Using the API to Increase College Readiness in Mathematics Now

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Public Schools Accountability Act Advisory Committee Meeting
February 20, 2014

Mathematics from High School to Community College

What are students **doing**?

How does it affect their college placement?

How can API indicators help?

Why Math?

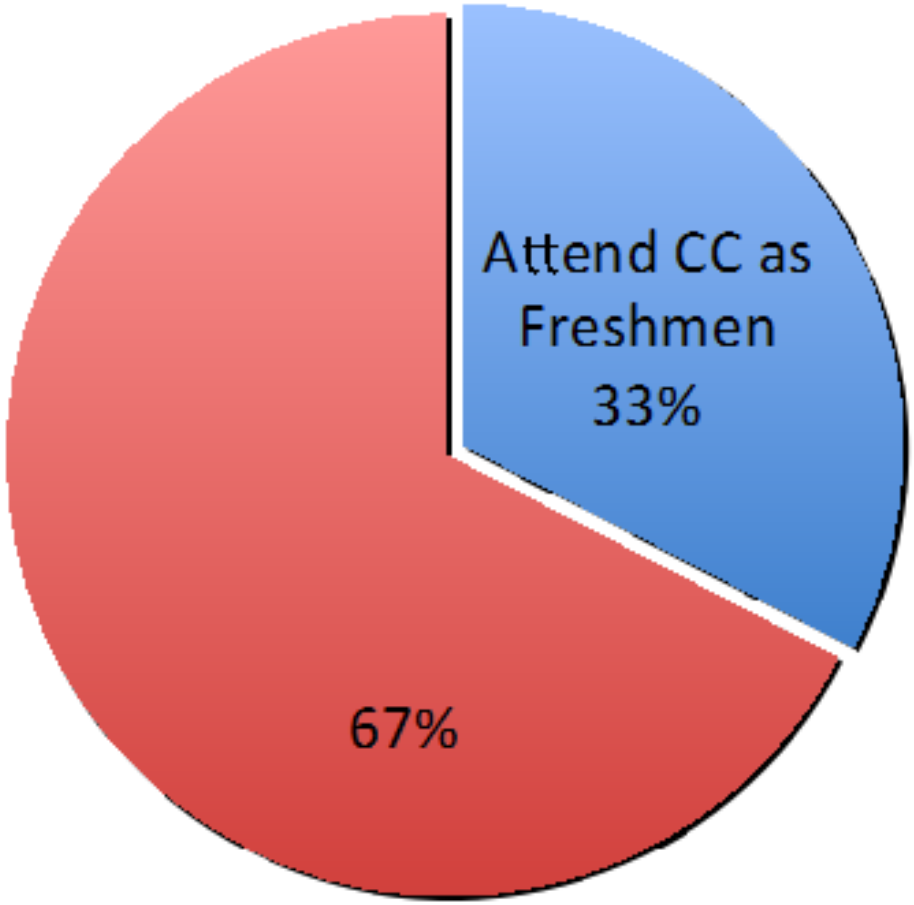
Math Functions As A Roadblock

"…placement in developmental math [is] one of the single greatest barriers to college completion."

(Burdman, 2013, p.3)

