		.3158**	.1562*
One Other AP Area			.0815
Two Other AP Areas			.3868**
Three Other AP Areas			.7095**
Four Other AP Areas			.0958
AIC	7,100	7,075	7,046
Change in AIC		-25	-29
Classification Accuracy	81.9%	81.9%	81.9%
Four-Year College Graduation			
Intercept	-6.2144**	-6.2192**	-6.0961**
HSGPA	.8229**	.8054**	.7874**
SAT Composite	.00167**	.00164**	.00157**
Social Science/History		.1902**	.1234*
One Other AP Area			.0856
Two Other AP Areas			.1198
Three Other AP Areas			.2297*
Four Other AP Areas			.1227
AIC	8,719	8,708	8,710
Change in AIC		-11	2
Classification Accuracy	71.0%	71.0%	71.2%
Six-Year College Graduation			
Intercept	-4.3401**	-4.3387**	-4.1153**
HSGPA	.819**	.7931**	.7587**
SAT Composite	.00122**	.00118**	.00105**
Social Science/History		.2871**	.1503**
One Other AP Area			.1555*
Two Other AP Areas			.3410**
Three Other AP Areas			.3704**
Four Other AP Areas			.2952
AIC	9,896	9,863	9,845
Change in AIC		-33	-18
Classification Accuracy	62.9%	63.0%	63.2%

Note. *N* = 19,086 for enrollment and 7,642 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A16.

Model Parameters for Four-Year College Outcomes: Social Science/History AP Takers Scoring 3 or Higher and Their Counterparts Who Did Not Take AP Social Science/History

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.7087**	-5.2557**	-5.0095**
HSGPA	.7255**	.6449**	.5962**
SAT Composite	.00263**	.00237**	.00222**
Social Science/History		.6070**	.3873**
One Other AP Area			.4717**
Two Other AP Areas			.4658**
Three Other AP Areas			.4580**
Four Other AP Areas			.4768*
AIC	6,437	6,354	6,322
Change in AIC		-83	-32
Classification Accuracy	78.5%	78.2%	78.3%
Persistence to Second Year			
Intercept	-3.0175**	-2.5822**	-2.2474**
HSGPA	.7869**	.7198**	.6703**
SAT Composite	.00123**	.000986**	.000802**
Social Science/History		.5048**	.2954*
One Other AP Area			.2678*
Two Other AP Areas			.4254**
Three Other AP Areas			.7277*
Four Other AP Areas			.0988
AIC	2,823	2,802	2,793
Change in AIC		-21	-9
Classification Accuracy	86.9%	86.9%	87.0%
Four-Year College Graduation			
Intercept	-6.4015**	-6.0865**	-5.8353**
HSGPA	.8625**	.8077**	.7732**
SAT Composite	.00180**	.00161**	.00148**
Social Science/History		.4249**	.2886**
One Other AP Area			.1681
Two Other AP Areas			.2433*
Three Other AP Areas			.3718**
Four Other AP Areas			.3562
AIC	4,909	4,874	4,872
Change in AIC		-35	-2
Classification Accuracy	62.5%	62.8%	62.9%
Six-Year College Graduation			
Intercept	-4.3873**	-3.9636**	-3.7627**
HSGPA	.8821**	.8158**	.7840**
SAT Composite	.00122**	.000975**	.000854**
Social Science/History		.5270**	.3874**
One Other AP Area			.2187*
Two Other AP Areas			.3190**
Three Other AP Areas			.3879**
Four Other AP Areas			.1747
AIC	4,311	4,267	4,264
Change in AIC		-44	-3
Classification Accuracy	72.7%	72.8%	72.4%

Note. *N* = 6,548 for enrollment and 3,808 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A17.

Model Parameters for Four-Year College Outcomes: World Languages AP and Non-World Languages AP Takers

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.3478**	-5.4511**	-4.8571**
HSGPA	.5250**	.4839**	.4221**
SAT Composite	.00283**	.00286**	.00245**
Language		.4211**	.2845**
One Other AP Area			.2879**
Two Other AP Areas			.3905**
Three Other AP Areas			.6412**
Four Other AP Areas			.7367**
AIC	16,185	16,065	15,957
Change in AIC		-120	-108
Classification Accuracy	67.0%	67.7%	68.0%
Persistence to Second Year			
Intercept	-1.3177**	-1.3856**	-.9280**
HSGPA	.4971**	.4617**	.3945**
SAT Composite	.00085**	.00084**	.00052**
Language		.4535**	.3061**
One Other AP Area			.3941**
Two Other AP Areas			.5442**
Three Other AP Areas			.5118**
Four Other AP Areas			.5741**
AIC	3,883	3,855	3,838
Change in AIC		-28	-17
Classification Accuracy	84.2%	84.2%	84.2%
Four-Year College Graduation			
Intercept	-6.9414**	-6.9989**	-6.9125**
HSGPA	.8188**	.7910**	.7583**
SAT Composite	.00221**	.00220**	.00208**
Language		.3198**	.2403**
One Other AP Area			.3971**
Two Other AP Areas			.3522**
Three Other AP Areas			.3647**
Four Other AP Areas			.2766*
AIC	5,334	5,313	5,302
Change in AIC		-21	-11
Classification Accuracy	69.5%	69.9%	69.9%
Six-Year College Graduation			
Intercept	-4.9108**	-5.0081**	-4.8152**
HSGPA	.7351**	.7053**	.6621**
SAT Composite	.00185**	.00185**	.00167**
Language		.4072**	.2981**
One Other AP Area			.4655**
Two Other AP Areas			.4084**
Three Other AP Areas			.4518**
Four Other AP Areas			.3054*
AIC	5,582	5,544	5,519
Change in AIC		-38	-25
Classification Accuracy	66.5%	67.2%	67.4%

Note. *N* = 13,468 for enrollment and 4,578 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A18.

