YOUR STEPS TO STEM TRANSFER SUCCESS TO UC…AND BEYOND

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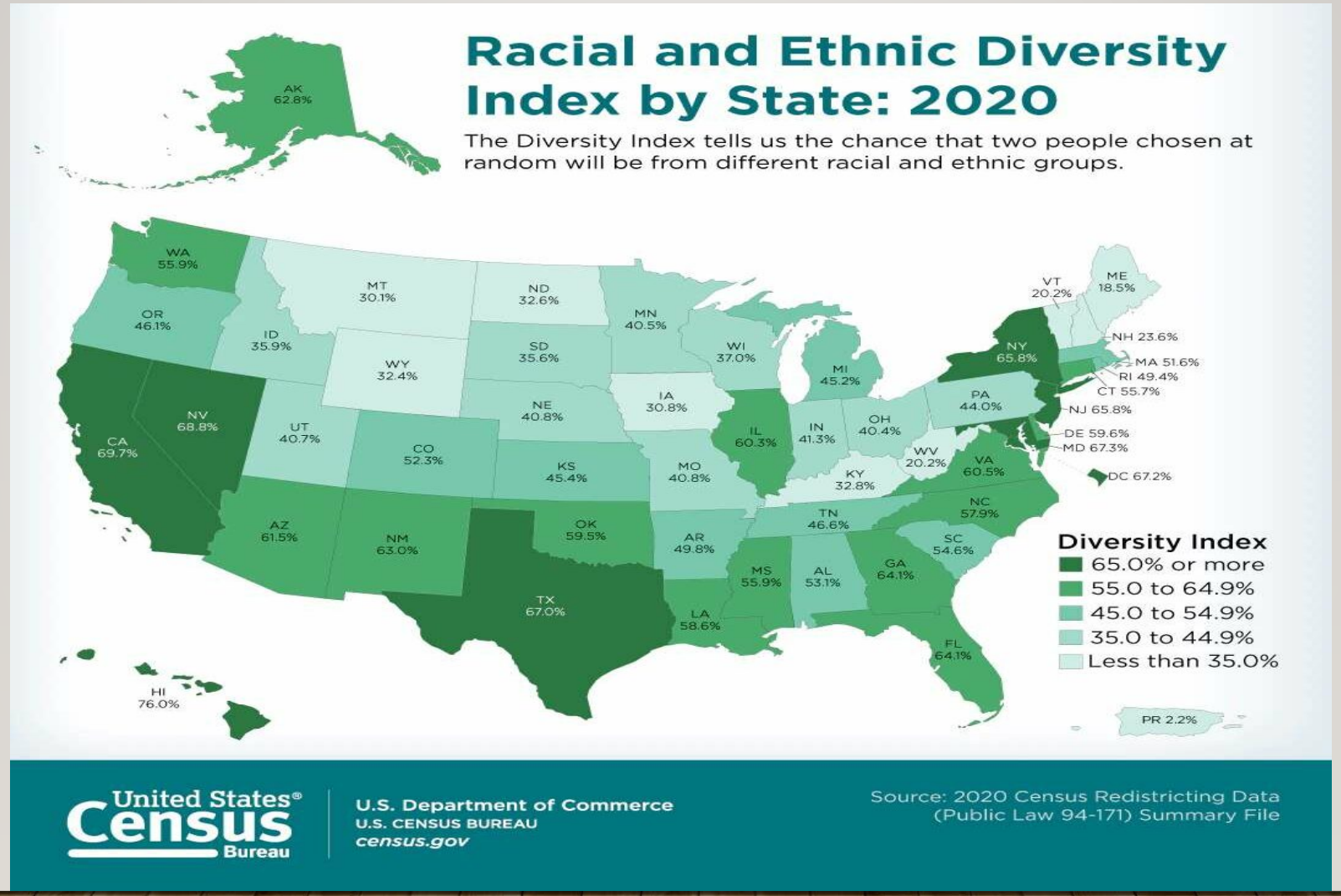
THE EVOLUTION OF HEALTH CARE*