Sample: 2920 12th Grade Students

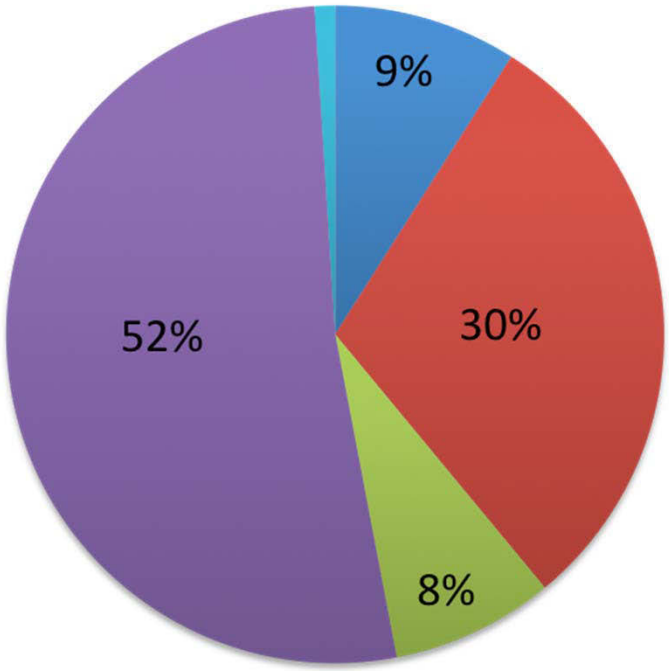
Classes of 2006, 2007, 2008, and 2009



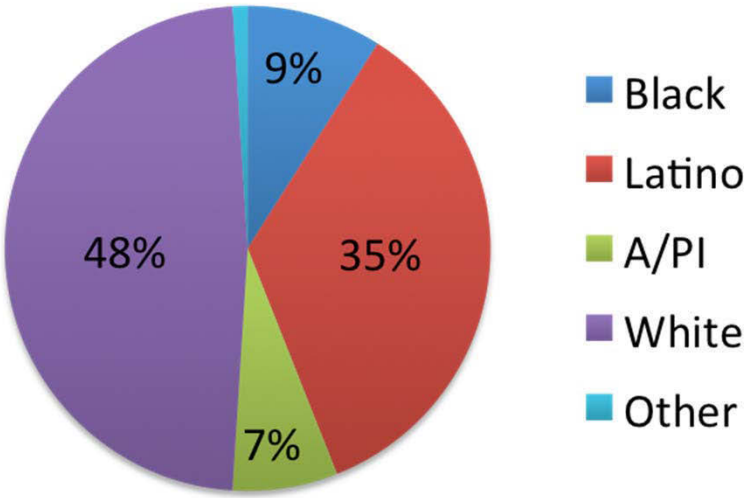
Data from Jaffe, 2012

Sample Ethnicity

All 12th Graders *(N=2920)*

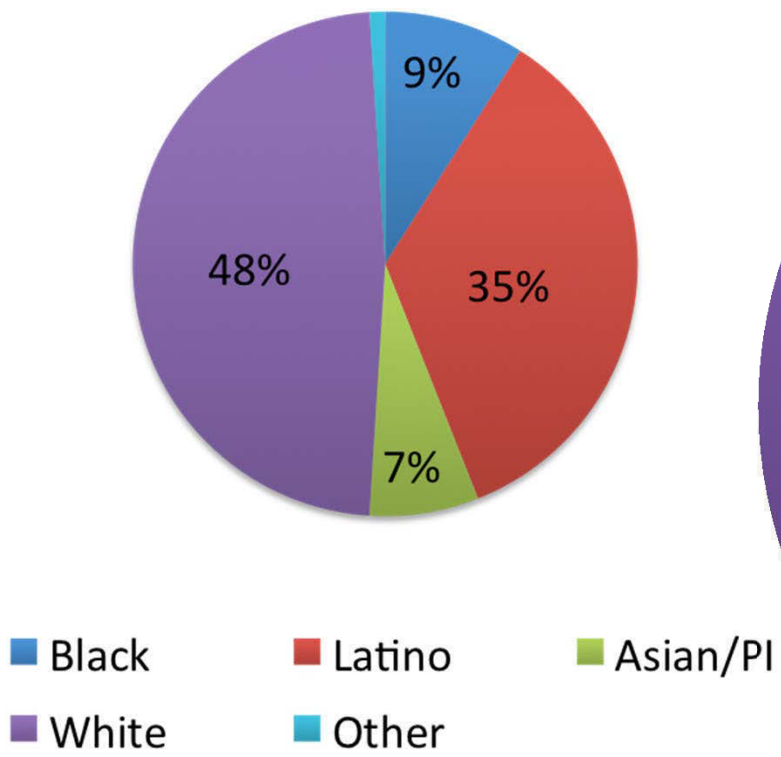


CC Freshmen Subset *(n=953)*

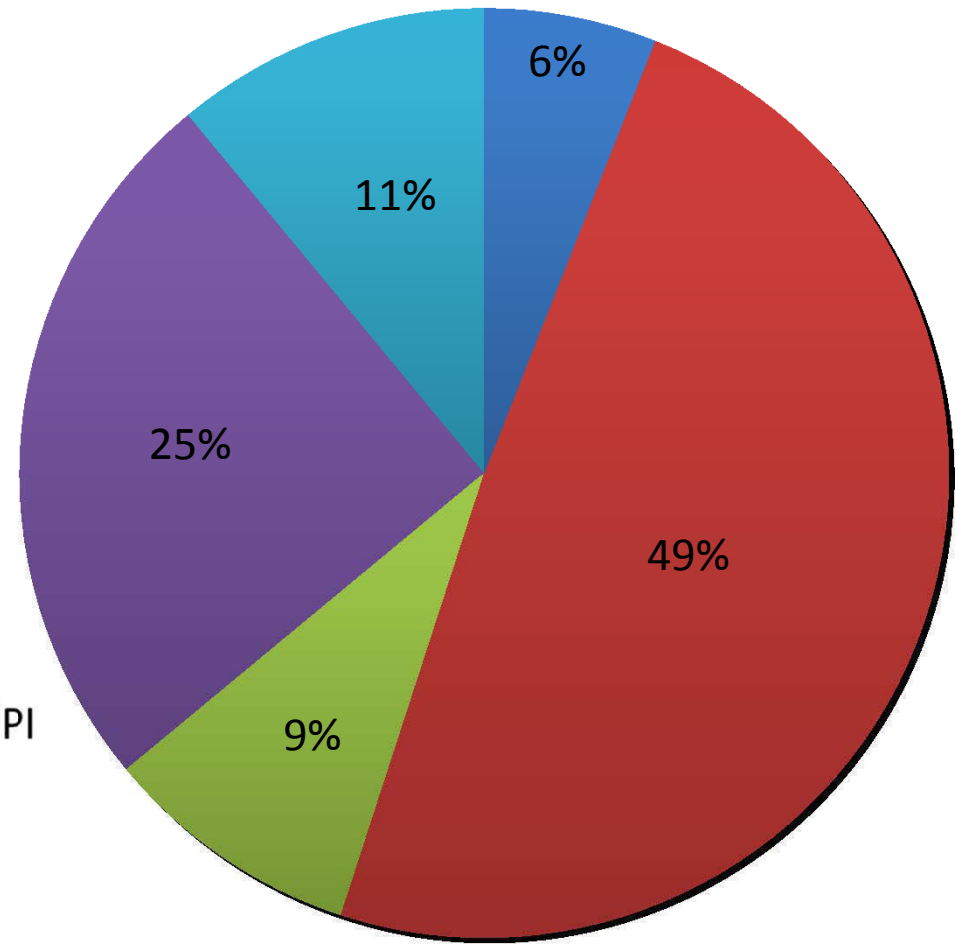


CC Freshmen Ethnicity

Sample *(N=953)*



State Fall 2012 *(N=164,857)*



High School Math Pathway Markers

- *Where students start:* Grade 9 Math
  - Geometry or Above
  - Algebra 1 or Below
- *When students stop:* Math in Grade 12
  - Yes or No
- *Where students stop:* Highest-Level Math
  - Above Algebra 2
  - Algebra 2
  - Below Algebra 2

Every course beyond Algebra 2 doubles the odds of college completion (Adelman, 2006)

All 12 high school math pathways lead to high school graduation

Path	High School Observed Math Pathways			All Students *N=2920*	CC Freshmen *n=953*
	Grade 9 Math Class	Math in Grade 12	Highest-Level Math		
1	Geometry	Yes	Above Algebra 2	36.5%	17.7%
2	Algebra 1 and Below	No	Algebra 2	12.4%	19.5%
3	Algebra 1 and Below	Yes	Above Algebra 2	11.0%	11.6%
4	Geometry	No	Above Algebra 2	9.6%	10.3%
5	Algebra 1 and Below	Yes	Algebra 2	6.0%	10.4%
6	Algebra 1 and Below	No	Below Algebra 2	2.0%	2.9%
7	Algebra 1 and Below	Yes	Below Algebra 2	1.5%	2.2%
8	Geometry	No	Algebra 2	.9%	1.3%
9	Geometry	Yes	Algebra 2	.4%	.5%
10	Geometry	Yes	Below Algebra 2	.4%	.6%
11	Algebra 1 and Below	No	Above Algebra 2	.2%	.2%
12	Geometry	No	Below Algebra 2	.1%	.2%
	TOTAL			81% (2363)	78% (739)

The goalposts have moved…

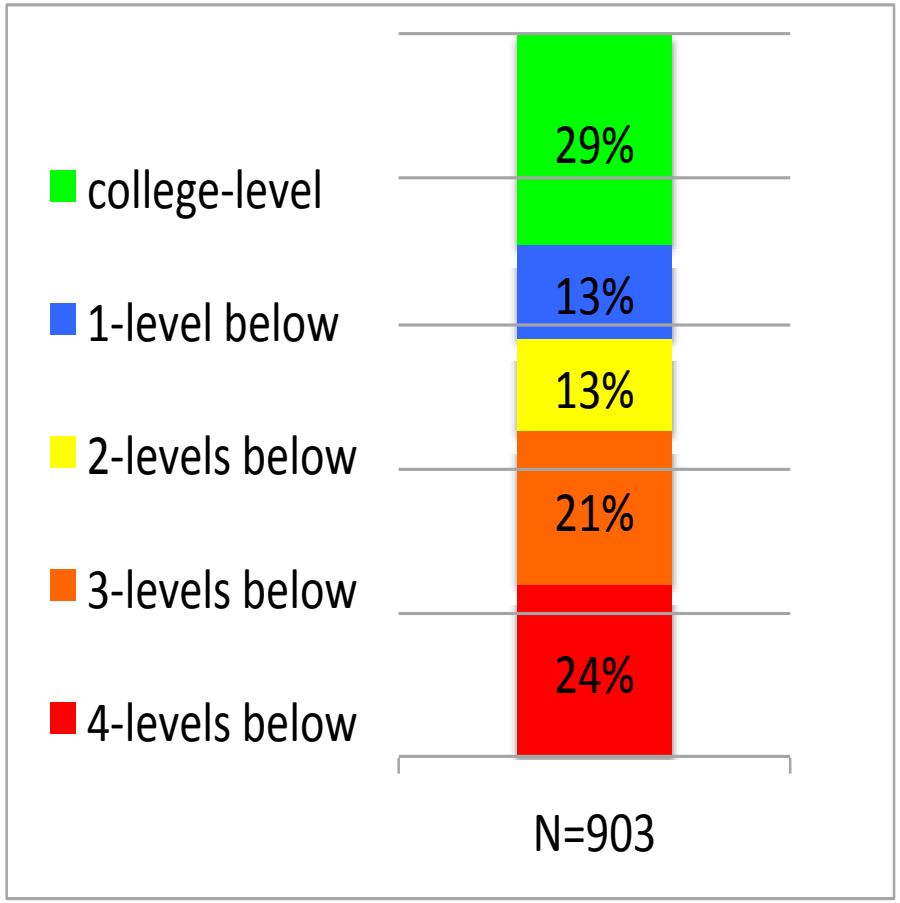
How do the different high school mathematics pathways prepare students for community college?

Enter Community College, Take Math Placement Assessment

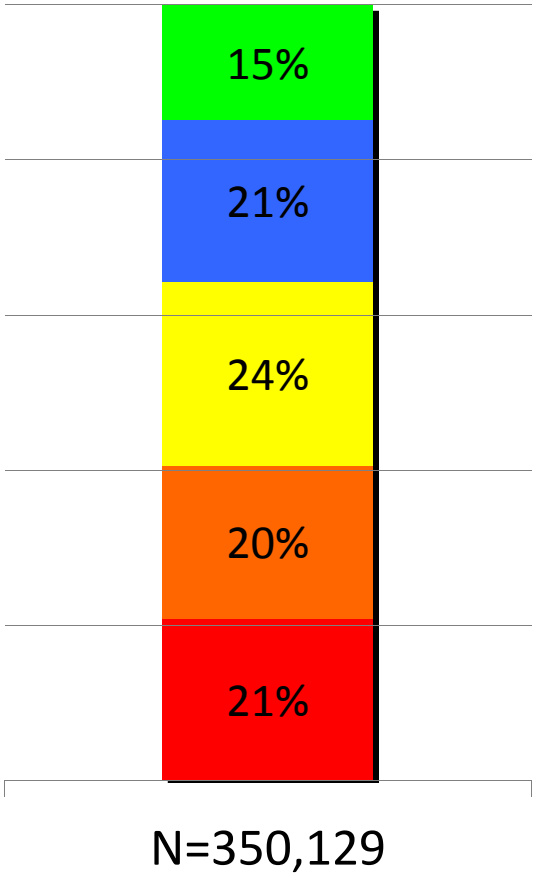
Assessment	Placement
College-level Mathematics	College-level Mathematics
1-level below	Intermediate Algebra
2-levels below	Algebra 1
3-levels below	Pre-Algebra
4-levels below	Basic Arithmetic

