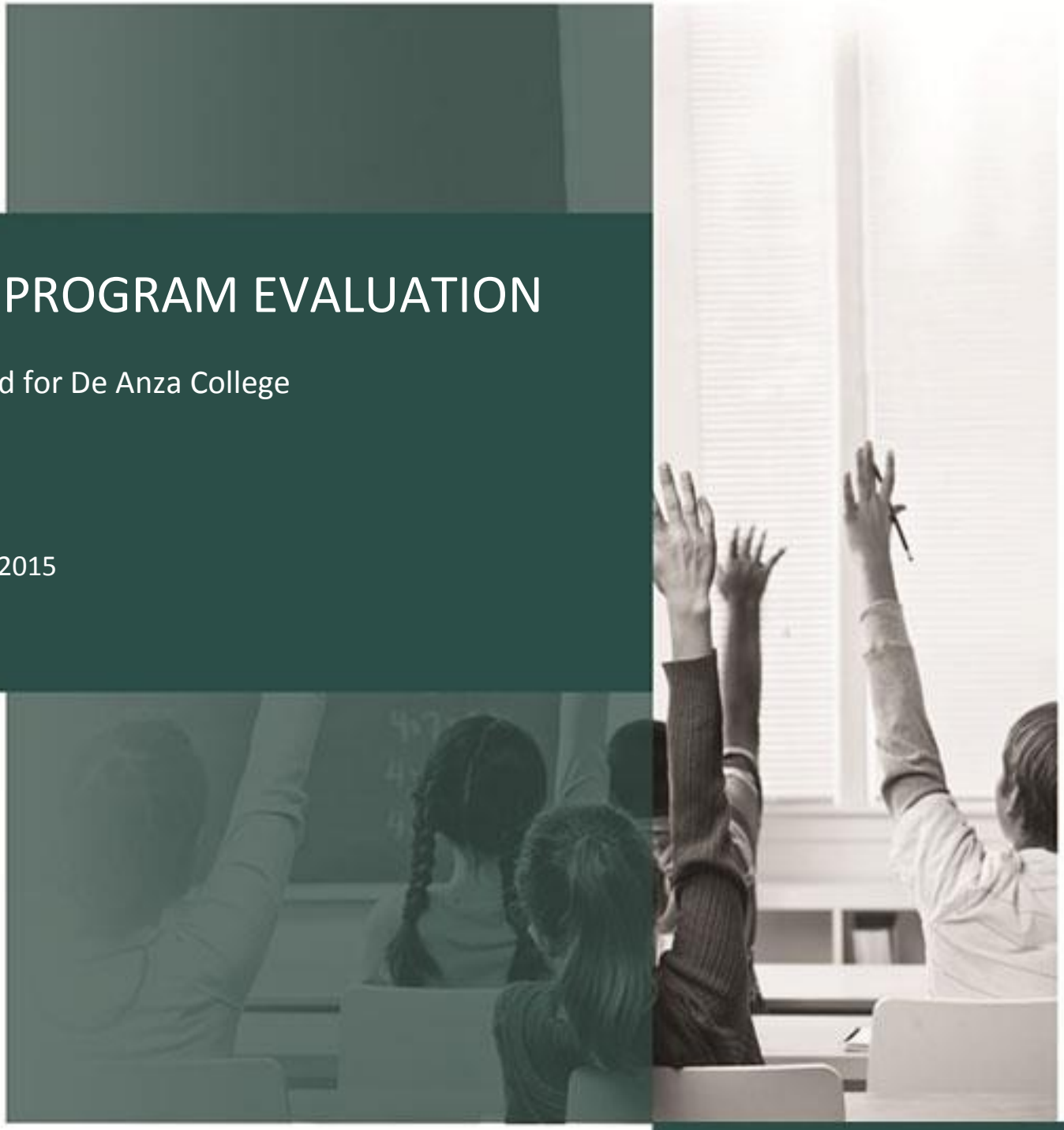
MPS PROGRAM EVALUATION

Prepared for De Anza College

October 2015



In the following report, Hanover Research evaluates the academic performance of students in De Anza College's Math Performance Success (MPS) program. We describe MPS student trends over time and use regression analysis to estimate the effect of the program on academic outcomes after controlling for student observable characteristics.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

In this report, Hanover Research evaluates the academic outcomes of students who have participated in De Anza College's (De Anza's) Math Performance Success (MPS) program, comparing these outcomes to those of similar students. Using demographic, program, and academic data provided by De Anza, we describe trends in student outcomes and employ regression analysis to examine differences between student groups. We find that MPS program participation is strongly correlated with all the positive academic outcomes we analyze.

This report is organized as follows:

- **Section I: Data and Methodology**. This section outlines the data provided by De Anza, the data processing conducted by Hanover Research, and the propensity score matching and linear regression methods employed in the analyses.
- **Section II: Program Trends**. This section describes MPS student outcomes from the first year of MPS courses in 2002.
- **Section III: MPS Students and Non-MPS Students**. This section provides an analysis of differences in assessment outcomes between the program participants and non-program students. We examine potential differences between the program students and non-program students in academic outcomes after controlling for observable differences in student characteristics.

KEY FINDINGS

- **Hanover finds evidence that De Anza's MPS program benefits participating students.** Specifically, MPS students outperform similar non-MPS students in every outcome Hanover analyzes.
  - MPS participation is correlated with an increased grade point average (GPA) of 0.2 points.
  - MPS participation is correlated with passing an additional 0.5 courses per term.
  - MPS participation is correlated with an increased proportion of STEM courses of 5.2 percentage points.
  - MPS participants outperform similar non-MPS students by 21.8 percentage points in six-year graduation rate.
  - MPS participants outperform similar non-MPS students by 18.9 percentage points in transfer rate.
  - MPS participants outperform similar non-MPS students by 28.8 percentage points in the combined "six-year graduation or transfer" rate.

- Among MPS students, there are not large differences in graduation rate, time until graduation, or proportion of STEM courses across gender or ethnicity categories. Although the correlation with MPS participation and graduation and transfer rates is strong in all cohorts we analyze, the effect diminishes somewhat in 2008 and 2009.

SECTION I: DATA AND METHODOLOGY

In this section, Hanover Research explains the data we analyze in this report and the methodology we use to conduct our analyses.

DATA

De Anza provided Hanover Research with data on program participation, academic outcomes, and demographics for two groups of students: MPS program participants and students who have not participated in MPS but who did not pass basic skills math at least once. These data cover academic years from 1984 to 2015, but this analysis focuses on the period since the MPS was implemented in 2002. Since the files delivered by De Anza contain data on student course enrollment, student demographics, and student outcomes separately, Hanover compiles this data into a single analytic file in which each observation is for a particular student in a specific term.