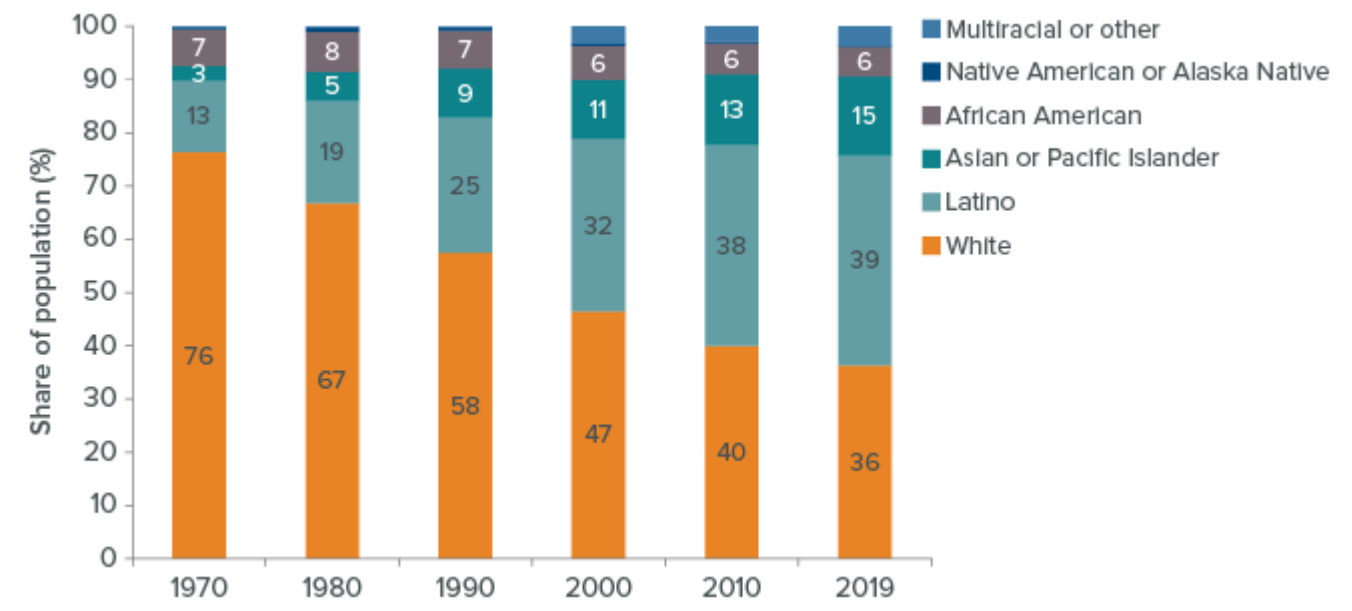
- **2000 BC "Here, eat this root."**
- **1000 AD "That root is heathen. Here, say this prayer."**
- **1850 AD "That prayer is superstition. Here, drink this potion."**
- **1940 AD "That potion is snake oil. Here, swallow this pill."**
- **1985 AD "That pill is ineffective, Here take this antibiotic."**
- **2000AD "The antibiotic is resistant, take this vaccine"**
- **2020 AD "That antibiotic doesn't work. Here, eat this root."**

CHANGING DEMOGRAPHICS IN THE U.S.