College Math Placement Results

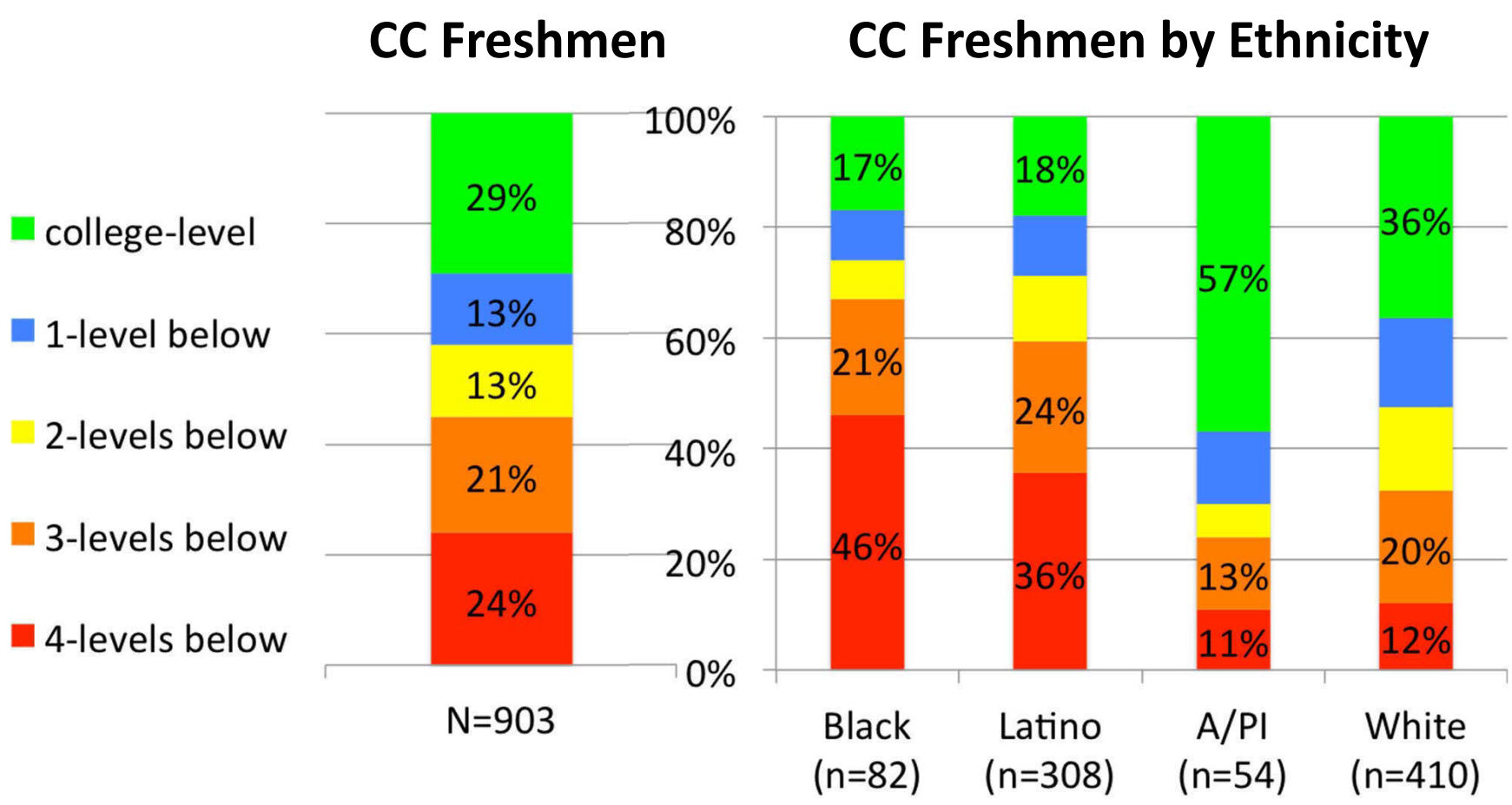
Sample CC Freshmen



State CC Freshmen - Fall 2010



College Math Placement Results



What predicts placing into college-level or below-college-level coursework on the community college placement assessment?

Variables Tested in Predictive Model

1. Gender
2. Ethnicity
3. Parent Education
4. Low SES
5. Grade 9 Math Course – *where students start*
6. Highest-Level Math Course – *where students stop*
7. No Math in Grade 12 – *when students stop*
8. Grade 9 Math GPA
9. Grade 10 Math GPA
10. Grade 11 Math GPA
11. CAHSEE Math

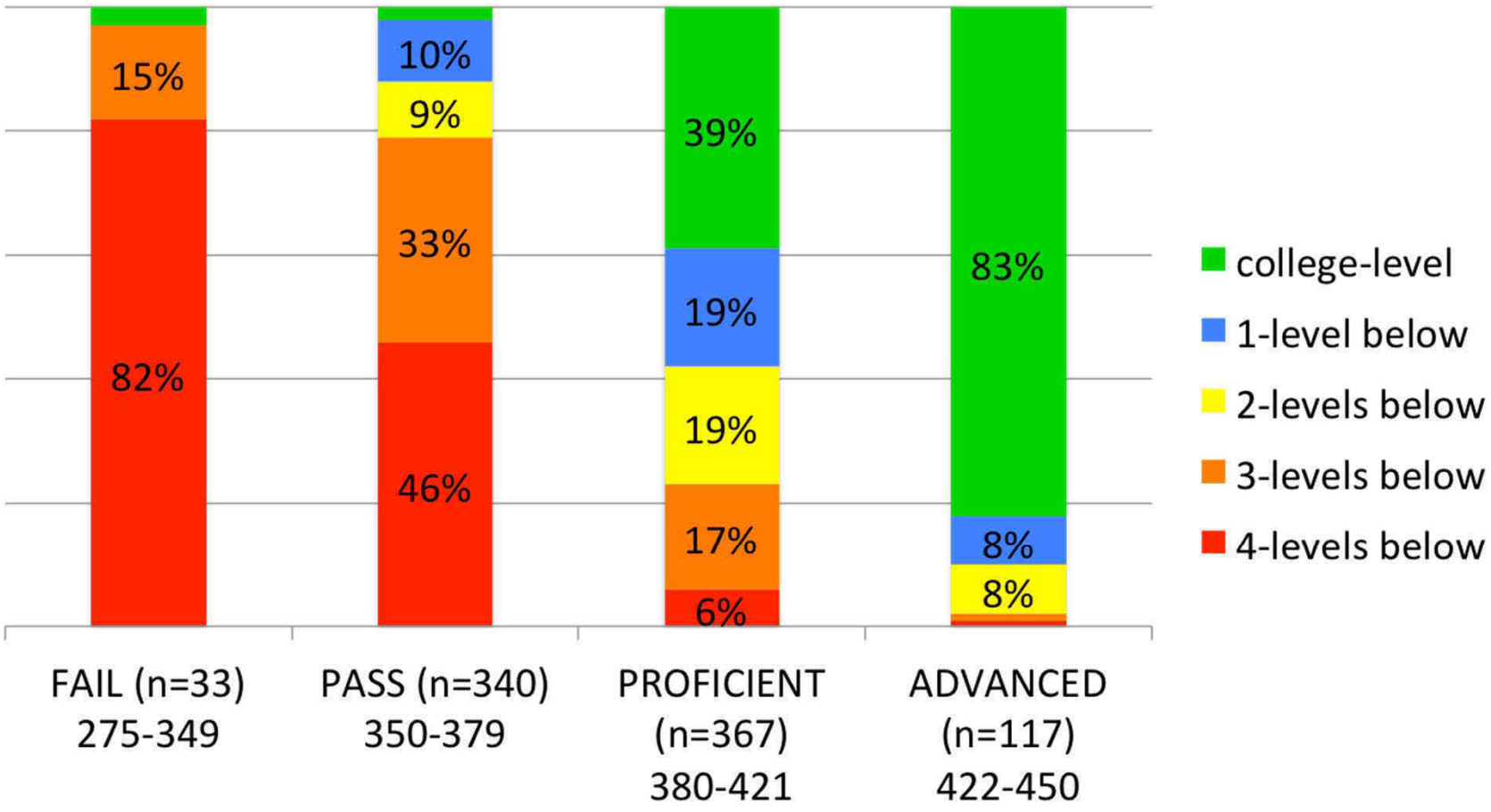
Significant Predictors of Placement in Below College-Level Mathematics

Variables Tested	Levels below-college-level mathematics			
	-1	-2	-3	-4
Gender				
Ethnicity				
Parent Education				
Low SES				
Grade 9 Math	✓	✓	✓	✓
Highest-Level Math				
Grade 12 - No Math		✓	✓	✓
Grade 9 Math GPA				✓
Grade 10 Math GPA				✓
Grade 11 Math GPA		✓	✓	
CAHSEE Math	✓	✓	✓	✓

CAHSEE Math scores were a significant predictor of placement at all below-college-level mathematics.

Delta-p				
Variable	*1-level below*	*2-levels below*	*3-levels below*	*4-levels below*
CAHSEE Math	**22.64*** **	**22.72*** **	**22.53*** **	**21.54*** **
** p < .05, ** p < .01, ***p < .001*				

CAHSEE Math and Community College Assessed Placement Level *(N=857)*



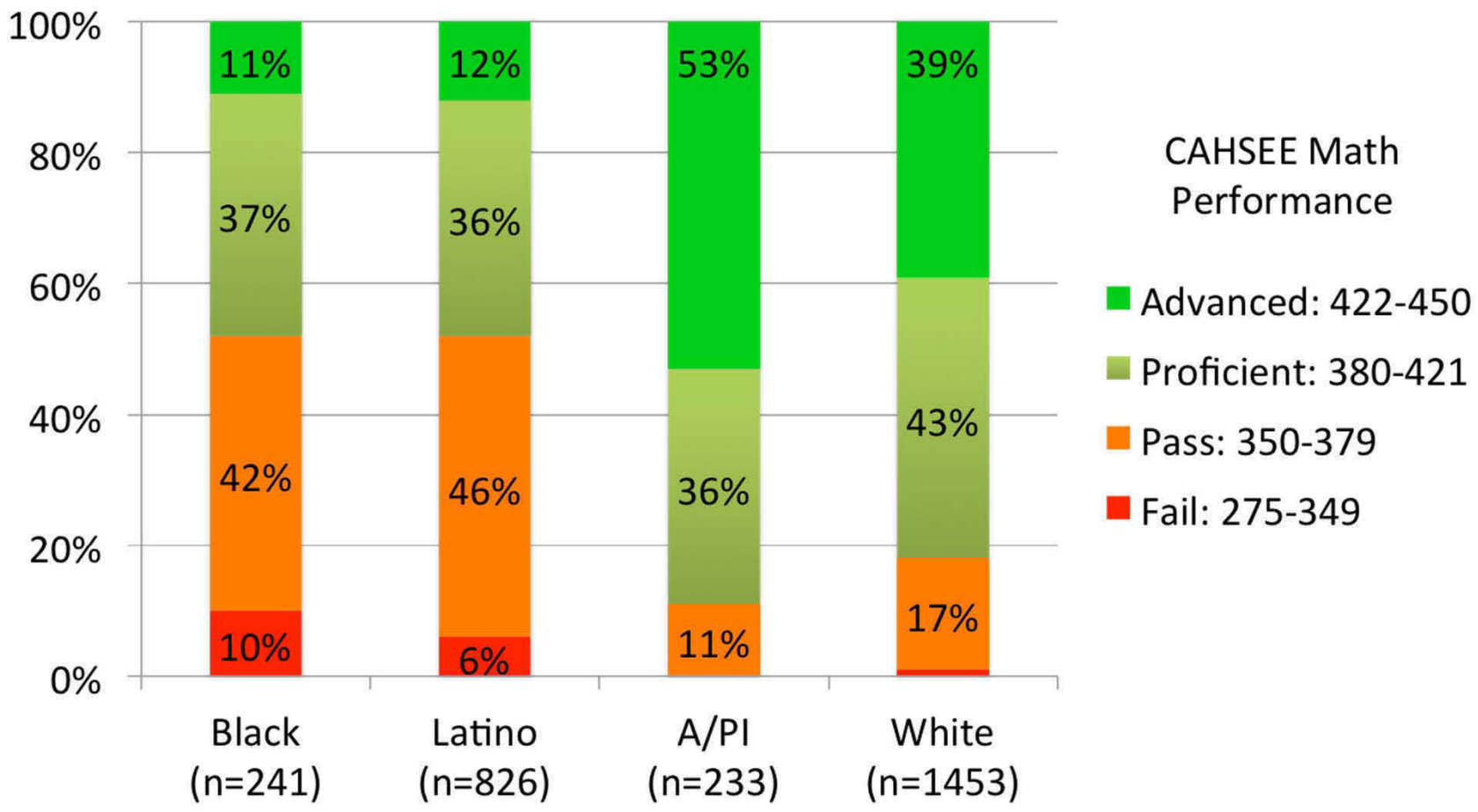
“Why do I care?”