A considerable proportion (2,058 out of 3,673) of the non-program students could not be matched to demographic data in the files provided by De Anza. This leads to non-program students being outnumbered by program students in the final analytic file by a factor of approximately two to one. In some cases, this means that certain cohorts could not be analyzed because of the absence of comparison student data. After processing all the data provided by De Anza, Hanover analyzed data for 50,388 student-terms representing 4,496 unique students.

Figure 1.1: Student Characteristics Summary Statistics

Variable	MPS			Non-MPS			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Demographic									
Male	41.4%	49.3%	35,344	54.1%	49.8%	14,830	45.2%	49.8%	50,174
Female	58.6%	49.3%	35,344	45.9%	49.8%	14,830	54.8%	49.8%	50,174
Age	24.939	7.665	35,410	23.006	5.947	14,847	24.368	7.254	50,257
Black	11.7%	32.1%	35,541	10.4%	30.5%	14,847	11.3%	31.6%	50,388
Asian	19.9%	39.9%	35,541	24.9%	43.3%	14,847	21.3%	41.0%	50,388
Latino	36.5%	48.1%	35,541	40.3%	49.1%	14,847	37.6%	48.4%	50,388
White	19.8%	39.8%	35,541	17.6%	38.1%	14,847	19.1%	39.3%	50,388
Other Ethnicity	12.2%	32.7%	35,541	6.8%	25.1%	14,847	10.6%	30.8%	50,388
Always Resident	92.3%	26.7%	35,410	92.6%	26.2%	14,847	92.4%	26.5%	50,257
Academic									
Prior: GED	6.5%	24.7%	35,239	7.0%	25.6%	14,805	6.7%	24.9%	50,044
Prior: HS Diploma	73.5%	44.2%	35,239	73.7%	44.0%	14,805	73.5%	44.1%	50,044
Prior: Not a HS Grad	1.4%	11.7%	35,239	1.0%	10.1%	14,805	1.3%	11.3%	50,044
Prior: Associate's Degree	6.8%	25.3%	35,239	3.2%	17.7%	14,805	5.8%	23.3%	50,044
Prior: Bachelor's Degree	1.9%	13.7%	35,239	0.3%	5.7%	14,805	1.4%	11.9%	50,044
Prior Education: Other	9.9%	29.8%	35,239	14.7%	35.4%	14,805	11.3%	31.7%	50,044
Courses Passed in Year One	2.635	1.839	29,866	1.676	1.135	14,847	2.317	1.700	44,713
Courses Attempted per Term	3.463	2.176	35,541	2.714	1.317	14,847	3.243	1.992	50,388

Variable	MPS			Non-MPS			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
STEM Courses per Term	0.492	0.710	35,541	0.388	0.624	14,847	0.461	0.688	50,388
Courses before Math 10	33.518	26.032	25,393	31.894	13.283	2,693	33.363	25.097	28,086
Terms before Math 10	9.073	5.497	25,393	11.221	5.471	2,693	9.279	5.531	28,086

OUTCOME VARIABLES

Hanover uses both transcript data and graduation and transfer data provided by De Anza to construct the outcome variables used in this report. Transfer is a binary variable indicating that a student transferred to a four-year institution. Time until graduation is measured based on the time from a student's first enrollment to graduation. A main variable of interest is the graduation rate within six years, which is measured based on the time until graduation variable.

In addition, Hanover examines three variables that vary at the term level: GPA, number of courses passed in a term,[1] and proportion of science, technology, engineering, and math (STEM) courses[2] are three outcome variables which vary at the term-level.

Figure 1.2: Outcome Variable Summary Statistics

Variable	MPS			Non-MPS			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Student-level Outcomes									
Time to Grad	4.773	4.091	14,326	4.412	2.922	1,844	4.732	3.977	16,170
Six-Year Graduation	36.0%	48.0%	26,097	15.6%	36.3%	8,935	30.8%	46.2%	35,032
Transfer	43.7%	49.6%	35,541	18.5%	38.9%	14,847	36.3%	48.1%	50,388
Term-level Outcomes									
GPA	2.614	1.090	24,124	1.939	1.243	8,980	2.431	1.173	33,104
Courses Passed	2.401	1.934	26,855	1.448	1.309	10,109	2.140	1.835	36,964
STEM Proportion	16.4%	25.7%	35,541	14.8%	25.2%	14,847	15.9%	25.6%	50,388

PROGRAM VARIABLES

De Anza also provided Hanover with data on the courses that constitute the MPS program. Hanover uses these data to identify program participants. For the purposes of this report, a program participant is a student who is currently enrolled or has been enrolled in a course defined by De Anza as an MPS course.

In the analyses in this report, comparisons are made at the term-level and at the student-level, as appropriate. For example, when comparing GPA, we consider the term-level. This term-level comparison then compares term GPAs of students who have not been in the program and term GPAs of students who are in the program or who were in the program in a previous term.

[1] Hanover assumes that "P" or a letter grade of at least "C-" indicates a passing grade.
[2] Students are only considered to be taking a STEM course the first time they take the course. Repeats of the same course do not count towards this metric.

CONTROL VARIABLES

In order to ensure that correlations between program participation and assessment outcomes are not a result of differences in other observable characteristics of the students, Hanover's analysis employs linear regression methods which allow the introduction of control variables. Hanover uses student-level demographic data and pre-program academic data provided in the files De Anza submitted for the purpose of this analysis. The student-level data include gender, ethnicity,[3] age, and residency.[4] We also use first-term GPA as a control variable in the regression analysis.[5]

Students are also identified by cohort. We define a student's cohort as the first year in which the student is enrolled at De Anza. Thus a student who begins the MPS program in 2005 could come from the 2003 cohort if his or her first record at De Anza was from 2003. Because it is possible that students who attended De Anza prior to the MPS program may have different characteristics than students who have attended De Anza since the implementation of MPS, we have excluded all observations from the years prior to 2000 and have focused our analysis on students in the 2002 to 2015 cohorts.

METHODOLOGY

We conduct linear (ordinary least squares) regression analysis in order to identify potential differences in academic outcomes between program participants and non-participants that are not explained by student observable characteristics. In the body of this report, Hanover compares program and non-program students in order to uncover any differences between students on the academic outcomes described above.

Although there may be differences in the outcomes for students in the program and those not in the program, these differences may be a result not of the program, but of the inclusion of different types of students within the groups. For example, if the program group contains a high number of students with low first year GPAs, this factor, rather than the program itself, may account for different average outcomes across the groups. Linear regression analysis accounts for the variation in this variable, and all other control variables discussed above, in order better identify the relationship between the program and the outcome of interest.

[3] Hanover consolidates the original 20 ethnicity variable codes into the five values listed in Figure 1.1. We assume that the code "B" indicates African American, "A" indicates Asian, "F" indicates Filipino, "P" indicates Pacific Islander, "W" indicates white, and "N" indicates Native American. Because the groups Native American, Filipino, Pacific Islander, "Decline to State," "X", "Y", and "Z" all have low counts, we consolidate Filipino and Pacific Islander into the Asian category and group the other codes in the "Other Ethnicity" category.