(PERCENTAGE OF POPULATION)
U.S. CENSUS 2020

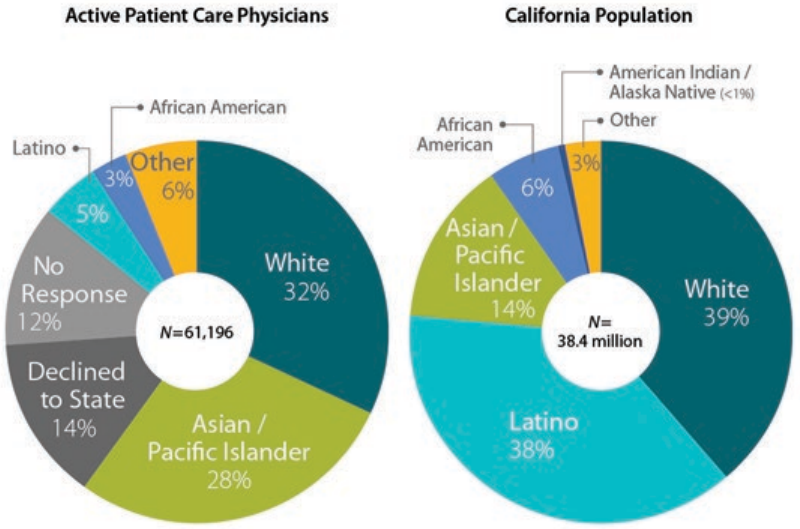


CHANGING DEMOGRAPHICS IN CALIFORNIA



Race/Ethnicity of Physicians and Population

California, 2015

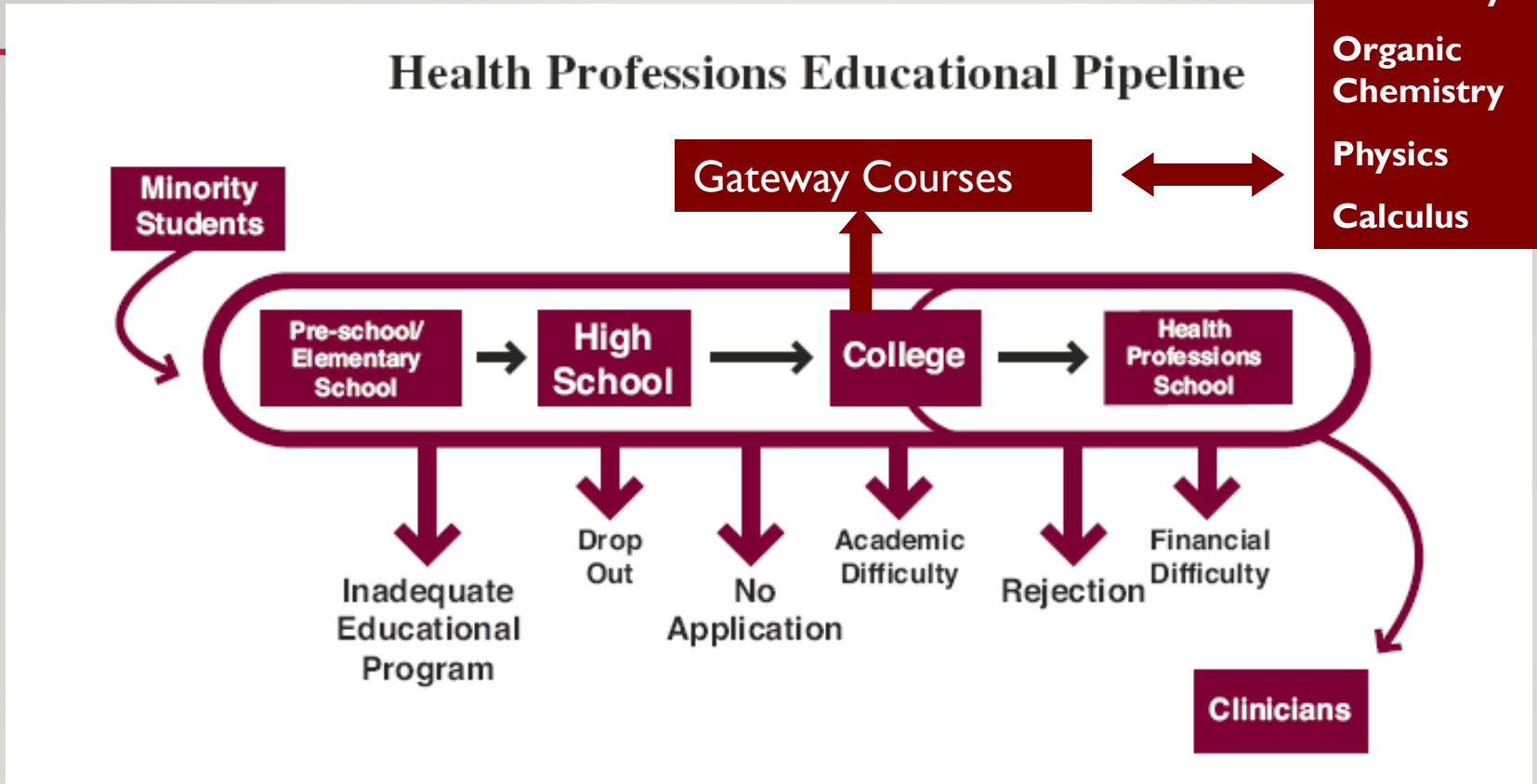


Notes: Data include active MDs, except residents and fellows, who practice in California providing at least 20 hours of patient care per week. *Other* includes American Indian, Native American, Alaskan Native, Native Hawaiian, those of two or more races, and those of unknown race/ethnicity. Segments may not total 100% due to rounding.