-high school principal

Recommendation 1

- ✓ Reward growth in the number of students performing at Proficient and Advanced levels on the CAHSEE Math

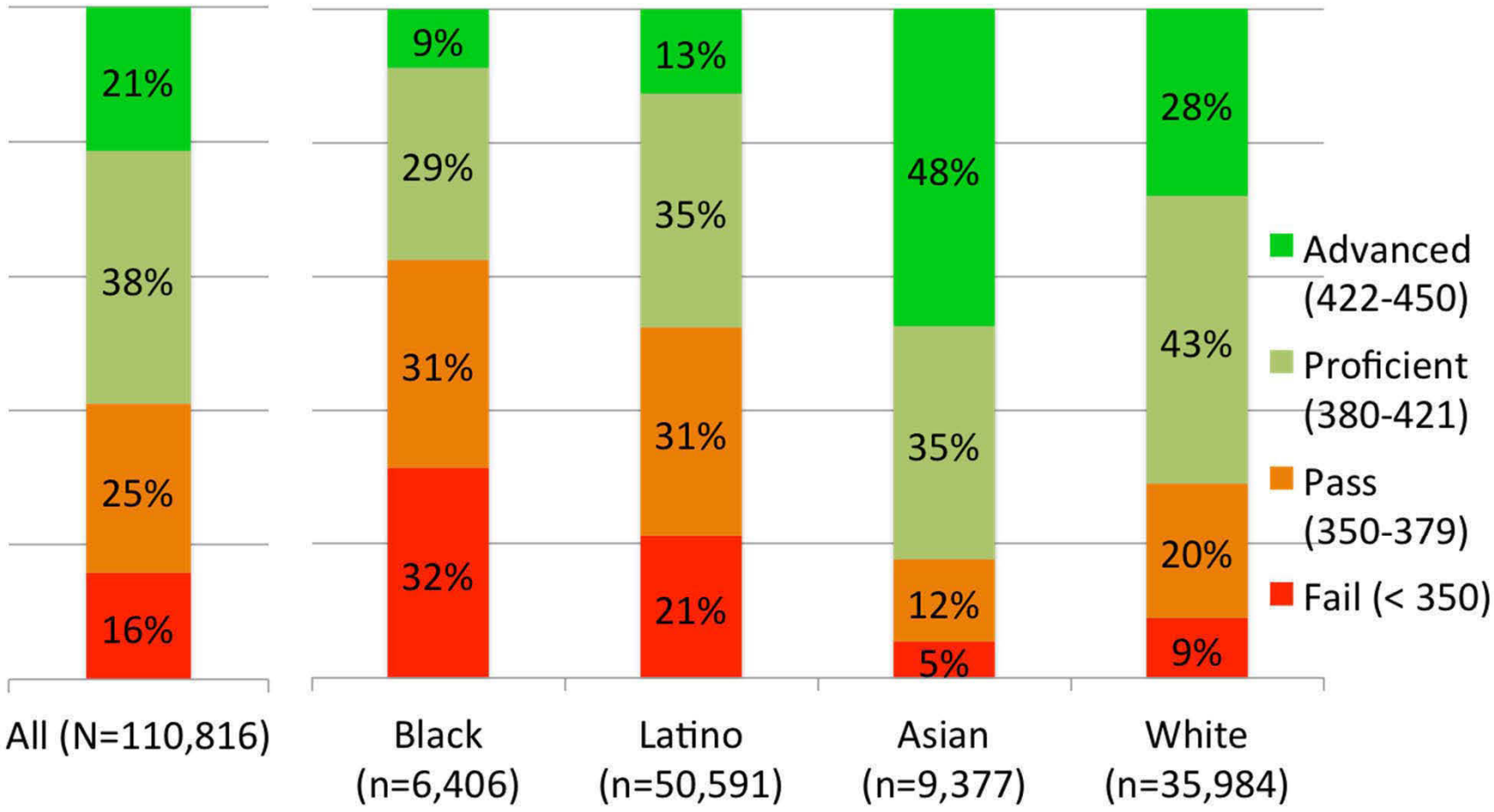
10th Grade CAHSEE Math Performance by Ethnicity *(N=2753)*



Data from Jaffe, 2012

10th Grade CAHSEE Performance 2011/12

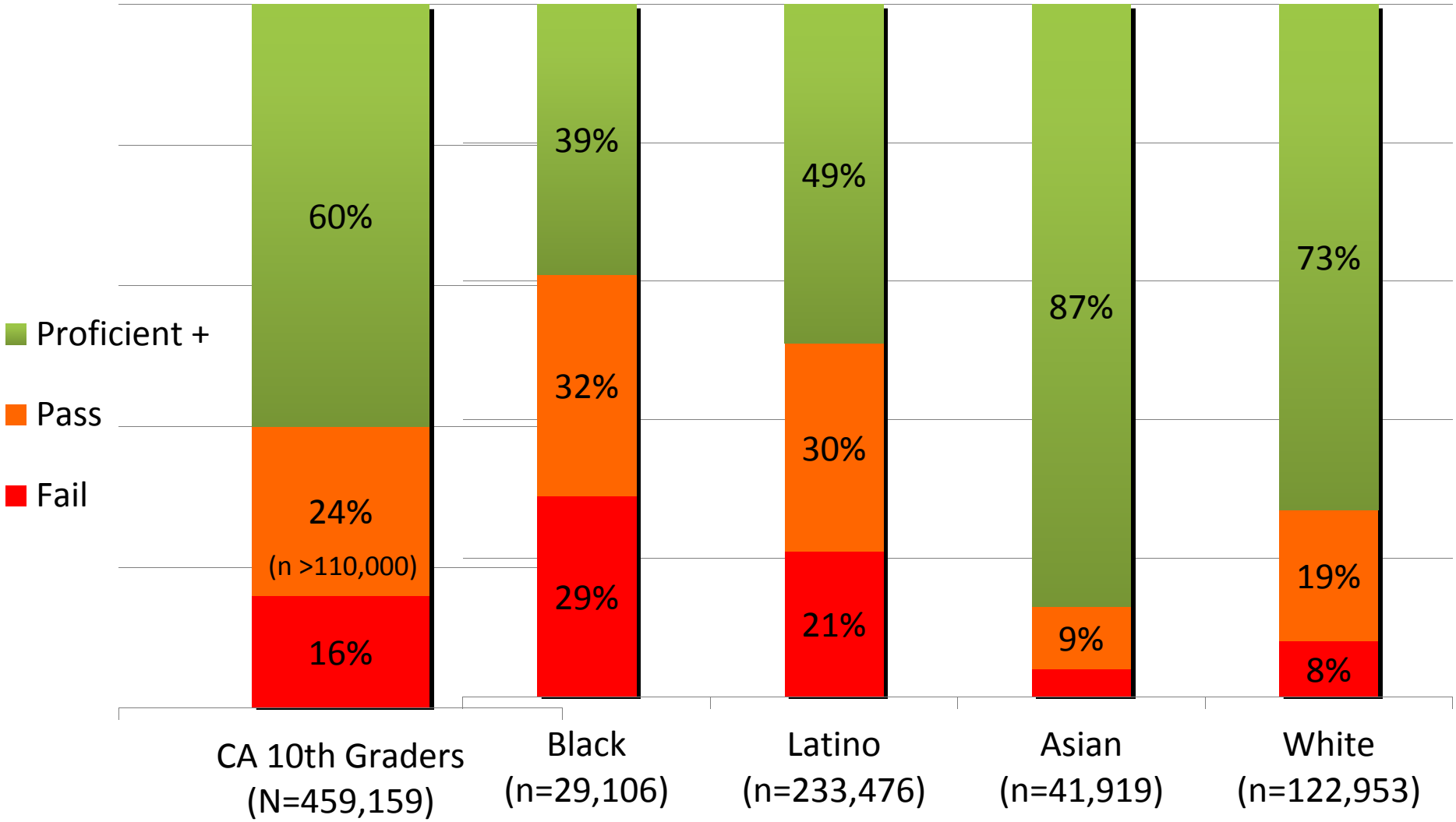
(N=110,816)



Data from Educational Results Partnership

10th Grade CAHSEE Performance 2012/13

(N=459,159)



Data from cde.ca.gov

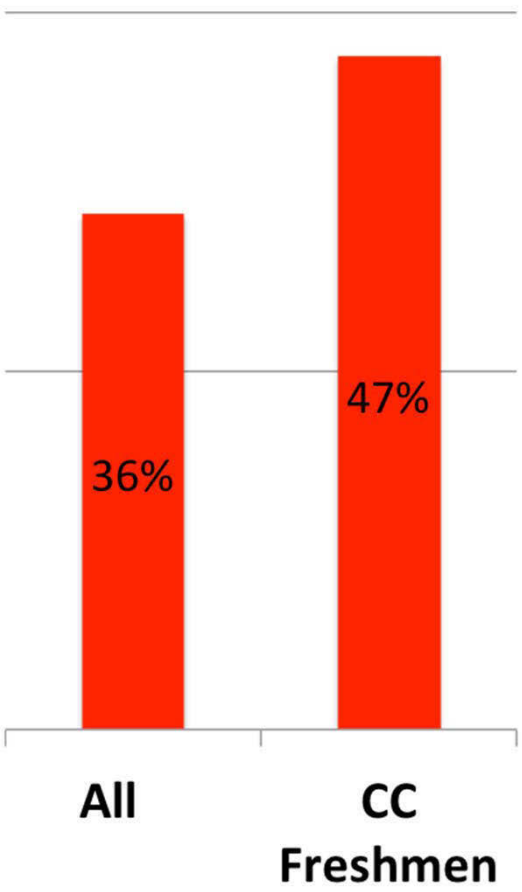
No Math in Grade 12 was a significant predictor of placement at 2-, 3-, and 4-levels below college-level mathematics, with a large effect.