Model Parameters for Four-Year College Outcomes: World Languages AP Takers Scoring Less Than 3 and Their Counterparts Who Did Not Take AP World Languages

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.2846**	-5.4656**	-4.8727**
HSGPA	.4701**	.4362**	.3921**
SAT Composite	.00309**	.00314**	.00271**
Language		.4486**	.2799**
One Other AP Area			.2278
Two Other AP Areas			.3695**
Three Other AP Areas			.5886**
Four Other AP Areas			.9748**
AIC	3,042	3,019	3,004
Change in AIC		-23	-15
Classification Accuracy	69.6%	70.6%	71.3%
Persistence to Second Year			
Intercept	-.9911	-1.1858*	-.2489
HSGPA	.4697**	.4086*	.3283*
SAT Composite	.000728*	.000752*	.00012
Language		.8865**	.6368**
One Other AP Area			.2849
Two Other AP Areas			.6483*
Three Other AP Areas			.5422
Four Other AP Areas			1.7911**
AIC	917	894	884
Change in AIC		-23	-10
Classification Accuracy	85.2%	85.1%	85.2%
Four-Year College Graduation			
Intercept	-7.2578**	-7.3015**	-6.73**
HSGPA	.9070**	.8842**	.8443**
SAT Composite	.00229**	.00228**	.00192**
Language		.2715*	.1541
One Other AP Area			.0300
Two Other AP Areas			.1811
Three Other AP Areas			.2798
Four Other AP Areas			.7119**
AIC	1,318	1,315	1,314
Change in AIC		-3	-1
Classification Accuracy	69.2%	68.3%	70.2%
Six-Year College Graduation			
Intercept	-5.1262**	-5.2277**	-4.4149**
HSGPA	.7170**	.6898**	.5992**
SAT Composite	.00216**	.00217**	.00157**
Language		.3835**	.0821
One Other AP Area			.5788**
Two Other AP Areas			.8351**
Three Other AP Areas			.7923**
Four Other AP Areas			1.2978**
AIC	1,279	1,273	1,255
Change in AIC		-6	-18
Classification Accuracy	71.4%	70.7%	71.4%

Note. *N* = 2,684 for enrollment and 1,112 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

Table A19.

Model Parameters for Four-Year College Outcomes: World Languages AP Takers Scoring 3 or Higher and Their Counterparts Who Did Not Take AP World Languages

Parameter Estimates	Model 1	Model 2	Model 3
Four-Year College Enrollment			
Intercept	-5.3626**	-5.4487**	-4.8647**
HSGPA	.5373**	.4945**	.4301**
SAT Composite	.00278**	.00279**	.0024**
Language		.4179**	.2917**
One Other AP Area			.298**
Two Other AP Areas			.3894**
Three Other AP Areas			.6392**
Four Other AP Areas			.6716**
AIC	13,115	13,019	12,936
Change in AIC		-96	-83
Classification Accuracy	66.3%	66.9%	67.5%
Persistence to Second Year			
Intercept	-1.4249**	-1.4645**	-1.1881**
HSGPA	.5070**	.4803**	.4267**
SAT Composite	.000885**	.000872**	.00066**
Language		.3277**	.2102*
One Other AP Area			.4286**
Two Other AP Areas			.504**
Three Other AP Areas			.4913**
Four Other AP Areas			.28
AIC	2,971	2,962	2,951
Change in AIC		-9	-11
Classification Accuracy	84.0%	84.0%	84.0%
Four-Year College Graduation			
Intercept	-6.8210**	-6.8819**	-7.001**
HSGPA	.7937**	.7640**	.7455**
SAT Composite	.00216**	.00216**	.00212**
Language		.3370**	.2722**
One Other AP Area			.5055**
Two Other AP Areas			.4057**
Three Other AP Areas			.3852**
Four Other AP Areas			.1003
AIC	4,016	3,999	3,981
Change in AIC		-17	-18
Classification Accuracy	69.8%	69.7%	70.6%
Six-Year College Graduation			
Intercept	-4.8162**	-4.9117**	-4.9306**
HSGPA	.7416**	.7109**	.6907**
SAT Composite	.00173**	.00173**	.00167**
Language		.4166**	.3518**
One Other AP Area			.4361**
Two Other AP Areas			.296**
Three Other AP Areas			.3536**
Four Other AP Areas			.0216
AIC	4,296	4,266	4,251
Change in AIC		-30	-15
Classification Accuracy	65.4%	66.2%	66.4%

Note. *N* = 10,784 for enrollment and 3,466 for the other outcomes. SAT Composite scores and HSGPA are mean centered.
Note. ** indicates < .01; * indicates < .05

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