[4] Hanover divides students into two residency categories: those who have ever been a non-resident and those who have always been residents.

[5] Using first year GPA as a control requires dropping students who only take pass or fail courses or students who are MPS program participants in their first year at De Anza from the final analyses.

However, regression analysis cannot control for factors that are unobserved and therefore cannot be included as controls in the models. For example, if program participation is an indication of academic motivation in the student, this unobserved factor could represent a confounding factor which drives a correlation between academic outcomes and program participation. Any such unobserved factors could be the actual drivers of a correlation between program participation and the outcomes, and Hanover warns against attributing differences in outcomes between groups to effects of the program itself.

LINEAR REGRESSION EQUATION

Each regression model has a single outcome variable and a set of predictor variables which include a program variable and control variables.

These control variables include those discussed above as well as fixed effects for each year and cohort, where appropriate. In Section III, we estimate regression equations which are similar to (1) separately for each outcome:

$$\mathrm{Y_i} = \alpha + \beta_1 * \mathrm{Program\_Post} + \mathrm{X}\beta_2 + \mu_t + \gamma_c + \epsilon_{\mathrm{it}} \quad (1)$$

$\mathrm{Y_i}$ denotes the outcome variable which is the assessment score for student *i.* Program_Post is an indicator that takes on a value of 1 if the student participates in the program in the current term or in a previous term, zero otherwise. X denotes a matrix of student-level characteristics, including ethnicity, gender, first year GPA, etc. γ_c represents cohort-level fixed effects, and μ_y represents year-level fixed effects, accounting for different mean scores in each year and cohort. Finally, ϵ_{it} is the idiosyncratic error term. For regressions at the term-level, errors are clustered at the student-level.

The parameter of interest to the evaluation is β_1 which signifies the difference in outcomes attributable to the program. The estimates of the regression model, i.e., the βs are reported in the figures in Section III and in the Appendix. This statistic represents the difference between program participants and control groups when holding the other predicting variables constant. A positive and statistically significant estimate of one of these statistics indicates that the students who were in the program have a more positive outcome (higher GPA, higher graduation rate, etc.) for that dependent variable than similar students who were not in the program.

SECTION II: PROGRAM TRENDS

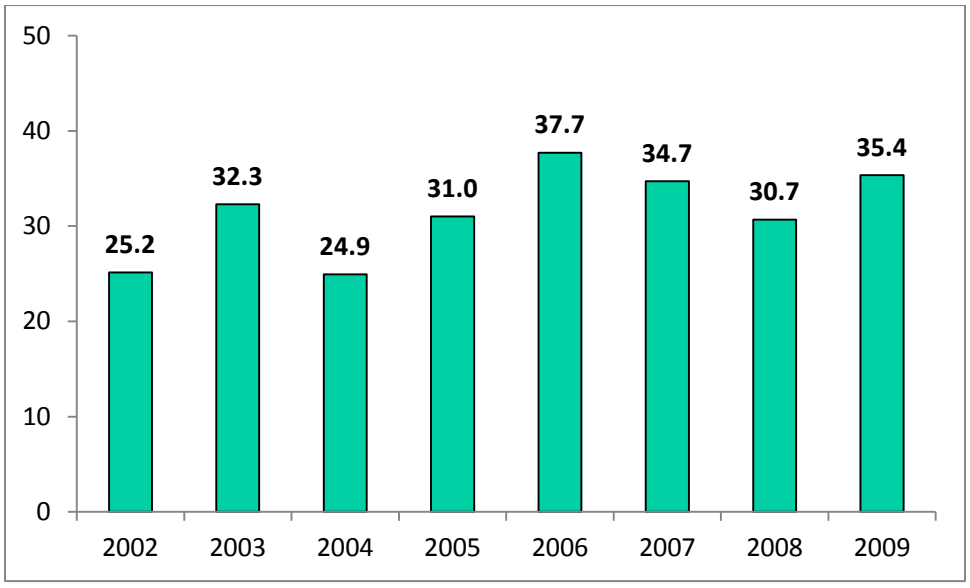
SUMMARY

In this section, Hanover Research examines program participant outcomes. We focus on changes across cohorts, with a student's cohort defined as the first year for which she has a record. In some cases we also segment outcomes by student demographic characteristics.

MATH COURSES AND OTHER COURSES

Figure 2.1 displays number of courses students take prior to taking Math 10. We find that this number fluctuates some across cohorts. Students from the 2002 and 2004 cohorts took relatively fewer courses before taking Math 10, whereas students from the 2006 and 2009 cohorts took relatively more. The number of terms enrolled prior to taking Math 10 also fluctuates some across cohorts. The 2003 cohort studied at De Anza an average of 9.7 terms before taking Math 10, but the 2008 cohort studied for only and average of 7.8 terms before enrolling in Math 10.

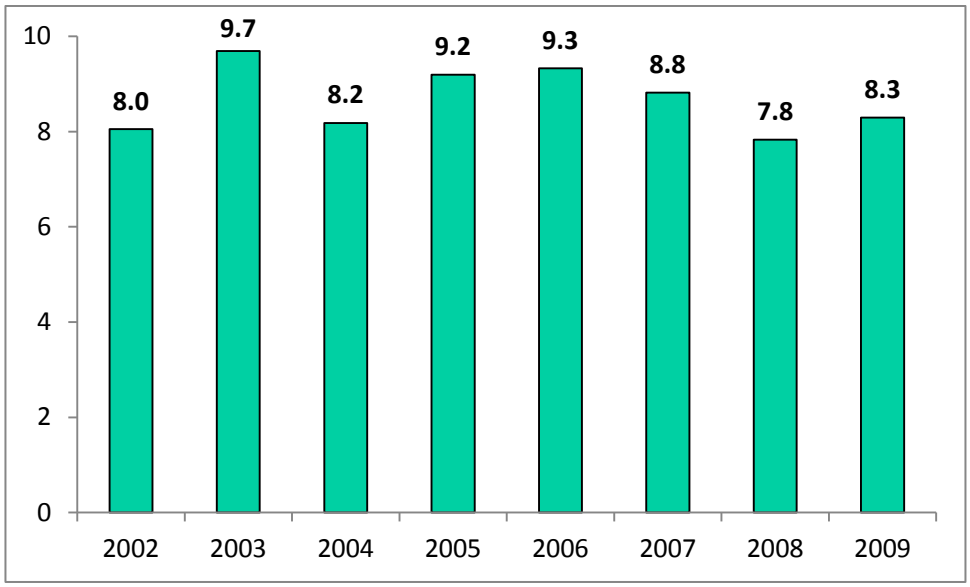
Figure 2.1: Number of Courses before Math 10 Enrollment by Cohort[6]



N=901

[6] Please note that although we have data through 2015, we restrict our sample to 2009 so that we do not display a decreasing trend by construction. Since our data is only for students who have taken Math 10, students who enrolled in, say, 2014, could have only taken at most 2 semesters worth of classes before enrolling in Math 10.