Sources: Survey of Licensees (private tabulation), Medical Board of California, 2015; 2015 American Community Survey, US Census Bureau.

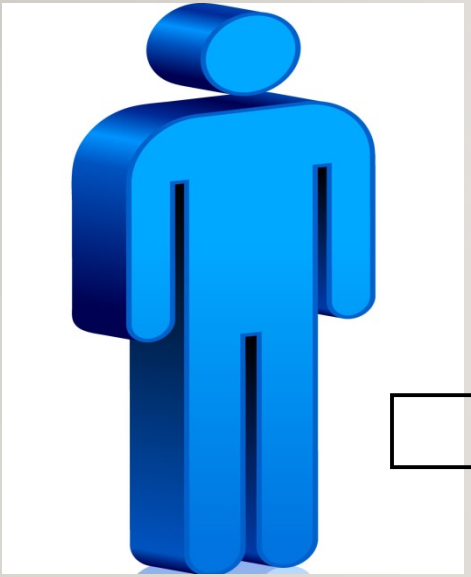
CALIFORNIA HEALTH CARE FOUNDATION

Charles J. Alexander, Ph.D., UCLA

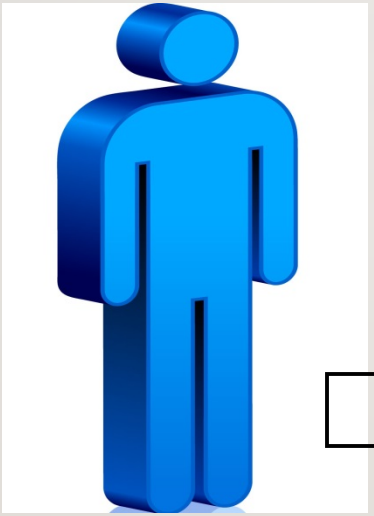


- Introductory Biology
- General Chemistry
- Organic Chemistry
- Physics
- Calculus

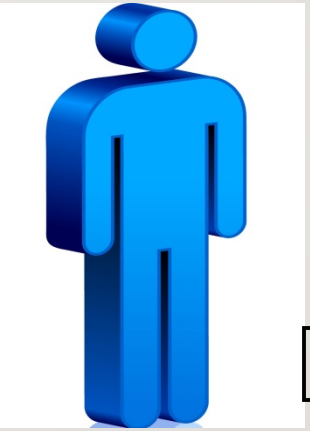
STEM PIPELINE FROM 9TH GRADE TO BACHELOR'S DEGREE FOR HIGH-INCOME STUDENTS IN THE U.S.



