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Improving College Pathways in California

Technical Appendices

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Appendix A: Pipeline Model

Developing a Pipeline Model

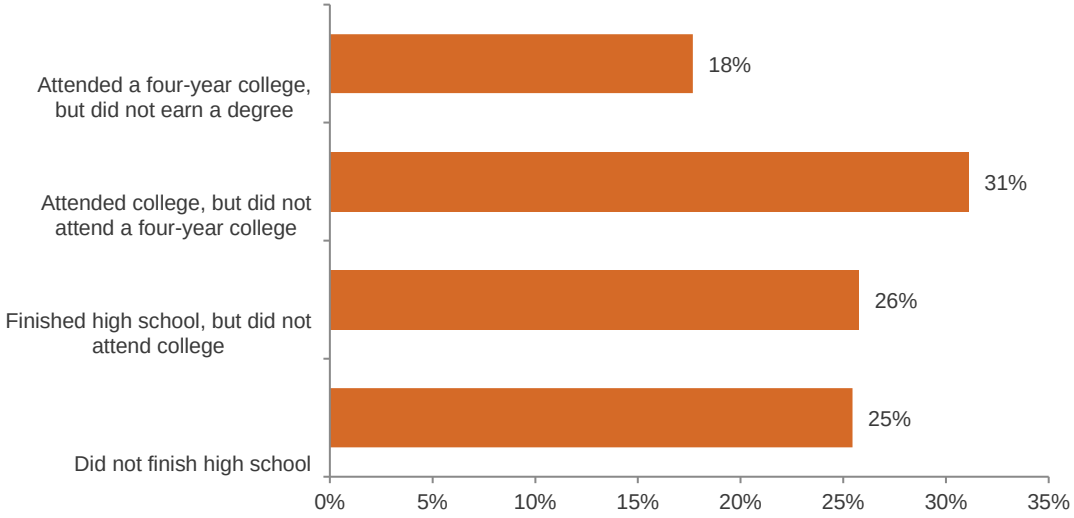
To estimate where students fall off the pathway to college readiness and completion, we develop a pipeline model that identifies key transitions as students move through their educational trajectories. The pipeline model shown in Figure 1 represents a synthetic cohort of 9th graders in public schools in California as they move through high school, complete the a–g courses, enter college (public or private, in California or another state), transfer from community college, and complete a bachelor's degree. The primary assumption of the model is that current rates of high school completion, a–g completion, college enrollment, transfer from community college, and college completion prevail throughout the cohort's high school and college years. Pipelines are developed separately for four large ethnic groups (Latinos, whites, Asian Americans, and African Americans) and two genders (female and male).

Four key transitions are identified and estimated in the model: (1) 9th grade to high school graduation (including a–g completion), (2) high school graduation to college enrollment (including community colleges and four-year colleges), (3) enrollment in four-year colleges (either as freshmen or transfer students), and (4) college enrollment to college completion (of a bachelor's degree).

- The first transition is based on cohort graduation rates provided by the California Department of Education for the 2015–16 graduating class. Completion of the a–g courses is based on rates among public high school graduates in 2015–16, also provided by the California Department of Education.
- The second transition is based on enrollment rates of recent high school graduates in community colleges and four-year colleges. College enrollment rates are calculated separately by type of college. California State University, the University of California, and the California Community Colleges provided 2015 data on public high school of origin for incoming freshmen. Data on private and out-of-state college enrollment rates was calculated from 2014 IPEDS data, adjusted to reflect public high school graduates. IPEDS data do not include information on ethnicity and gender of students based on their state of residence. Therefore, estimates of enrollment rates to private and out-of-state colleges by ethnicity and gender were derived by applying ethnic and gender distributions of young college-enrolled migrants (students who had left California) based on American Community Survey data.
- The third transition is derived from data on 2014–15 transfers from Community Colleges to UC, CSU, private colleges, and out-of-state colleges as provided by institutional research offices of UC, CSU, and the community colleges.
- The final transition to college completion is based on six-year graduation rates of incoming freshmen and four-year graduation rates of transfer students. Rates are calculated separately by gender and ethnicity for UC, CSU, private colleges in California, and out-of-state colleges.