Figure 2.2: Number of Terms before Math 10 Enrollment by Cohort



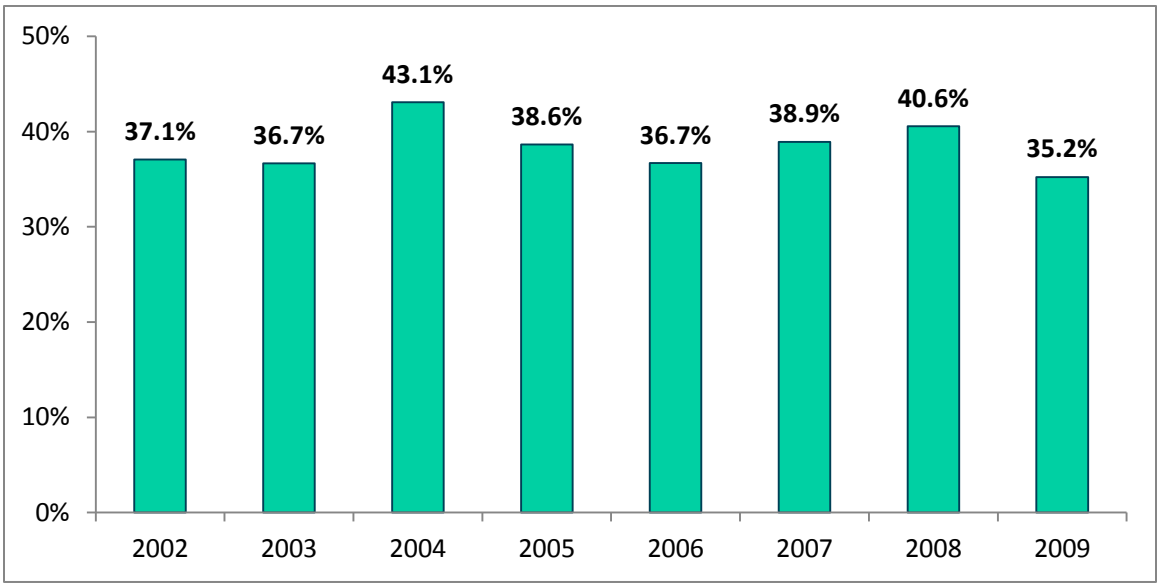
N=901

SIX-YEAR GRADUATION RATE

Since students in the cohorts after 2009 have not had sufficient time to determine if they will graduate in six years, we only examine six-year graduation rate for students from the 2002 to 2009 academic years. For program participants, the overall six-year graduation rate for these cohorts is 38.3 percent. The cohort with the highest six-year graduation rate is the 2004 cohort, with a graduation rate of 43.1 percent. The cohort with the lowest rate is the 2009 cohort, with a graduation rate of 35.2 percent.

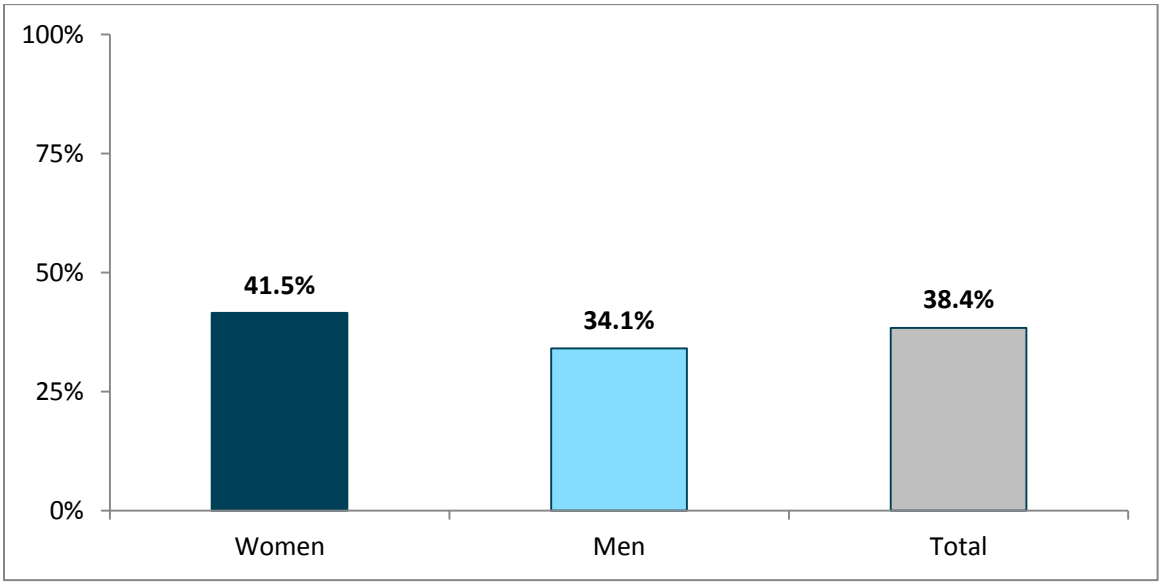
Women have a higher six-year graduation rate than men, with a rate of 41.5 percent, compared with 34.1 percent for men. The differences between ethnic categories in graduation rate are not large. Asian students have the lowest six-year graduation rate, with a rate of 29.3 percent. Latinos and Latinas have the highest rate, with a 42.2 percent six-year graduation rate.