1000 Students in the Top Income Quartile Start the 9th Grade



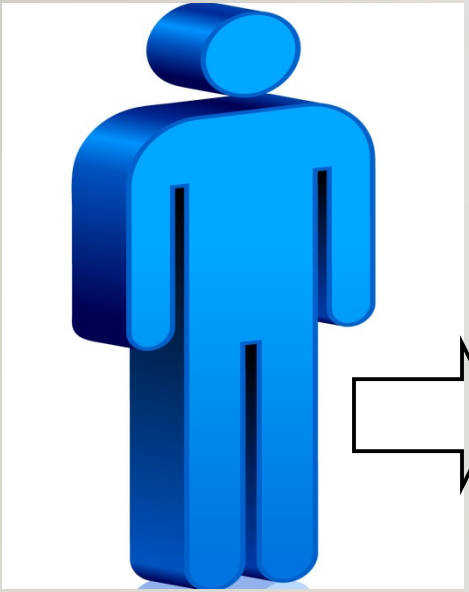
938 of 1000 Students Earn a High School Diploma



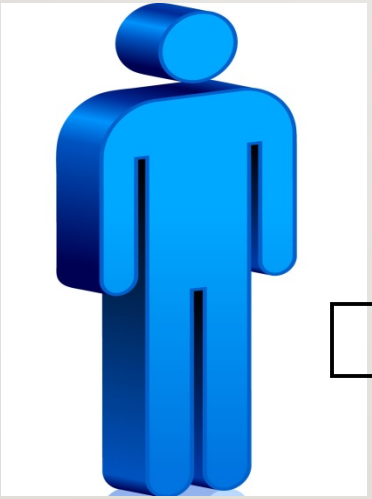
807 of 1000 Students Go to College
124 are Declared STEM Majors

571 of 1000 Students Earn a Bachelor's Degree
94 BA/BS in STEM Fields

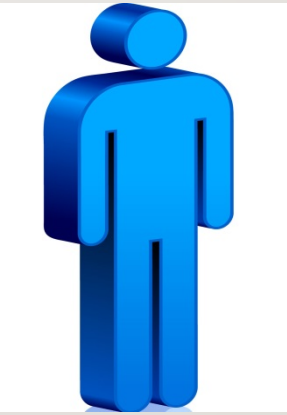
STEM PIPELINE FROM 9TH GRADE TO BACHELOR'S DEGREE FOR LOW-INCOME STUDENTS IN THE U.S.



1000 Students in the Bottom Income Quartile Start the 9th Grade



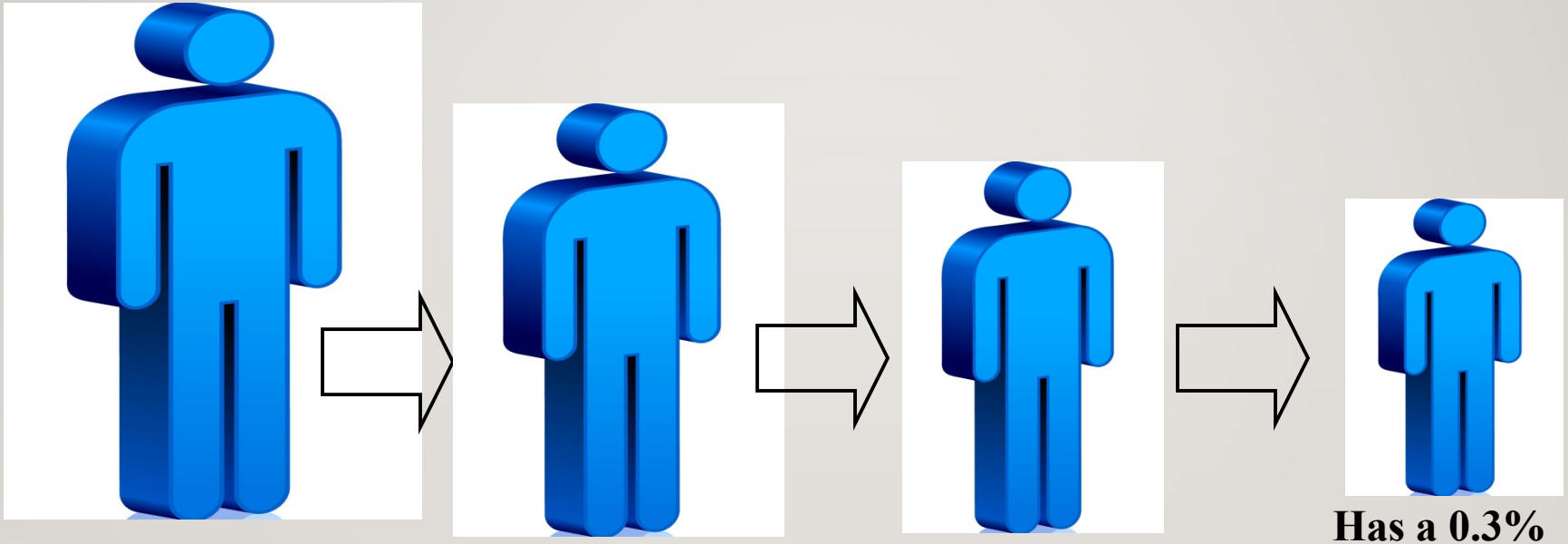
660 of 1000 Students Earn a High School Diploma