FIGURE 1

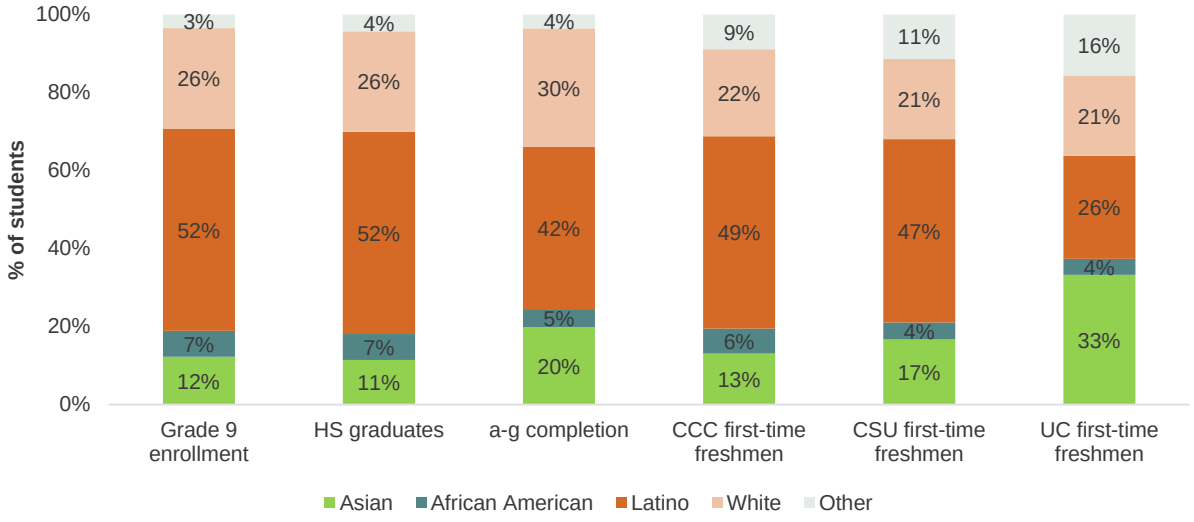
Among those not obtaining a bachelor's degree, most fall off the pathway before making it to a four-year college



Student Pathways to College

FIGURE 2

Latino and African American students are underrepresented in the pathways to college



SOURCE: Grade 9 enrollment: California Department of Education, 2011–12; a–g completion: California Department of Education, 2015–16, CCC first-time freshmen enrollment: California Community College, 2016; CSU first time freshmen from California high schools: California State University, 2015, UC first time freshmen: University of California, 2016.

The need to focus on a–g courses

Statewide, at current rates of high school completion and preparation for college, only 30% of 9th graders will earn a high school diploma and complete the a–g college preparatory courses required for entry to UC and CSU. These rates of completion and readiness vary substantially by gender and ethnicity. For example, only 25 percent of African American 9th graders will complete both high school and the a–g courses, compared to 65 percent of Asian Americans. Male 9th graders are less likely to finish high school prepared for college than females (32% and 44% respectively). While high school dropout is an important problem and an obvious reason that some students are not prepared for college, completing the a–g college preparatory courses is an even larger challenge. As shown in Table 1, for every ethnic group and for females and males, the share of high school students who are not ready for college because they did not complete the a–g courses is substantially higher than the share not ready because they did not finish high school.

TABLE 1

Most 9th graders will not complete high school ready for college, with large differences by gender and ethnicity

		Among the cohort of 9th graders in the class of 2016:		
		Did not finish high school	Did not complete the a–g courses	Total share not ready for college
Female	African American	21%	47%	68%
	Latino	16%	48%	63%
	White	9%	39%	48%
	Asian American	5%	23%	28%
	All females	13%	43%	56%
Male	African American	33%	48%	81%
	Latino	24%	52%	77%
	White	14%	46%	60%
	Asian American	8%	33%	41%
	All males	20%	48%	68%

Appendix B: Descriptive Summary of Our Sample

K–12 Sample

Our K–12 sample includes 472,324 high school students in 24 diverse districts from 2007 to 2014 school years. Geographically, these districts are well spread across the state (inland and coastal, northern and southern). As seen in Table 1, African American and low-income students are overrepresented in our sample when compared to statewide average. Students in our sample also tend to be low-performing. Note that we also have more other/missing (including inconsistent) values for ethnicity in our dataset.

Due to the differences in student characteristics between our sample and statewide averages, our findings can only be applied to similar settings, e.g., schools with a large concentration of low-income and low performing students. This is not necessarily a drawback of our study, as recent reforms (e.g., Every Student Succeeds Act and its predecessor No Child Left Behind) have focused on turning around low-performing schools.