Figure 2.3: Six-Year Graduation Rate by Cohort



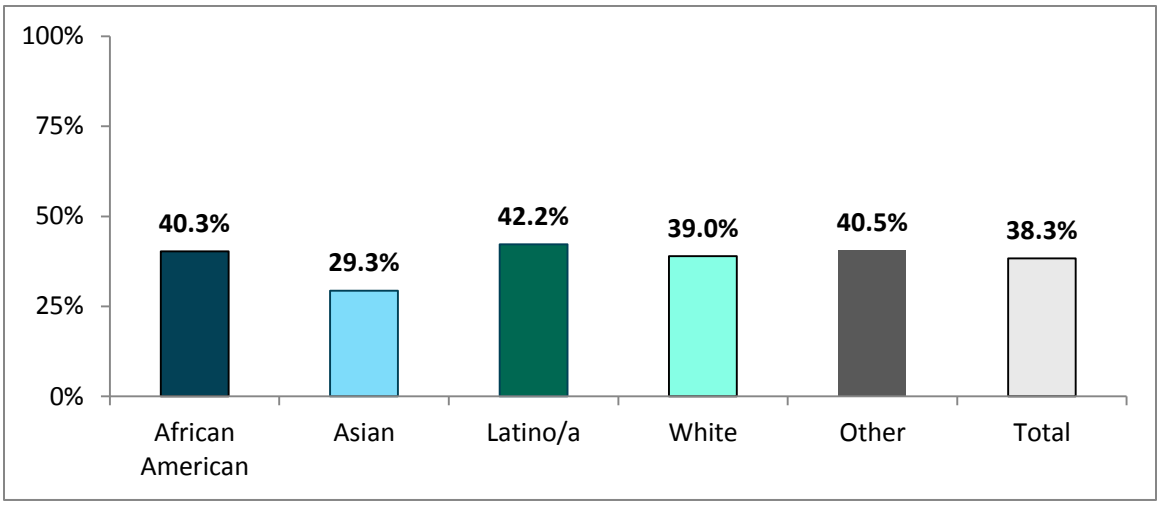
N=1,244

Figure 2.4: Six-Year Graduation Rate by Gender



N=1,244

Figure 2.5: Six-Year Graduation Rate by Ethnicity

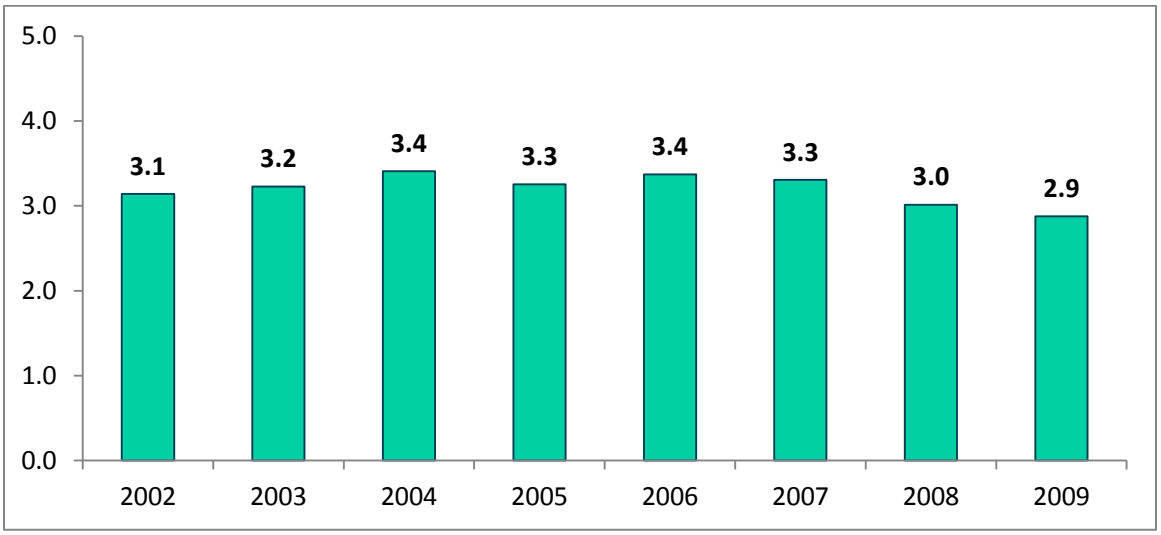


N=1,244

TIME UNTIL GRADUATION

There is not a large difference in years until graduation for those students who graduate within six years across program cohorts. These students graduate after 3.2 years, on average.[7] For those who graduate in six years, men and women take about the same amount of time to graduate. Across ethnicities, there is likewise no large difference. However, African American students take slightly less time than average to graduate, while white students take slightly more time to graduate on average.

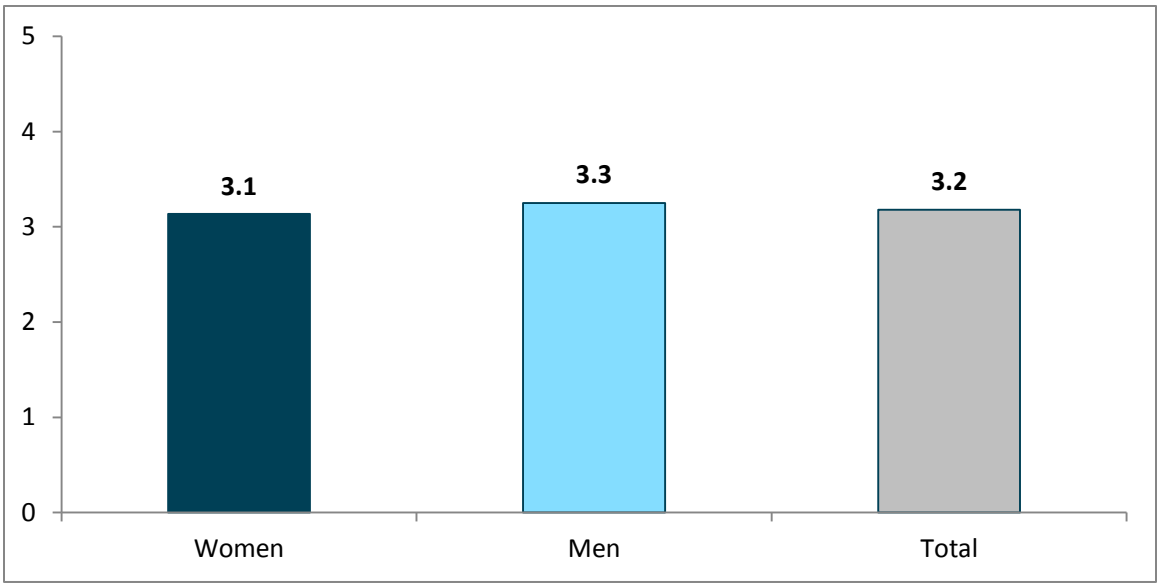
Figure 2.6: Years until Graduation for Students Who Graduate by Cohort