Delta-p				
Variable	*1-level below*	*2-levels below*	*3-levels below*	*4-levels below*
No Math in Grade 12		**57.64****	**45.66***	**49.20****
** p < .05, ** p < .01, ***p < .001*				

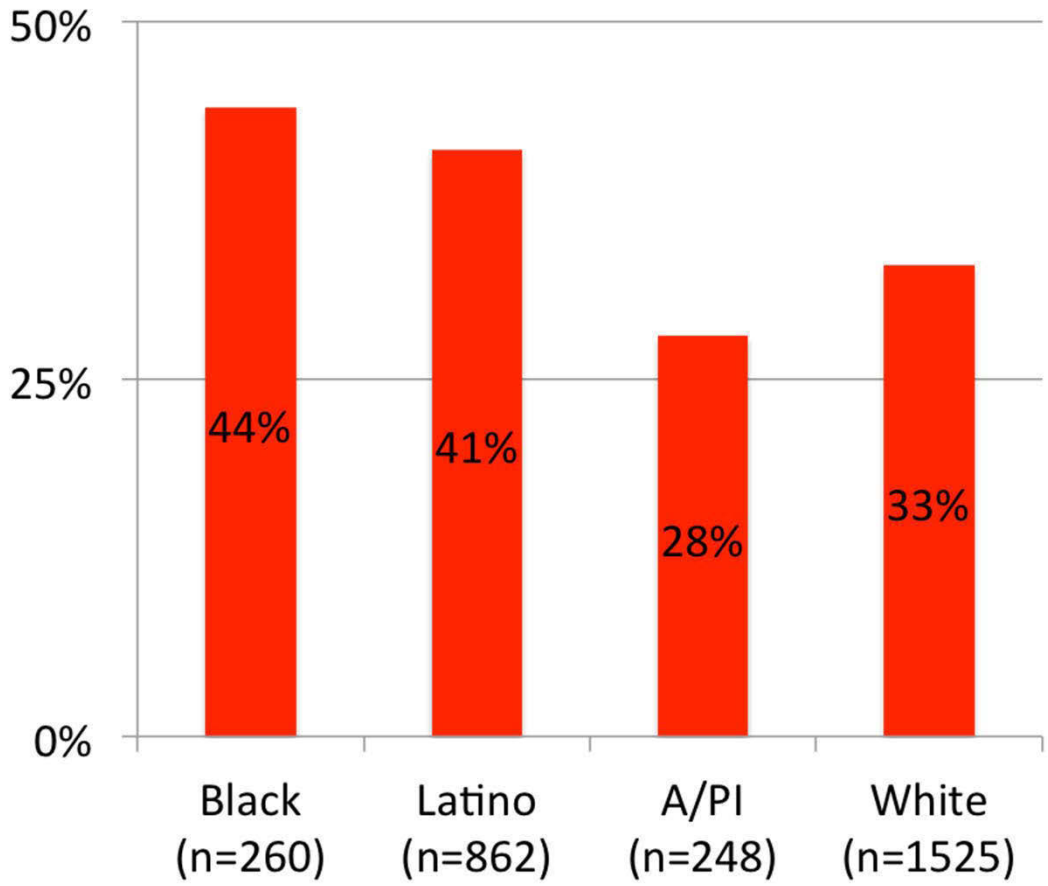
Who Took No Math in Grade 12?