TABLE 1

Descriptive summary of key student characterIstics in our k–12 sample

	Sample	State
Female	49%	49%
Asian American	9%	8%
African American	13%	8%
Latino	34%	45%
White	29%	34%
Other/missing	15%	5%
Eligible for free/reduced price lunch	64%	50%
Parent education: college degree or above	31%	-
CST: math	278	312
CST: English	315	346
% graduates completing a–g	20%	38%
N Graduates	141,307	2,832,012

SOURCE: Cal-PASS Plus, 2007 – 2014; California Department of Education, 2007–2014.

Community College Sample

We matched the high school graduates in our sample to 18 nearby community colleges and followed them over time. Our analytical sample includes 16,792 first-time college students from 2011–2015. Since we restricted our sample to high school graduates (1) who have complete four-year transcripts (so we can identify their a–g completion status), and (2) who enroll in a nearby community college immediately following high school graduation (due to data limitations), our sample is a very selective one; students in our sample have better outcomes than state averages. For instance, 45 percent of students in our sample take at least one transfer-level course in Math or English, and only a third of students are ever enrolled in a developmental education course during their two years in college (compared to 80 percent statewide within six years). Latino and African

American students are underrepresented in our sample, but more students in our sample are first generation college students. A descriptive summary of our community college sample is in Table 2 below.

TABLE 2

Descriptive summary of key student characterIstics in our Community college sample

Variable		CC statewide
Asian American	7%	15%
African American	4%	6%
White	51%	26%
Latino	31%	44%
Female	52%	53%
Pell grant recipients	24%	22%
BOGG recipients	42%	49%
free/reduced lunch eligible	34%	
First generation	56%	40%
CCC outcomes		
% taking transfer-level math/English	45%	-
Average passing rate of transfer math/English	77%	-
High school preparation		
# a–g math taken	3	-
# a–g science taken	2	-
# a–g English taken	3	-
# a–g social science taken	2	-
# a–g foreign language taken	2	-
# a–g art taken	2	-
Average GPA in a–g math	2.3	-
Average GPA in a–g science	2.5	-
Average GPA in a–g English	2.6	-
Average GPA in a–g social science	2.7	-
Average GPA in a–g foreign language	2.7	-
Average GPA in a–g art	3.3	-
Highest math taken: higher math	42%	-
Highest math taken: algebra 2 or equivalent	30%	-
Highest math taken: geometry or equivalent	14%	-
N	16,792	2,355,774

SOURCE: Cal-PASS Plus, 2007–2014; California Community College Data Mart, various years.

CSU Sample

A descriptive summary of our CSU sample has been summarized in Table 3. Our analytical sample includes 3,004 first-time freshmen students in three CSU campuses (with complete high school transcripts) from 2011 to 2015 school years. Latino students are underrepresented in our sample, and more students in our sample are low-income and first generation college students. First-year and second-year persistence is lower among our sample, which is not surprising given that most students in our sample are low-income or first generation college students.

TABLE 3

Descriptive summary of key student characteristics in our CSU sample

	Our Sample	CSU system wide (2014)
Asian American	30%	17%
African American	13%	4%
White	32%	23%
Latino	22%	43%
Female	60%	85%
Low-income students	64%	57%
First generation	68%	36%
CSU outcomes		
First-year persistence	77%	84%
Second-year persistence	61%	76%
Average year end units earned	21	-
Average year end GPA	2.39	-
High school preparation		
Average GPA in a–g math	2.71	-
Average GPA in a–g science	2.93	-
Average GPA in a–g English	3.18	-
Average GPA in a–g social studies	3.19	-
Average GPA in a–g foreign languages	3.15	-
Average GPA in a–g art	3.64	-
Average GPA in a–g elective	3.19	-
Took a–g math in 12th grade	67%	-
Took a–g science in 12th grade	54%	-
Took a–g social science in 12th grade	82%	-
Highest level by 11th grade: higher math	40%	-
N	3,004	62,523

Source: Cal-PASS Plus, 2011–2015; California State University, 2014.

Note: We use students' eligibility for free/reduced price lunch in high school to determine their low-income status; and CSU uses a different metric—Pell grant recipients—which contributes to the difference in low-income students counts. About 12 percent of students in our CSU sample (not the K–12 sample) miss their free/reduced price lunch information; and about 20 percent of students miss their parental education, which may skew our share of low-income, first generation students.