Note: Only includes students who graduate within six years. N=477

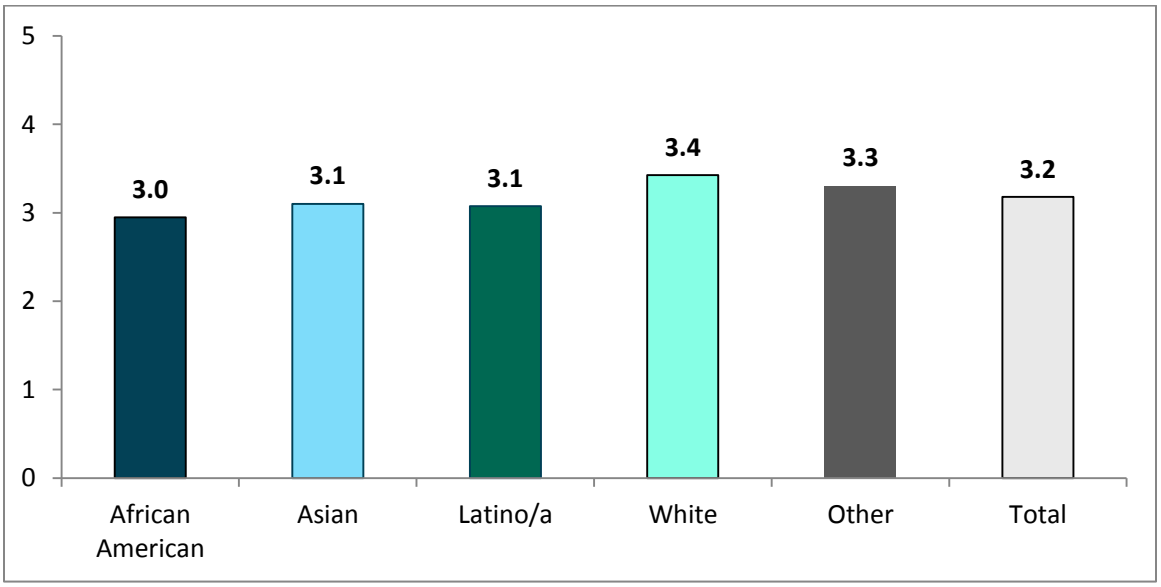
[7] Hanover does not evaluate rates for students in more recent cohorts because a reduction in years to graduation is a predictable statistical artifact when students from more recent cohorts could not have graduated at all if they had not graduated relatively quickly.

Figure 2.7: Time until Graduation by Gender



Note: Only includes students who graduate within six years. N=477

Figure 2.8: Time until Graduation by Ethnicity

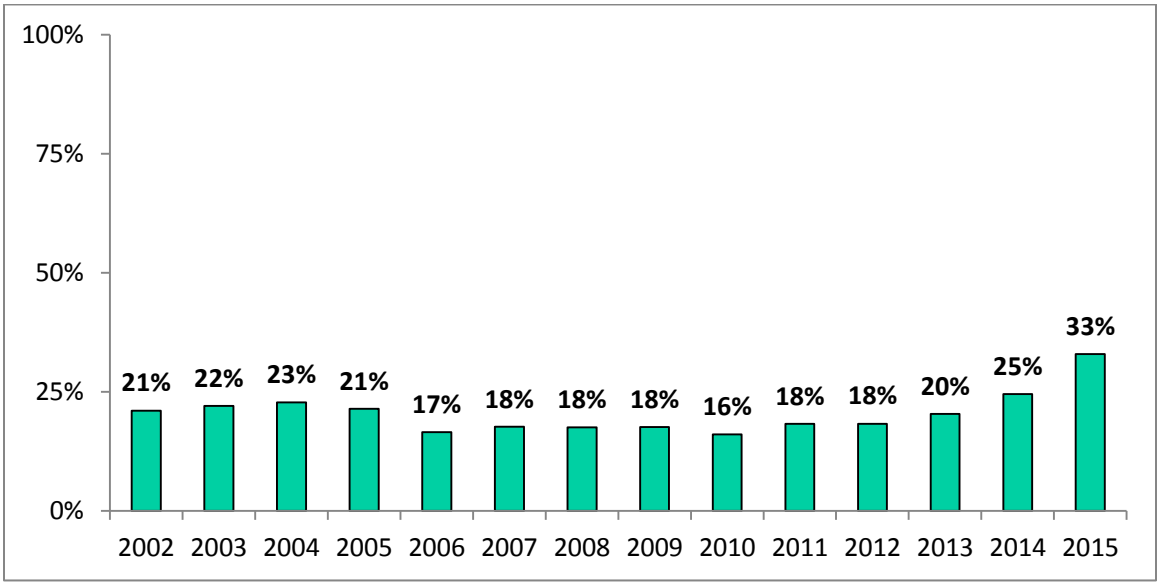


Note: Only includes students who graduate within six years. N=477

STEM ENROLLMENT

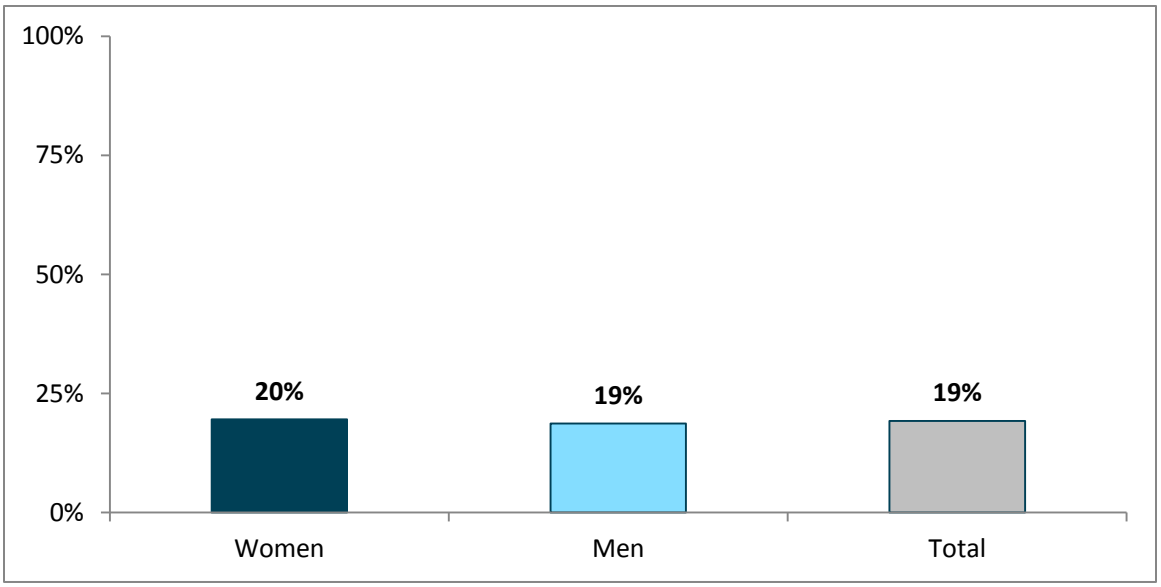
Figure 2.9 presents term-level data describing the proportion of STEM courses for students who have been in the MPS program. While enrollment in STEM courses for the 2006 to 2012 cohorts is slightly lower than for previous program cohorts, these enrollments rebound for later cohorts, with nearly one third of the 2015 program cohort's courses being STEM courses. Men and women program students enroll in STEM courses at equal rates at De Anza. There are not large differences in STEM enrollment across ethnic categories, but African American students have slightly lower enrollment in STEM courses and students in the "other ethnicity" category enroll in a slightly higher proportion of these courses.