All Students *(N=2920)*

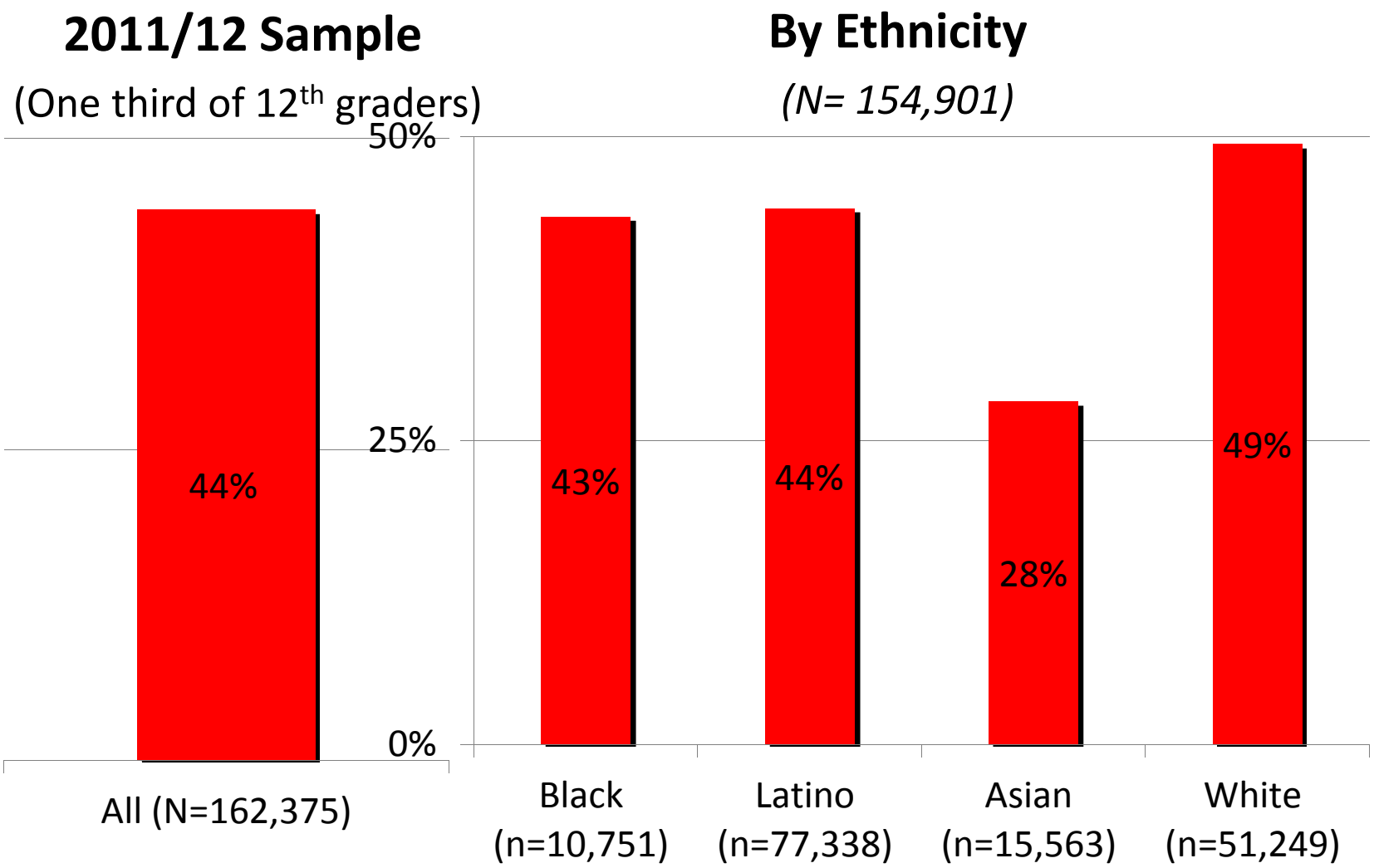
CC Freshmen *(N=953)*



By Ethnicity *(N=2895)*

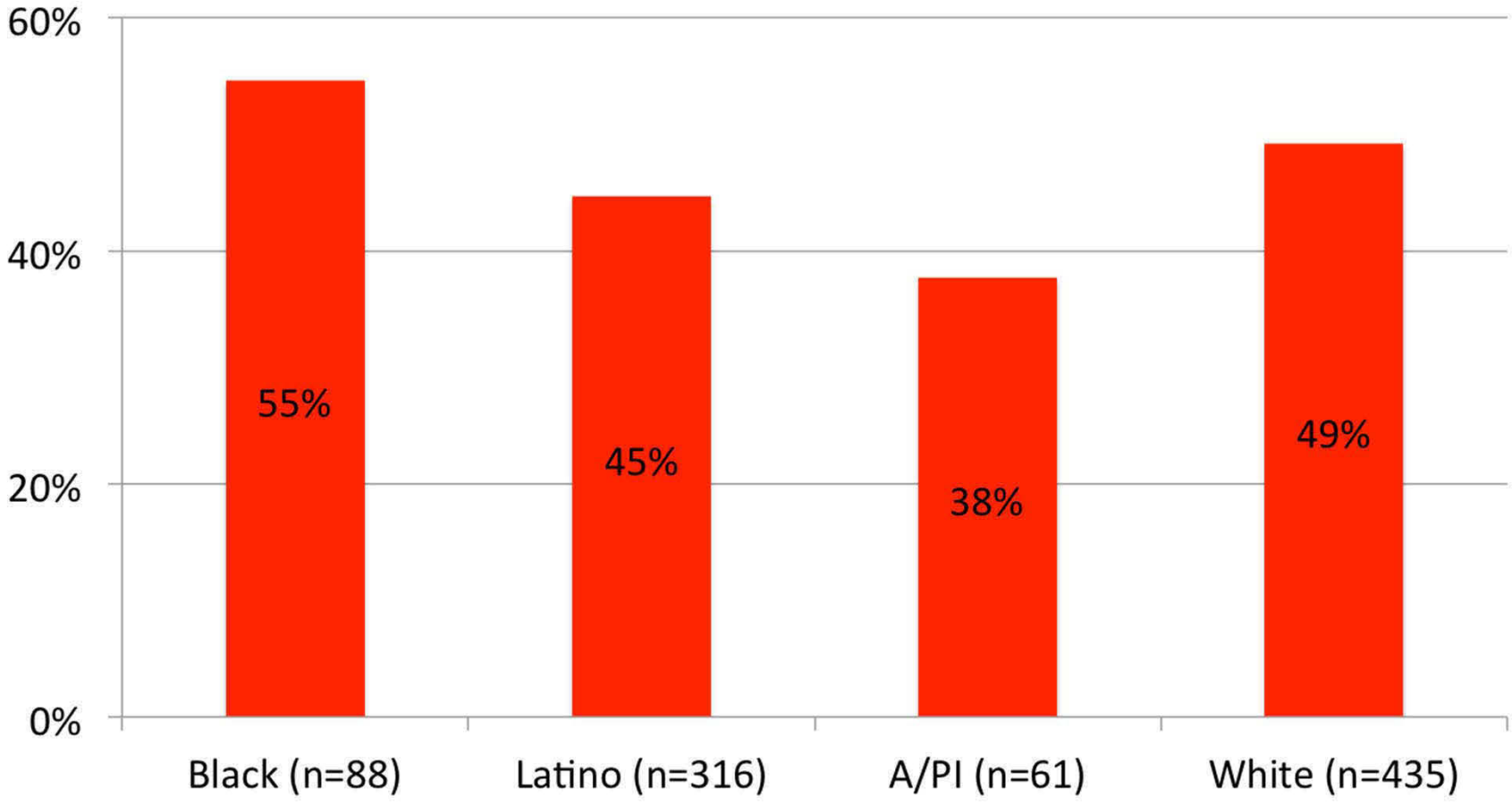


Who Took No Math in Grade 12?



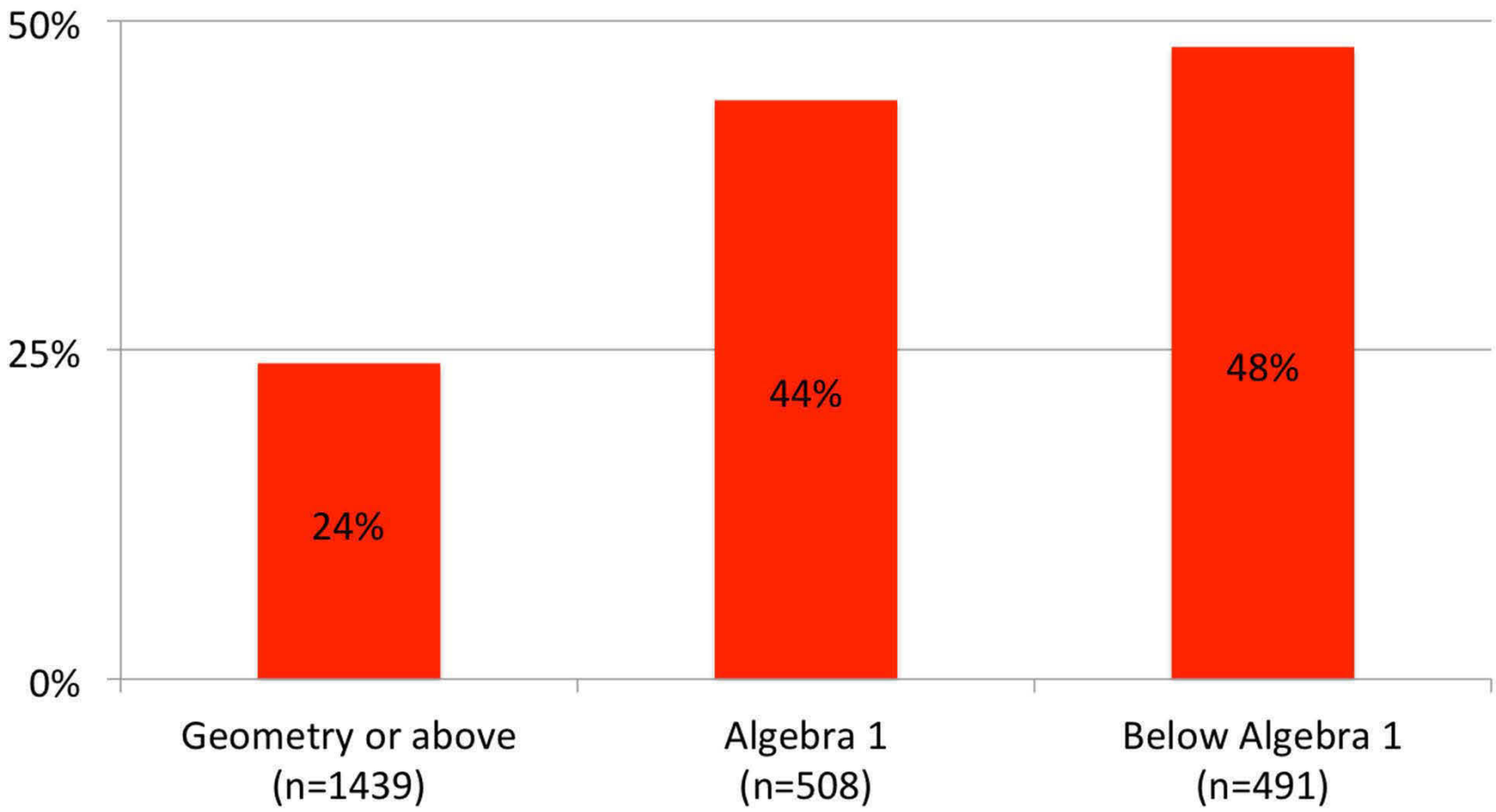
Data from Educational Results Partnership

No Math in Grade 12
CC Freshmen by Ethnicity *(N=900)*



Data from Jaffe, 2012

Who Took No Math in Grade 12?



Grade 9 Math

When it comes to increasing college readiness in mathematics for community college students, taking math in grade 12 is the low hanging fruit.

Recommendation 2

- ✓ Include taking mathematics in grade 12 as a high school API metric

How does not taking mathematics in grade 12 negatively impact students matriculating to community college?

Where students stopped was determined in part by *when* students stopped

Highest-Level Mathematics					
Students	Last Grade	Above Alg. 2	Alg. 2	Geom.	Alg. 1 and below
All *(n=2920)*	12	52%	9%	1%	2%
	11	**11%**	**15%**	**3%**	**1%**
Total		63%	24%	4%	4%
CC Freshmen *(n=953)*	12	34%	14%	1%	3%
	11	**12%**	**23%**	**4%**	**2%**
Total		46%	37%	6%	5%

Most No Math in Grade 12 Students Passed Grade 11 Math

GPA in Grade 11 Math for students who took No Math in Grade 12						
		A	B	C	D	Fail
All Students	Above Algebra 2 (n=313)	21%	27%	33%	12%	6%
	Algebra 2 (n=438)	12%	20%	33%	17%	18%
	Geometry (n=86)	7%	10%	19%	37%	27%
CC Freshmen	Above Algebra 2 (n=110)	8%	26%	36%	19%	10%
	Algebra 2 (n=218)	11%	17%	30%	20%	22%
	Geometry (n=39)	10%	13%	18%	41%	18%

Students who advanced beyond Algebra 2 were more frequently college-ready

Highest-Level Math with CC Math Placement							
High School Math		Community College Math Placement					
Highest-level	Grade Taken	College-level	1-level below	2-levels below	3-levels below	4-levels below	*N*
> Algebra 2	**12**	**54%**	**16%**	**13%**	**11%**	**6%**	**307**
	11	**48%**	**16%**	**15%**	**12.5%**	**8%**	**104**
Algebra 2	12	11%	8%	9.5%	32%	40%	126
	11	11%	14%	16%	28%	31%	210