Appendix C: Additional Figures for Our Pathway Analysis

TABLE 1

% high school graduates completing each subject area requirements with a C or better, by student characteristics, 2007–2014

	Social Science (a)	English (b)	Math (c)	Science (d)	Foreign Language (e)	Art (f)	Electives (g)
Female	60%	40%	45%	56%	56%	77%	84%
Male	54%	32%	39%	51%	46%	71%	81%
Asian American	71%	47%	49%	75%	70%	79%	80%
African American	44%	23%	31%	41%	36%	64%	79%
White	65%	45%	46%	59%	58%	80%	84%
Latino	49%	27%	39%	46%	42%	69%	83%
Free/reduced price lunch eligible	47%	25%	38%	45%	41%	68%	82%
First generation college students	51%	29%	40%	47%	43%	70%	82%
Overall	57%	36%	42%	54%	51%	74%	82%

SOURCES: Authors' calculations using Cal-PASS Plus data.

TABLE 2

Average passing rate in a–g courses, by subject area and by student characteristics, 2007 –2014

	All	Female	Asian American	African American	Latino	White	Low-income	First generation college
Social Science (a)	88%	91%	95%	81%	85%	91%	83%	86%
English (b)	87%	90%	95%	80%	83%	91%	81%	84%
Math (c)	82%	85%	92%	73%	78%	87%	77%	78%
Science (d)	88%	90%	95%	77%	84%	92%	84%	85%
Foreign Language (e)	91%	93%	96%	83%	89%	94%	88%	89%
Art (f)	93%	95%	97%	87%	91%	95%	89%	91%
Electives (g)	89%	92%	95%	82%	86%	93%	85%	87%

SOURCE: Authors' calculations using Cal-PASS Plus data.

NOTE: (1). Sample includes 472,324 high school students from 2007 to 2014 school years. (2). Overall passing rate is higher in later grades (e.g., Grades 11 and 12). (3). The same conclusion holds for all subgroups in all subject areas.

TABLE 3

% schools offering a–g courses, by subject areas and by grade, 2007–2014

	Math	Science	English	Social Science
Grade 9	96%	96%	96%	95%
Grade 10	97%	97%	97%	97%
Grade 11	97%	96%	96%	96%
Grade 12	97%	97%	97%	96%

NOTE: (1). Sample includes 105 regular high schools from 2007 to 2014 school years. (2). Social science sequences includes one year of world history, cultures, and historical geography and one year of US history, both of which are typically offered in grades 10 or above.

TABLE 4

Math progression, by student characteristics, 2007–2014

	Overall	Female	Male	Asian American	African American	White	Latino	Low-income	First generation
Earned A or B in algebra 1, took geometry	69%	70%	69%	72%	66%	64%	68%	74%	75%
Earned A or B in geometry , took algebra 2	68%	68%	68%	73%	54%	67%	63%	68%	69%
Earned A or B in algebra 2, took higher math	59%	58%	59%	66%	48%	57%	53%	57%	58%

SOURCE: Authors' calculations using CalPASS Plus data.

NOTE: Sample restricted to schools offering the full a–g math sequence.

TABLE 5

Math progression, by pathway and student characteristics, 2007 – 2014

	Female	Asian American	African American	White	Latino	Low-income	First generation
Pathway I (start algebra 1 before 9th grade)							
% algebra 1 completers moving to geometry	82%	91%	74%	77%	77%	79%	79%
% geometry completers moving to algebra 2	66%	70%	59%	60%	63%	65%	66%
% algebra 2 completers moving to higher level math	52%	58%	40%	44%	49%	51%	52%
Pathway II (start algebra 1 in 9th grade)							
% algebra 1 completers moving to geometry	66%	72%	64%	62%	67%	70%	70%
% geometry completers moving to algebra 2	56%	63%	49%	53%	54%	55%	55%
% algebra 2 completers moving to higher level math	24%	31%	21%	19%	25%	26%	25%
Pathway III (start algebra 1 in 10th grade)							
% algebra 1 completers moving to geometry	56%	62%	57%	49%	56%	59%	59%
% geometry completers moving to higher level math	26%	32%	26%	20%	23%	25%	25%
Pathway IV (start algebra 1 in 11/12th grade)							
% algebra 1 completers moving to geometry	32%	37%	34%	26%	34%	35%	35%

NOTE: Sample includes 472,324 high school students from 2007 to 2014 school years.