Figure 2.9: Proportion of STEM Courses by Cohort



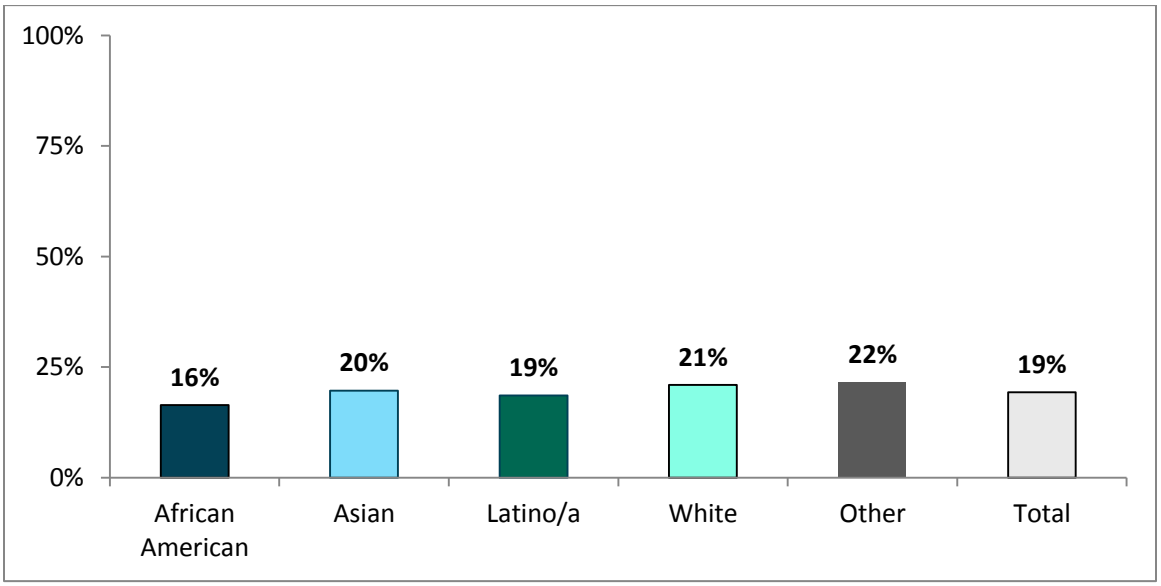
N=15,663

Figure 2.10: Proportion of STEM Courses by Gender



N=15,544

Figure 2.11: Proportion of STEM Courses by Ethnicity



N=15,663

COMPARING NON MPS STUDENTS TO MPS STUDENTS

Figure 2.12 displays the summary of the profiles of the non-MPS students who are in this study. It is important to note that these students are in the dataset because they took Math 10, but did not subsequently participate in the MPS program. We do not provide as detailed yearly tabulations for this group of students as some of the yearly counts are very low. We also provide the summary of MPS students for comparison. From these summary statistics, the reader will observe that students who are MPS participants are more likely to graduate within six years, have a shorter time to graduate, and are about five percentage points more likely to enroll in a STEM course.

Figure 2.12: Comparing MPS and non-MPS students

Variable Name	Non MPS Group		MPS Group	
	Mean	N	Mean	N
Number of Courses before Math 10	30.0	169	28.6	1744
Number of Terms before Math 10	10.1	169	7.5	1744
Share Graduated within 6 years				
All Students	11.4%	537	38.4%	1,636
Male	10.0%	289	34.1%	522
Female	12.9%	248	41.5%	720
African American	12.1%	66	40.3%	149
Asian	10.9%	119	29.3%	259
Latino/a	11.7%	197	42.2%	379
Other	15.6%	45	40.5%	185
White	9.1%	110	39.0%	272
Time to Graduation				
All Students	3.66	61	3.20	477
Male	3.86	29	3.3	179
Female	3.47	32	3.1	298
African American	3.25	8	3.0	60
Asian	3.69	13	3.1	79
Latino/a	3.39	23	3.1	159
Other	4.43	7	3.3	69
White	4.00	10	3.4	110
Proportion of STEM Courses[8]				
All Students	14.8%	14,131	19.3%	15,663
Male	15.0%	7,680	18.7%	6,394
Female	14.5%	6,451	19.6%	9,150
African American	13.4%	1,430	16.4%	1,815
Asian	15.3%	3,646	19.6%	3,233
Latino/a	14.5%	5,737	18.6%	5,984
Other	15.2%	937	22.0%	2,808
White	15.2%	2,398	21.4%	1,823

[8] The N's here are the number of courses, which is a multiple of the number of students and therefore substantially higher than the N's associated with unique students.

SECTION III: MPS STUDENTS AND NON-MPS STUDENTS

SUMMARY

In this section, Hanover Research compares MPS program participants to similar students who did not participate in the program. For all of the outcome variables we examine, we find that program participants have substantially greater positive outcomes than similar students who are not in the program.

OUTCOMES AT DE ANZA

Hanover evaluates the potential program effect on three variables that vary at the term-level while the student continues to attend De Anza: GPA, number of courses passed, and the proportion of courses attempted that are STEM courses. For all three outcomes, program participation is correlated with more positive outcomes after controlling for student observable characteristics.

As displayed in Figure 3.1, program participants experience an increased term GPA of 0.2 points. Program students also pass nearly 0.5 additional courses per term, indicating that they pass more than one additional course on average each year. Also, program students attempt a higher proportion of STEM courses, a 5.2 percentage point difference from non-program students. These differences are statistically significant at the 1 percent level, which means that there is less than a one percent probability that these differences are due to random chance.

Figure 3.1: Program Effect on Later Outcomes at De Anza

OUTCOME	PROGRAM EFFECT
Term GPA	0.204***
Term Number of Courses Passed	0.456***
Proportion of Courses Attempted STEM (Percentage Points)	5.2***

*** p<0.01, ** p<0.05, * p<0.1

GRADUATION AND TRANSFER

For graduation within six years and transfer to a four-year institution, program students likewise strongly outperform non-MPS students after controlling for observable student characteristics. Graduation within six years is 21.8 percentage points higher for MPS students than their non-MPS counterparts. Program students outperform non-program students by 18.9 percentage points in the rate of transferring to a four-year institution. When both of these outcomes are considered together, program students outperform non-program students by 28.8 percentage points.

Figure 3.2: Program Effect on Graduation and Transfer Outcomes

Outcome	Program Effect
Graduated within 6 Years (Percentage Points)	21.8***
Transfer (Percentage Points)	18.9***
Graduated or Transferred (Percentage Points)	28.8***

*** p<0.01, ** p<0.05, * p<0.1

Figure 3.3 breaks out the effect of the program on the outcome of transfer or graduating within six years by cohort.[9] Although this effect is very strong in all cohorts, the effect subsides from a 36.4 percentage point effect in in the 2007 cohort to less than 25 percentage points in the 2008 and 2009 cohorts.