386 of 1000 Students Go to College
49 are Declared STEM Majors

71 of 1000 Students Earn a Bachelor's Degree
13 BA/BS in STEM Fields

STEM PIPELINE FROM 9TH GRADE TO BACHELOR'S DEGREE FOR LOW-INCOME STUDENTS IN THE U.S.



A 9th grader in the Bottom Income Quartile

Relative to the total 9th grade population

Has a 0.3% chance of graduating with a BA/BS in a STEM Field

QUESTIONS

- Do URM students receive lower grades in gateway courses than non-URM students?
- Do URM students perform disproportionately worse in particular gateway course(s)? (i.e., is there a URM "weeder" course?)
- Are URM students less likely than non-URM students to persist in completing the full requisite # of gateway courses?

STUDY PARTICIPANTS & DATA SOURCES

- Campus participants
  - UC (Berkeley, Los Angeles, Riverside), CSU (San Francisco, Los Angeles, Dominguez Hills)
- Student participants
  - All new students (freshman and transfers) entering during 1999-2000 and 2000-2001 academic years who enrolled in at least one gateway course between entry and end of 2005-06 academic year
- Data source for all variables
  - College administrative records

VARIABLES

- Predictor Variables
  - Student characteristics
    - Ethnicity (main predictor)
    - Gender
    - Transfer status
    - Intended college major
  - Academic preparation
    - High school status (CA public API score, CA private, non CA)
    - Standardized college admission test scores (SAT, ACT)

- Outcome Variables
  - Gateway course grades
  - GPA across gateway courses
  - Number of gateway courses completed