TABLE 6

Science and English pathways, by student characteristics, 2007–2014

	Female	Asian American	Black	White	Hispanic	Low-income	First generation
Science							
Passed 9th grade, moved to 10th	77%	70%	67%	68%	65%	72%	73%
Passed 10th grade, moved to 11th	68%	75%	65%	68%	61%	62%	62%
Passed 11th grade, moved to 12th	43%	55%	37%	42%	37%	37%	38%
English							
Passed 9th grade, moved to 10th	90%	73%	75%	75%	77%	88%	88%
Passed 10th grade, moved to 11th	82%	86%	79%	85%	75%	76%	77%
Passed 11th grade, moved to 12th	82%	87%	78%	83%	75%	76%	81%

TABLE 7

% schools offering each a–g course/sequence, by subject area and school characteristics, 2007–2014

	Overall	High poverty	High minority	High first generation
Math				
Algebra I (or equivalent)	96%	93%	93%	94%
Geometry (or equivalent)	96%	93%	93%	94%
Algebra II (or equivalent)	96%	93%	93%	94%
Entire math sequence	96%	93%	93%	94%
Science				
Biology (regular or advanced)	96%	93%	93%	94%
Chemistry (regular or advanced)	95%	92%	91%	93%
Physics (regular or advanced)	90%	86%	86%	86%
Entire science sequence	90%	85%	84%	84%
English				
9th grade	96%	93%	93%	94%
10th grade	96%	93%	93%	94%
11th grade	95%	92%	91%	93%
12th grade	94%	92%	89%	91%
Entire English sequence	93%	90%	86%	90%
Social Science				
World history	96%	93%	93%	94%
US history	95%	93%	91%	93%
Entire social science sequence	95%	93%	91%	93%
N high schools	105	59	44	70

SOURCE: Cal-PASS Plus, 2007 – 2014.

NOTE: (1). Sample includes all regular high schools. (2).We define high poverty and high African American/Latino minority schools according to NCES definitions. Specifically, high-poverty schools are schools where more than 75%of students are eligible for free/reduced price lunch; and high-minority schools are those where more than 75% of students are African American or Latino. High first generation schools refer to those where more than 75 percent of students are first generation college students, i.e., their parents do not have a bachelor's degree or higher.

TABLE 8

Probit estimates of the partial effects of student characteristics on course-taking decisions in community college

	DV: Taking development education course (math/ English)					DV: Taking transfer level course (math / English)				
VARIABLES	**Overall**	**Female**	**Latino**	**Low income**	**First generation**	**Overall**	**Female**	**Latino**	**Low income**	**First generation**
Female	0.0166***		0.0163***	0.0218***	0.0179***	-0.0079***		-0.0069*	-0.0044	-0.0042**
	(0.0032)		(0.0050)	(0.0042)	(0.0024)	(0.0023)		(0.0038)	(0.0029)	(0.0021)
Asian American	0.0393***	0.0442***	-0.0477	0.0368***	0.0364***	0.0087**	0.0049	0.0205	0.0099	0.0130
	(0.0095)	(0.0095)	(0.0626)	(0.0066)	(0.0052)	(0.0042)	(0.0052)	(0.0467)	(0.0071)	(0.0091)
African American	0.0335***	0.0364***	0.0213	0.0345***	0.0306***	-0.0217**	-0.0080	0.0025	-0.0214*	-0.0294*
	(0.0082)	(0.0072)	(0.0409)	(0.0124)	(0.0086)	(0.0103)	(0.0178)	(0.0231)	(0.0114)	(0.0166)
Latino	0.0243***	0.0236***		0.0319***	0.0314***	0.0019	0.0016		0.0020	0.0006
	(0.0045)	(0.0030)		(0.0049)	(0.0045)	(0.0015)	(0.0027)		(0.0020)	(0.0032)
American Indian	-0.0194*	-0.0430**	0.1037***	-0.0291	-0.0230***	-0.0062	-0.0117	0.0043	-0.0064	-0.0059
	(0.0116)	(0.0169)	(0.0326)	(0.0211)	(0.0085)	(0.0082)	(0.0168)	(0.0461)	(0.0078)	(0.0051)
Eligible for free/reduced lunch price	0.0204***	0.0258***	0.0265***		0.0230***	-0.0140***	-0.0144***	-0.0144***		-0.0123***
	(0.0022)	(0.0032)	(0.0041)		(0.0037)	(0.0028)	(0.0032)	(0.0049)		(0.0037)
Parented education: BA or above	-0.0029	-0.0028	-0.0125	-0.0073		0.0085***	0.0056**	0.0133***	0.0061***	
	(0.0029)	(0.0039)	(0.0097)	(0.0100)		(0.0018)	(0.0022)	(0.0030)	(0.0019)	
Pell grant recipients	0.0079***	0.0052	0.0131*	0.0088	0.0071**	0.0089*	0.0071	0.0135**	0.0121**	0.0101**
	(0.0028)	(0.0050)	(0.0070)	(0.0075)	(0.0027)	(0.0052)	(0.0064)	(0.0054)	(0.0051)	(0.0047)
# a–g English courses taken	-0.0018*	-0.0020**	-0.0023**	-0.0031**	-0.0022*	0.0010	0.0006	-0.0002	0.0014	0.0010
	(0.0010)	(0.0010)	(0.0010)	(0.0014)	(0.0013)	(0.0009)	(0.0010)	(0.0008)	(0.0010)	(0.0012)
Average grade in a–g English	-0.0071***	-0.0120***	-0.0119**	-0.0083***	-0.0082***	0.0162***	0.0184***	0.0147***	0.0117***	0.0163***
	(0.0018)	(0.0019)	(0.0057)	(0.0028)	(0.0026)	(0.0041)	(0.0033)	(0.0046)	(0.0033)	(0.0036)
Highest math: higher level	-0.0463***	-0.0428***	-0.0731***	-0.0573***	-0.0548***	0.0659***	0.0613***	0.0692***	0.0649***	0.0658***
	(0.0116)	(0.0143)	(0.0183)	(0.0166)	(0.0143)	(0.0097)	(0.0125)	(0.0145)	(0.0081)	(0.0125)
Highest math: algebra 2 or equivalent	-0.0402***	-0.0411***	-0.0496***	-0.0425***	-0.0451***	0.0360***	0.0344***	0.0386***	0.0344***	0.0358***