From Cal-PASS Plus public achievement data

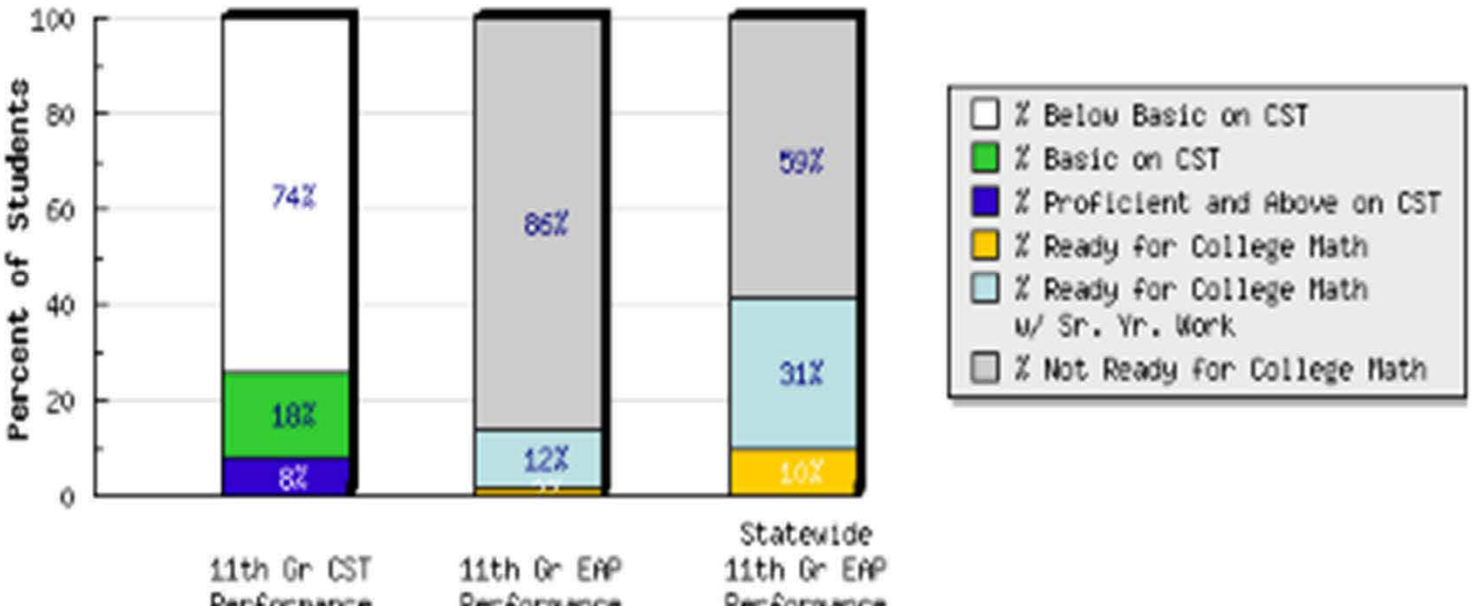
Grade 11 Algebra II 2012 Results
CSU Early Assessment Program Report

College Readiness – EAP Algebra II

Socioeconomic Disadvantaged: 26.1%
English Learners: 9.0%
Number Tested on CST: 295
Number Tested on EAP: 248 (84.1%)
Statewide CSU EAP Comparable Schools Found: 30

Click on Top Comparables bar below to see a breakdown of the schools that make up that bar.

All 11th Grade Math | **11th Grade Algebra II** | 11th Grade High School Summative Math



41% statewide ready with 12th grade math

From Cal-PASS Plus public achievement data

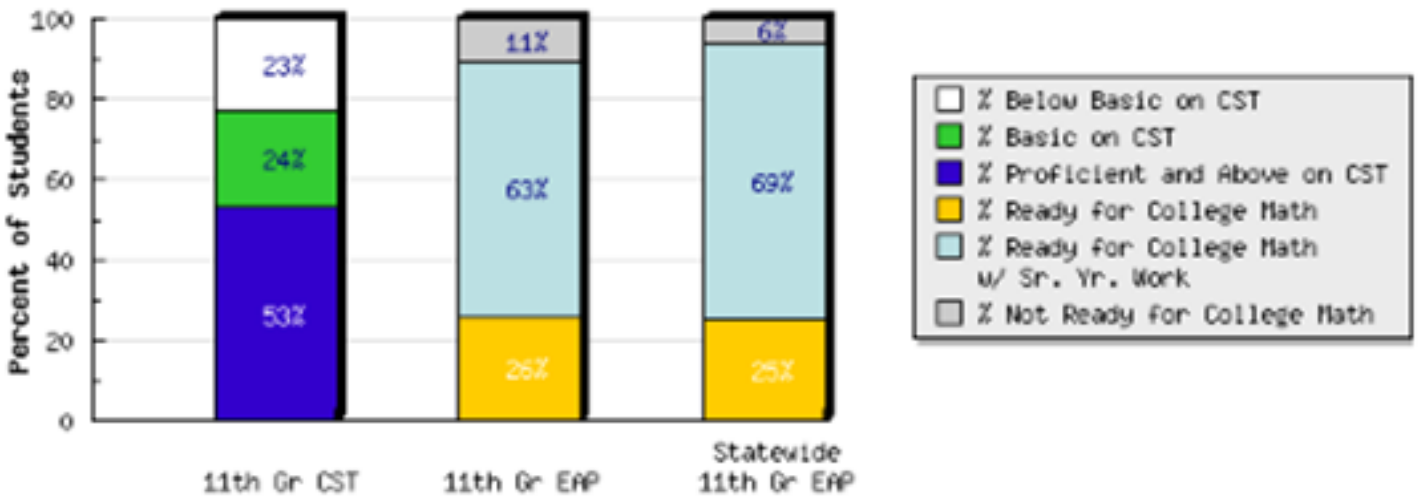
Grade 11 High School Summative Math 2012 Results
CSU Early Assessment Program Report

College Readiness – EAP Summative Math

Socioeconomic Disadvantaged: 26.1%
English Learners: 9.0%
Number Tested on CST: 469
Number Tested on EAP: 424 (90.4%)
Statewide CSU EAP Comparable Schools Found: 2

Click on Top Comparables bar below to see a breakdown of the schools that make up that bar.

All 11th Grade Math | 11th Grade Algebra II | 11th Grade High School Summative Math



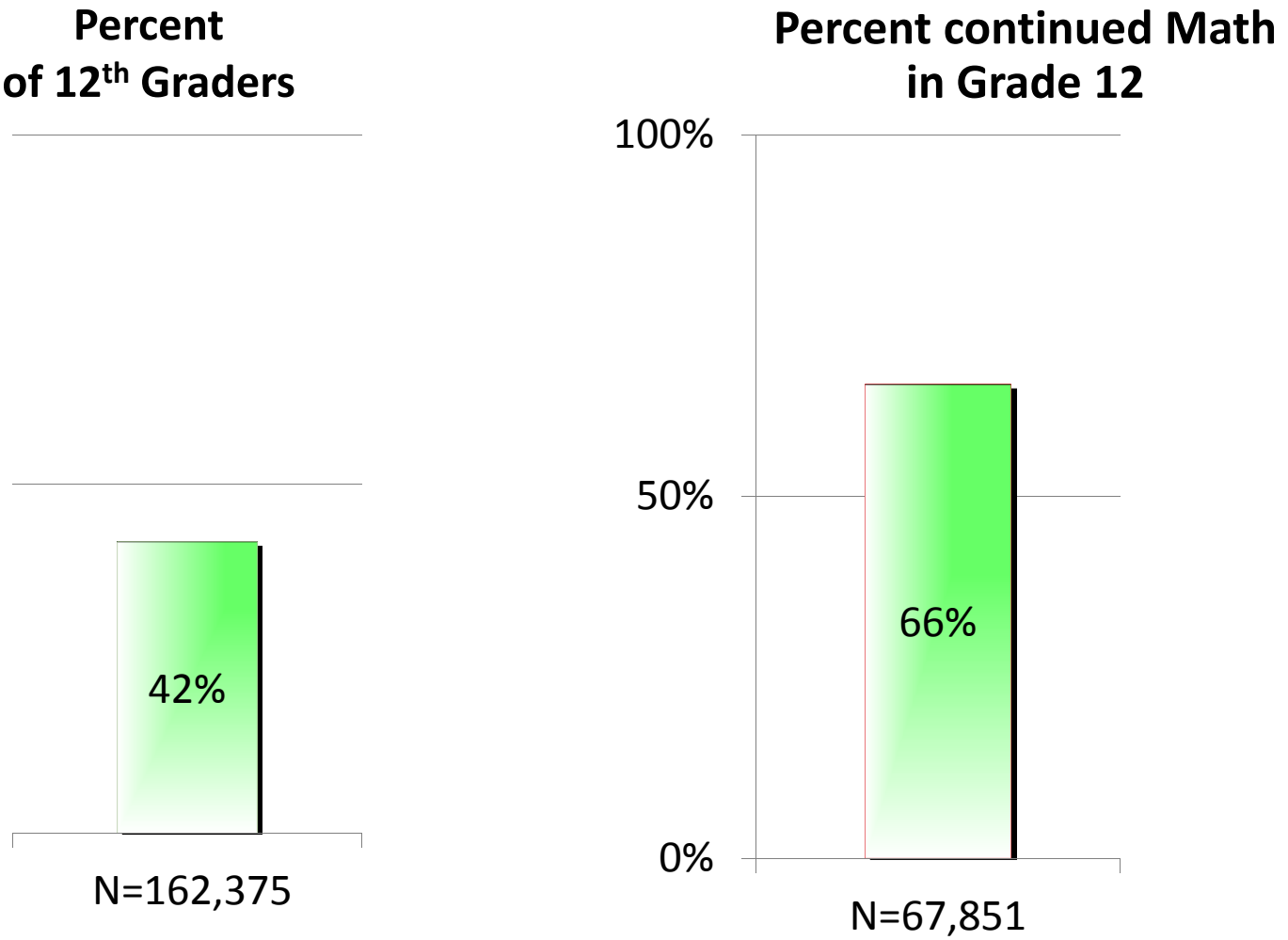
94% statewide ready with 12th grade math

Recommendation 3

- ✓ Include coursework beyond Algebra 2 as a high school API metric

*Every course **beyond** Algebra 2 doubles the odds of college completion (Adelman, 2006)*