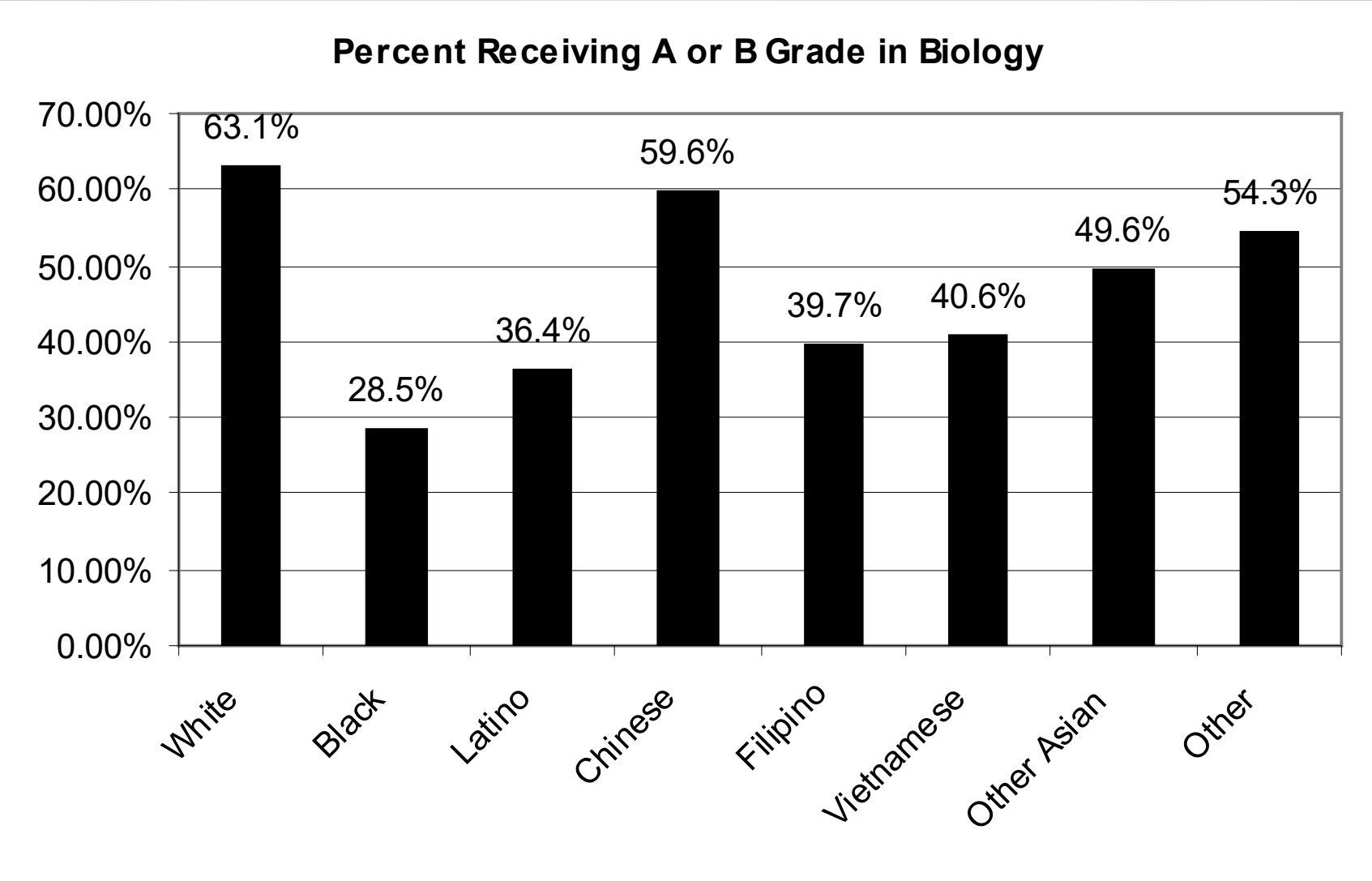
RESULTS – STUDY POPULATION
N=15,000

School: UC-Riverside	3160 (21.1)
School: UC-Berkeley	4030 (26.9)
School: UC-UCLA	5229 (34.9)
School: SF State	1499 (10)
School: CSU-Dominguez Hills	274 (1.8)
School: CSU - LA	808 (5.4)
Male	7482 (49.9)
Transfer	2577 (17.2)
Major: Biological Science	4727 (31.7)
Major: Physical Science	3936 (26.4)
Major: Undeclared/Other	6262 (42)