	DV: Taking development education course (math/ English)					DV: Taking transfer level course (math / English)				
	(0.0083)	(0.0128)	(0.0098)	(0.0115)	(0.0106)	(0.0056)	(0.0081)	(0.0111)	(0.0035)	(0.0083)
Highest math: geometry or equivalent	-0.0103	-0.0108	-0.0095	-0.0068	-0.0078	-0.0064	-0.0045	0.0031	-0.0040	0.0002
	(0.0091)	(0.0138)	(0.0111)	(0.0104)	(0.0119)	(0.0067)	(0.0111)	(0.0112)	(0.0053)	(0.0090)
Grade in highest math course	-0.0043*	-0.0052**	-0.0096***	-0.0074**	-0.0050**	0.0094***	0.0052***	0.0121***	0.0097***	0.0096***
	(0.0022)	(0.0023)	(0.0029)	(0.0029)	(0.0021)	(0.0007)	(0.0010)	(0.0020)	(0.0007)	(0.0006)
Dual enrollment (ever)	0.0446	0.0418	0.1241	0.0679	0.0681	-0.0030	-0.0043	-0.0221	-0.0091	-0.0079
	(0.0276)	(0.0333)	(0.0814)	(0.0535)	(0.0434)	(0.0396)	(0.0430)	(0.0356)	(0.0311)	(0.0316)
Community college fixed effects	X	X	X	X	X	X	X	X	X	X
School year fixed effects	X	X	X	X	X	X	X	X	X	X
School term fixed effects	X	X	X	X	X	X	X	X	X	X
N students	16,792	16,792	16,792	16,792	16,792	16,792	16,792	16,792	16,792	16,792

SOURCE: Cal-PASS Plus.

NOTE: (1). Standard errors (in parentheses) adjusted for clustering at the community college campus level. (2). *** p<0.01, ** p<0.05, * p<0.1 (3).We did not report the results for African Americans because the sample is too small.

TABLE 9

Probit estimates of the partial effects of student characteristics on passing transfer math/English in community college