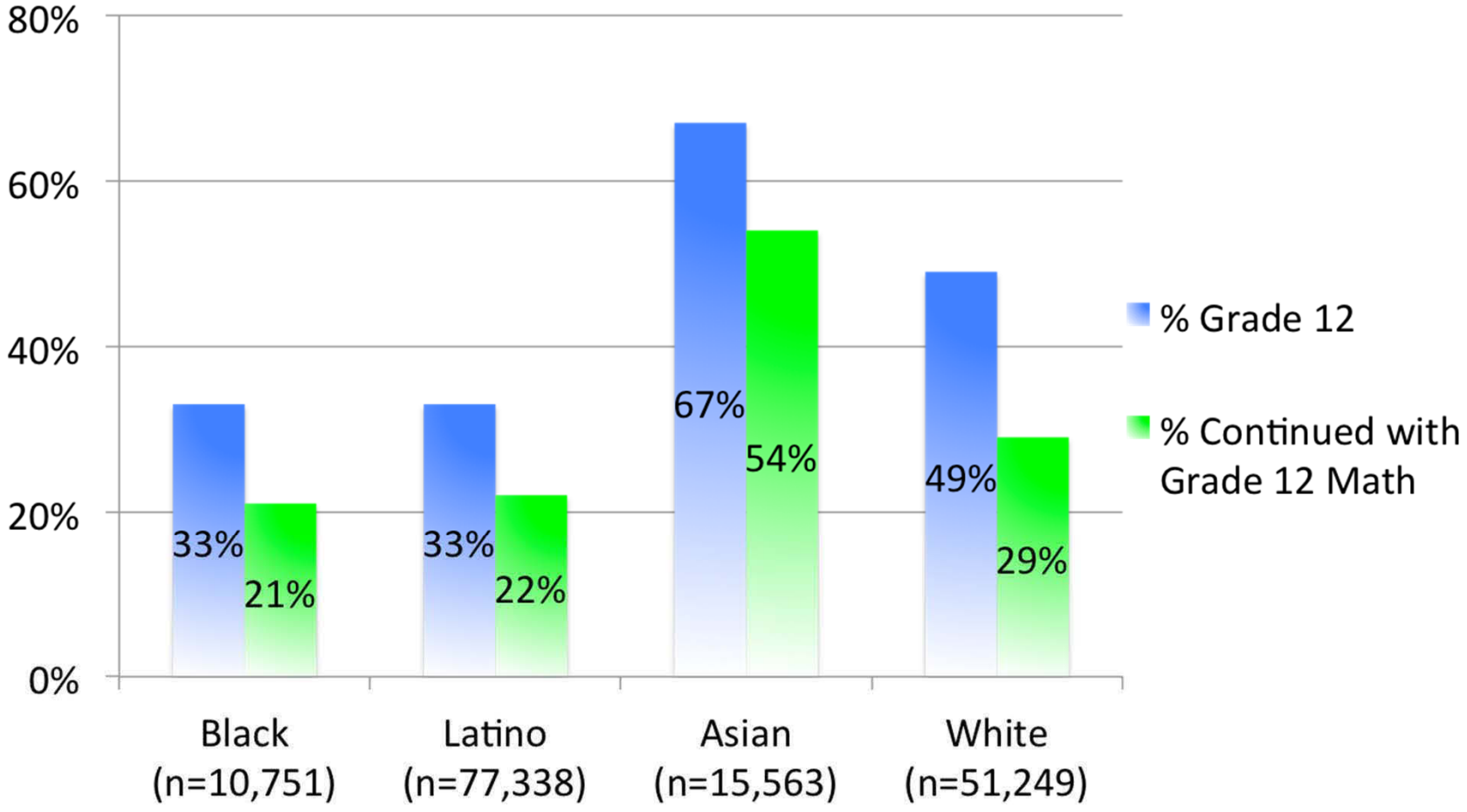
Students took Algebra 2 or higher before grade 12



Data from Educational Results Partnership

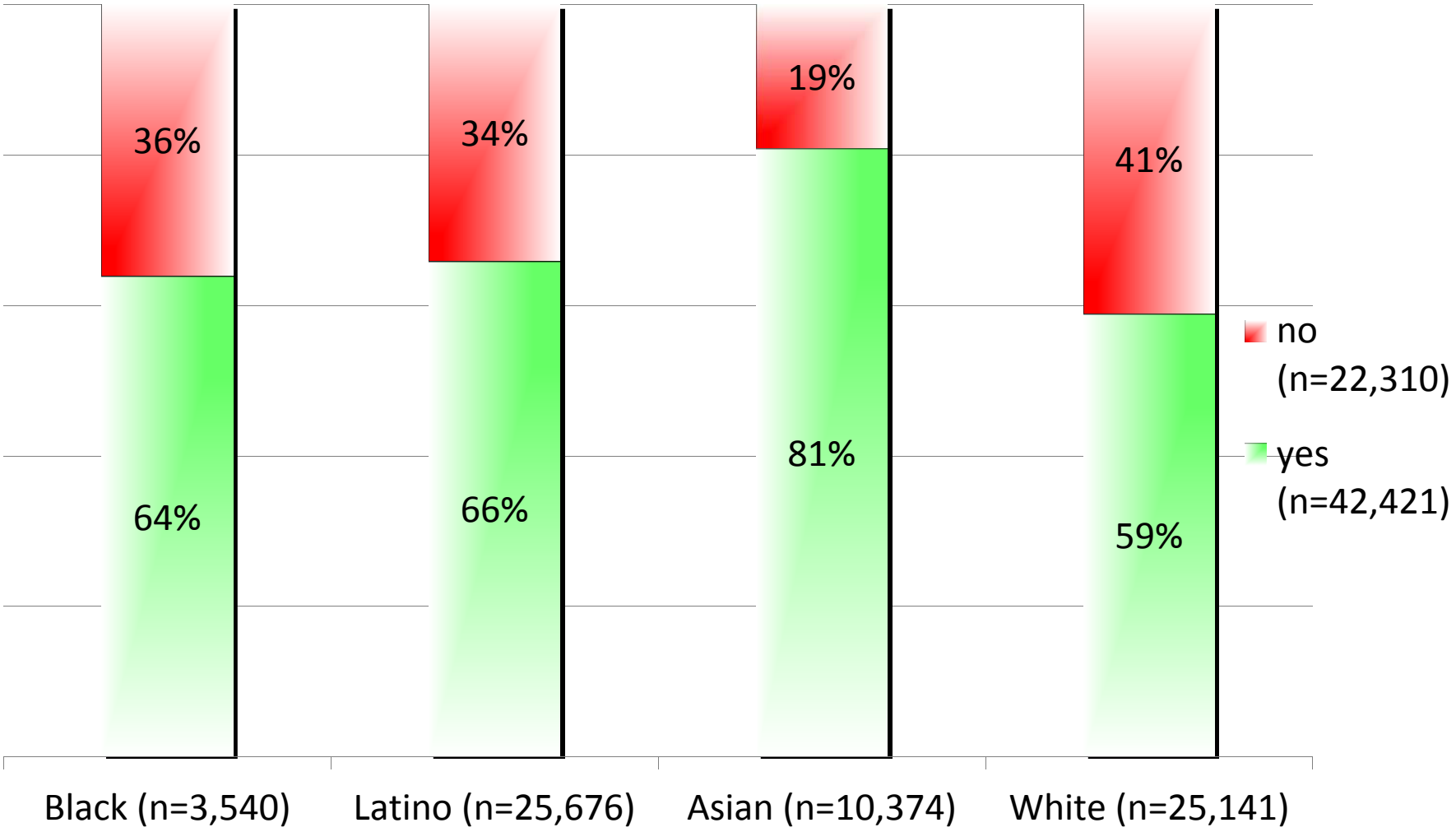
Percent of 12th Graders Who Took Algebra 2 or Above Before Grade 12, by Ethnicity

(N=154,901)



Data from Educational Results Partnership

Participation in Grade 12 Math for students who took Algebra 2 or above before Grade 12, by Ethnicity *(N=64,731)*



Data from Educational Results Partnership

Putting this all together….

No Math in Grade 12: Different Students, Different Needs

HS Path	High School Mathematics Pathway Markers			CAHSEE Math Grade 10	Community College Placement Level	% of HS Path	n	% of 903
	Gr 9 Math	Grade 12 Math	Highest-level Math					
2	≤ Algebra 1	No	Algebra 2	380+	College-level	9%	17	2%
4	Geometry	No	> Algebra 2	380+	College-level	46%	43	5%
4	Geometry	No	> Algebra 2	380+	1-level below	13%	12	1%
4	Geometry	No	> Algebra 2	380+	2-levels below	14%	13	1%
2	≤ Algebra 1	No	Algebra 2	380+	1-level below	9%	17	2%
2	≤ Algebra 1	No	Algebra 2	380+	2-levels below	11%	20	2%
2	≤ Algebra 1	No	Algebra 2	380+	3-levels below	11%	19	2%
2	≤ Algebra 1	No	Algebra 2	**350-379**	3-levels below	19%	34	4%
2	≤ Algebra 1	No	Algebra 2	**350-379**	4-levels below	27%	48	5%
6	≤ Algebra 1	No	< Algebra 2	**350-379**	4-levels below	41%	11	1%
							234	26%

No Math in Grade 12: Four Groups of Need

1. No need – students are prepared
2. Need to brush up
3. Need to acquire more skills
4. Need remediation

By not taking mathematics in grade 12,
the students in Groups 2, 3, and 4
did not just miss an opportunity;
they diminished their chances for post-secondary success.

No Math in Senior Year

Launchpad to College Un-Readiness

One Size Does Not Fit All

- **balance the benefits** of clearly communicating and advancing college-readiness standards to high school students

- **without incurring the harmful effects** of presuming all students are ready to follow the same pathway

Recommended Revisions to API

1. Reward growth in the number of students performing at Proficient and Advanced levels on the CAHSEE Math.
2. Reward growth in the number of students taking mathematics in grade 12.*
3. Reward growth in the number of students taking mathematics coursework beyond Algebra 2.*

* *Consider making this permissive/inclusive of dual or concurrent enrollment*

Thank you!

Questions?

Please contact

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