Figure 3.3: Program Effect on Graduation and Transfer by Cohort

Year	Increased Likelihood of Graduation in 6 Years or Transfer (Percentage Points)
2006	33.6***
2007	36.4***
2008	22.3***
2009	21.7***

*** p<0.01, ** p<0.05, * p<0.1

[9] Hanover suppresses the 2002 to 2005 cohorts because of very small numbers of observations of the non-program students. As mentioned in Section I, many non-program students are excluded from the analysis due to missing demographic data.

APPENDIX: SUPPLEMENTARY TECHNICAL INFORMATION

This appendix presents the full results of Hanover's regression analyses described in the body of this report.

Figure A.1: Program Effects on Student Outcomes

VARIABLES	GRADUATED WITHIN 6 YEARS	TRANSFER	GRADUATED OR TRANSFERRED	TERM GPA	TERM NUMBER OF COURSES PASSED	PROPORTION OF COURSES ATTEMPTED STEM
MPS Post				**0.204*** **	**0.456*** **	**0.052*** **
				(0.022)	(0.040)	(0.005)
MPS Ever	**0.218*** **	**0.189*** **	**0.288*** **			
	(0.022)	(0.017)	(0.024)			
GPA in Year One	0.073***	0.048***	0.084***	0.259***	0.236***	-0.003*
	(0.010)	(0.007)	(0.010)	(0.013)	(0.022)	(0.002)
Male[10]	-0.057***	-0.018	-0.034	-0.041*	-0.035	-0.002
	(0.019)	(0.014)	(0.021)	(0.024)	(0.045)	(0.003)
Age	-0.003*	-0.006***	-0.007***	0.015***	0.005	0.002***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.005)	(0.001)
Black[11]	0.007	0.005	-0.004	0.005	0.168**	-0.005
	(0.032)	(0.024)	(0.035)	(0.040)	(0.079)	(0.006)
Asian	-0.084***	0.014	-0.009	0.062*	-0.056	0.022***
	(0.027)	(0.019)	(0.029)	(0.032)	(0.057)	(0.005)
White	-0.064**	-0.012	-0.005	0.133***	0.014	0.030***
	(0.026)	(0.021)	(0.029)	(0.035)	(0.061)	(0.005)
Other Ethnicity	-0.067**	0.061**	0.030	0.084**	0.046	0.012**
	(0.031)	(0.028)	(0.033)	(0.042)	(0.075)	(0.006)
Prior Education: GED[12]	-0.008	-0.075**	-0.099**	0.024	0.120	0.017*
	(0.037)	(0.030)	(0.040)	(0.049)	(0.086)	(0.009)
Prior Education: Not a HS Grad	-0.074	-0.224***	-0.210***	-0.038	-0.171	0.026
	(0.070)	(0.070)	(0.076)	(0.134)	(0.232)	(0.020)
Prior Education: Other	0.086***	0.037	0.068**	0.128***	0.231***	-0.006
	(0.027)	(0.025)	(0.029)	(0.040)	(0.075)	(0.006)
Prior Education: Associate's Degree	0.470***	0.205***	0.339***	0.168***	0.310***	0.009
	(0.040)	(0.038)	(0.043)	(0.041)	(0.114)	(0.010)

[10] The reference group for this variable is female students.
[11] The reference group for this variable and all other ethnicity variables is Latino/a students.
[12] The reference group for this variable and all other prior education variables is that the student earned a high school diploma.

VARIABLES	GRADUATED WITHIN 6 YEARS	TRANSFER	GRADUATED OR TRANSFERRED	TERM GPA	TERM NUMBER OF COURSES PASSED	PROPORTION OF COURSES ATTEMPTED STEM
Prior Education: Bachelor's Degree	0.067	0.349***	0.275***	0.179*	0.045	0.022
	(0.080)	(0.077)	(0.086)	(0.094)	(0.116)	(0.019)
Always Resident[13]	-0.045	0.056**	-0.011	-0.061	-0.028	-0.014**
	(0.038)	(0.026)	(0.041)	(0.046)	(0.074)	(0.007)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed Effects	No	No	No	Yes	Yes	Yes
Constant	-0.017	0.290***	0.333***	1.500***	0.324	0.200**
	(0.081)	(0.069)	(0.088)	(0.214)	(0.310)	(0.082)
Observations	1,968	3,387	1,968	27,665	30,778	41,431
R-squared	0.189	0.221	0.211	0.117	0.062	0.020

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure A.2: Program Effects on Graduation or Transfer by Cohort

VARIABLES	2006	2007	2008	2009
MPS Ever	0.336***	0.364***	0.223***	0.217***
	(0.086)	(0.072)	(0.063)	(0.048)
GPA in Year One	0.052	0.088***	0.056*	0.146***
	(0.039)	(0.034)	(0.030)	(0.022)
Male[14]	-0.052	-0.016	-0.102*	-0.052
	(0.078)	(0.066)	(0.059)	(0.045)
Age	-0.005	-0.008	-0.010*	-0.006
	(0.007)	(0.006)	(0.006)	(0.005)
Black[15]	-0.060	0.049	0.019	0.048
	(0.120)	(0.108)	(0.105)	(0.070)
Asian	0.103	-0.137	-0.063	0.033
	(0.121)	(0.094)	(0.075)	(0.059)
White	0.063	-0.119	-0.101	0.078
	(0.094)	(0.093)	(0.085)	(0.064)
Other Ethnicity	0.278**	0.054	0.069	0.021
	(0.132)	(0.106)	(0.101)	(0.088)
Prior Education: GED[16]	-0.259**	0.102	0.014	-0.147*
	(0.128)	(0.129)	(0.139)	(0.086)
Prior Education: Not a HS Grad	-0.441**	0.044	-0.452**	-0.115
	(0.193)	(0.209)	(0.181)	(0.203)

[13] The reference group for this variable is students who have ever been non-residents.
[14] The reference group for this variable is female students.
[15] The reference group for this variable and all other ethnicity variables is Latino/a students.
[16] The reference group for this variable and all other prior education variables is that the student earned a high school diploma.

VARIABLES	2006	2007	2008	2009
Prior Education: Other	0.272	0.169*	0.162*	0.041
	(0.164)	(0.098)	(0.085)	(0.053)
Prior Education: Associate's Degree	0.221	0.370**	0.595***	0.535***
	(0.134)	(0.179)	(0.223)	(0.171)
Prior Education: Bachelor's Degree	-0.669		-0.060	0.415*
	(0.471)		(0.334)	(0.225)
Always Resident [17]	-0.063	0.046	-0.067	0.142
	(0.125)	(0.128)	(0.111)	(0.090)
Constant	0.311	0.236	0.629***	-0.025
	(0.208)	(0.202)	(0.193)	(0.149)
Observations	161	209	269	409
R-squared	0.266	0.217	0.173	0.230

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[17] The reference group for this variable is students who have ever been non-residents.

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