VARIABLES	Overall	Female	Latino	Low income	First generation
Female	-0.0042***		-0.0020	-0.0021	-0.0018
	(0.0016)		(0.0026)	(0.0025)	(0.0017)
Asian American	0.0125***	0.0079**	0.0179	0.0116*	0.0162*
	(0.0038)	(0.0031)	(0.0281)	(0.0067)	(0.0087)
African American	-0.0178*	-0.0104	0.0081	-0.0149	-0.0165
	(0.0101)	(0.0153)	(0.0242)	(0.0096)	(0.0161)
Latino	0.0010	0.0002		0.0016	-0.0004
	(0.0015)	(0.0019)		(0.0015)	(0.0028)
American Indian	-0.0057	-0.0147*	-0.0564	-0.0078	-0.0073
	(0.0067)	(0.0085)	(0.0375)	(0.0112)	(0.0093)
Eligible for free/reduced lunch price	-0.0147***	-0.0144***	-0.0128***		-0.0130***
	(0.0027)	(0.0027)	(0.0037)		(0.0028)
Parented education: BA or above	0.0085***	0.0068***	0.0135***	0.0059***	
	(0.0010)	(0.0015)	(0.0033)	(0.0014)	
Pell grant recipients	0.0084*	0.0062	0.0153***	0.0114***	0.0101***
	(0.0044)	(0.0053)	(0.0048)	(0.0043)	(0.0038)
# a–g English courses taken	0.0011*	0.0005	0.0002	0.0014***	0.0014*
	(0.0006)	(0.0004)	(0.0008)	(0.0005)	(0.0008)
Average grade in a–g English	0.0288***	0.0294***	0.0243***	0.0222***	0.0263***
	(0.0026)	(0.0020)	(0.0033)	(0.0015)	(0.0023)
Highest math: higher level	0.0476***	0.0557***	0.0498***	0.0478***	0.0481***
	(0.0059)	(0.0092)	(0.0075)	(0.0026)	(0.0066)
Highest math: algebra 2 or equivalent	0.0248***	0.0351***	0.0286***	0.0310***	0.0272***
	(0.0064)	(0.0082)	(0.0095)	(0.0043)	(0.0060)
Highest math: geometry or equivalent	-0.0051	0.0030	0.0089	0.0047	0.0026
	(0.0072)	(0.0114)	(0.0098)	(0.0032)	(0.0065)
Grade in highest math course	0.0081***	0.0058***	0.0085***	0.0075***	0.0082***
	(0.0006)	(0.0012)	(0.0021)	(0.0006)	(0.0007)
Dual enrollment (ever)	0.0061	0.0042	-0.0134	0.0046	0.0039
	(0.0280)	(0.0325)	(0.0228)	(0.0233)	(0.0207)

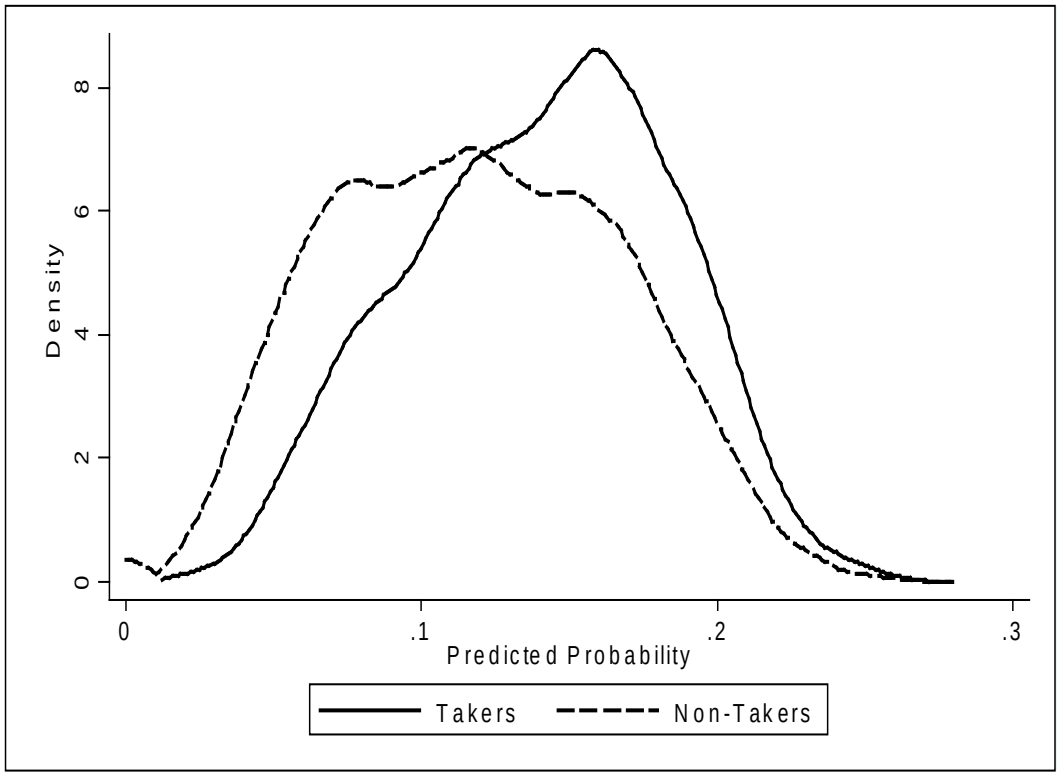
VARIABLES	Overall	Female	Latino	Low income	First generation
Community college fixed effects	X	X	X	X	X
School year fixed effects	X	X	X	X	X
School term fixed effects	X	X	X	X	X
N Students	16,792	16,792	16,792	16,792	16,792

SOURCE: Cal-PASS Plus.

NOTE: (1). Standard errors (in parentheses) adjusted for clustering at the community college campus level. (2). *** p<0.01, ** p<0.05, * p<0.1 (3). Sample includes 16,792 first-time college freshmen from 2011–2015 school years (4).We did not report the results for African Americans because the sample is too small.

FIGURE 1

Likelihood of taking transfer courses based on high school record



Cond

SOURCE: Cal-PASS Plus.

NOTE: (1). Sample includes 16,792 first-time college freshmen from 2011–2015 school years. (2). Predicted probability is based on a probit model where the dependent variable is whether a student takes transferable course (in a school year/term); and the independent variables include student demographics (gender and race/ethnicity), low-income status (as proxied by free/reduced lunch price eligibility), parental education, disability status, financial aid status, community college fixed effects, term, and school year fixed effects.

TABLE 10

The effects of student characteristics on CSU persistence, units earned, and average GPA

	Persistence	Units	GPA
Female	-0.0211***	1.0171	-0.0051
	(0.0019)	(0.6951)	(0.0571)
Asian American	-0.0024	0.7950	-0.1651
	(0.0258)	(0.5556)	(0.0838)
African American	-0.0001	-0.4250	-0.2644*
	(0.0082)	(0.7982)	(0.0833)
Latino	0.0469***	0.7207	-0.1231
	(0.0174)	(0.4249)	(0.0557)
Eligible for free/reduced price lunch (in high school)	0.0142***	-0.7879	-0.1936*
	(0.0044)	(0.6739)	(0.0568)
Parent education: BA or above	0.0285	0.2024	0.1178***
	(0.0189)	(0.0995)	(0.0102)
GPA in a–g math	0.0313***	0.3450	0.1382***
	(0.0006)	(0.5162)	(0.0094)
GPA in a–g science	-0.0137	-0.4535	0.1282
	(0.0650)	(0.6018)	(0.0896)
GPA in a–g English	0.0347	0.2891	0.1591**
	(0.0419)	(0.5596)	(0.0297)
GPA in a–g social science	0.0149*	-0.0545	0.0559
	(0.0080)	(0.0234)	(0.0337)
GPA in a–g foreign language	0.0160	0.0900	0.0730***
	(0.0128)	(0.1391)	(0.0043)
GPA in a–g art	0.0473**	0.1349	0.1480***
	(0.0207)	(0.2860)	(0.0120)
GPA in a–g elective	0.0040	0.8101	0.0567**
	(0.0292)	(0.5039)	(0.0097)
Took a–g math in 12th grade	0.0312***	0.5916*	0.1334**
	(0.0037)	(0.1760)	(0.0297)
Took a–g science in 12th grade	0.0315***	0.0288	0.0745***
	(0.0033)	(0.0736)	(0.0022)
Highest math by 11th grade: higher-level math	0.0029	1.4819	0.1547**
	(0.0118)	(1.1000)	(0.0300)
Model	Probit	OLS	OLS
CSU fixed effects	X	X	X

	Persistence	Units	GPA
School year effects	X	X	X
N Students	3,004	3,004	3,004
R-squared		0.169	0.230

NOTE: (1). We did not include a–g course-taking in English or social science because more than 90%of students in our sample took at least one course in each subject in grade 12. (2). The raw gender gap favors females, but reversed after we factor in high school preparation. This is perhaps due to males slightly outperformed females in our sample. For instance, while most females and males completed a higher math course, the share is slightly higher among males.

TABLE 11

% schools offering a–g courses, by subject area, 2016–17

	All	High poverty	High minority	Small	Rural
Math	88%	86%	87%	65%	77%
Science	86%	86%	87%	61%	73%
English	86%	86%	86%	64%	78%
Social Science	90%	89%	89%	75%	85%
N High Schools	1607	540	577	401	244

SOURCE: California Department of Education, 2016–17. National Center for Education Statistics, 2013–14.
NOTE: (1). Sample includes all regular high schools in California. (2).We define high poverty and high African American/Latino minority schools according to NCES definitions. Specifically, high-poverty schools are schools where more than 75 percent of students are eligible for free/reduced price lunch; and high-minority schools are those where more than 75 percent of students are African American or Latino. (3). Small schools are those in the bottom 25th percentile of the enrollment distribution. (4). Rural districts are based on NCES locality measures.

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