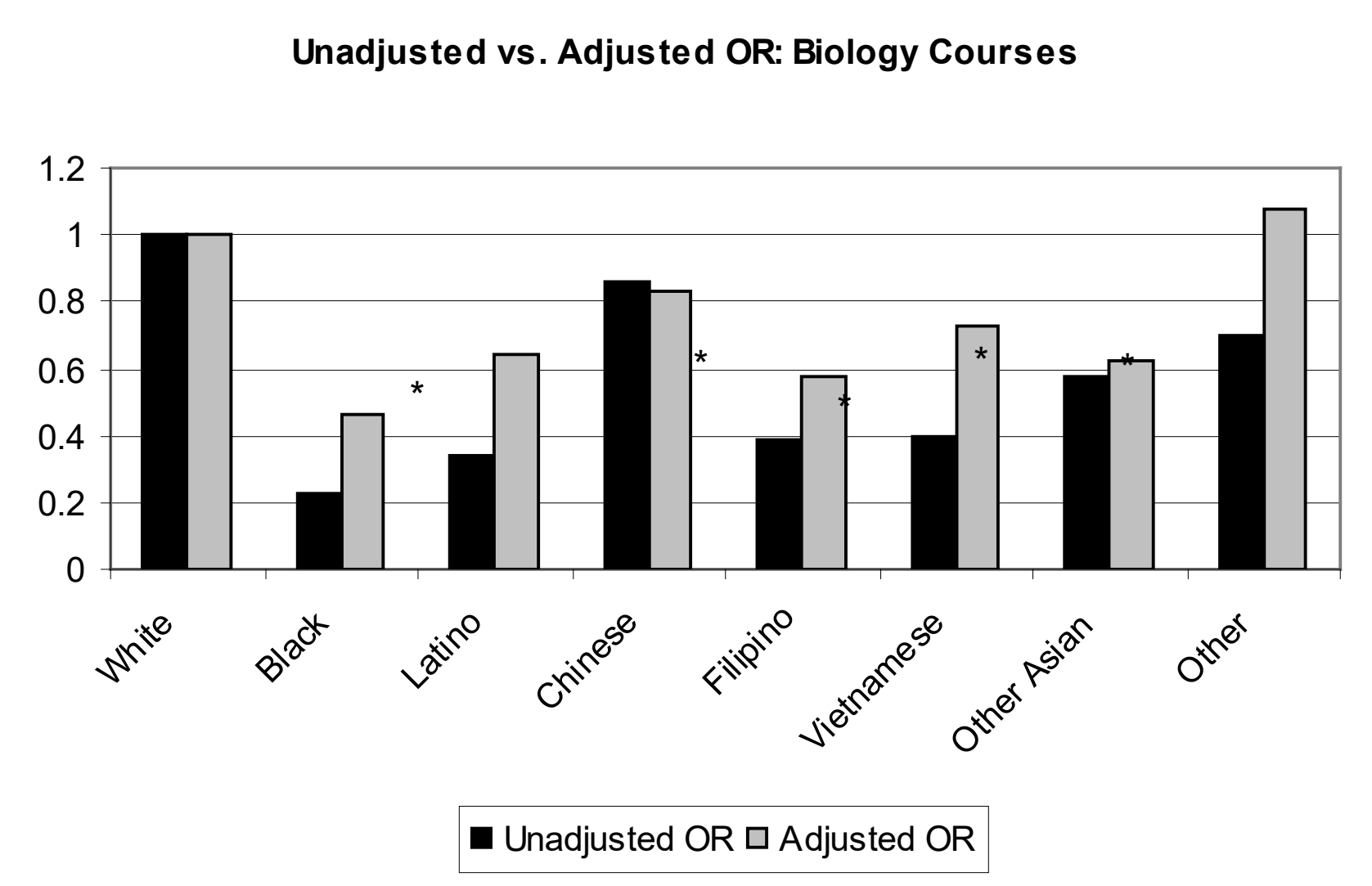
STUDY POPULATION BY RACE/ETHNICITY

	N (%)
Ethnicity: White	4247 (28.3)
Ethnicity: Black	729 (4.9)
Ethnicity: Latino	1743 (11.6)
Ethnicity: Chinese	3088 (20.6)
Ethnicity: Filipino	1055 (7.0)
Ethnicity: Vietnamese	1001 (6.7)
Ethnicity: Other Asian	2583 (17.2)
Ethnicity: Other	554 (3.7)

RESULTS- BIOLOGY

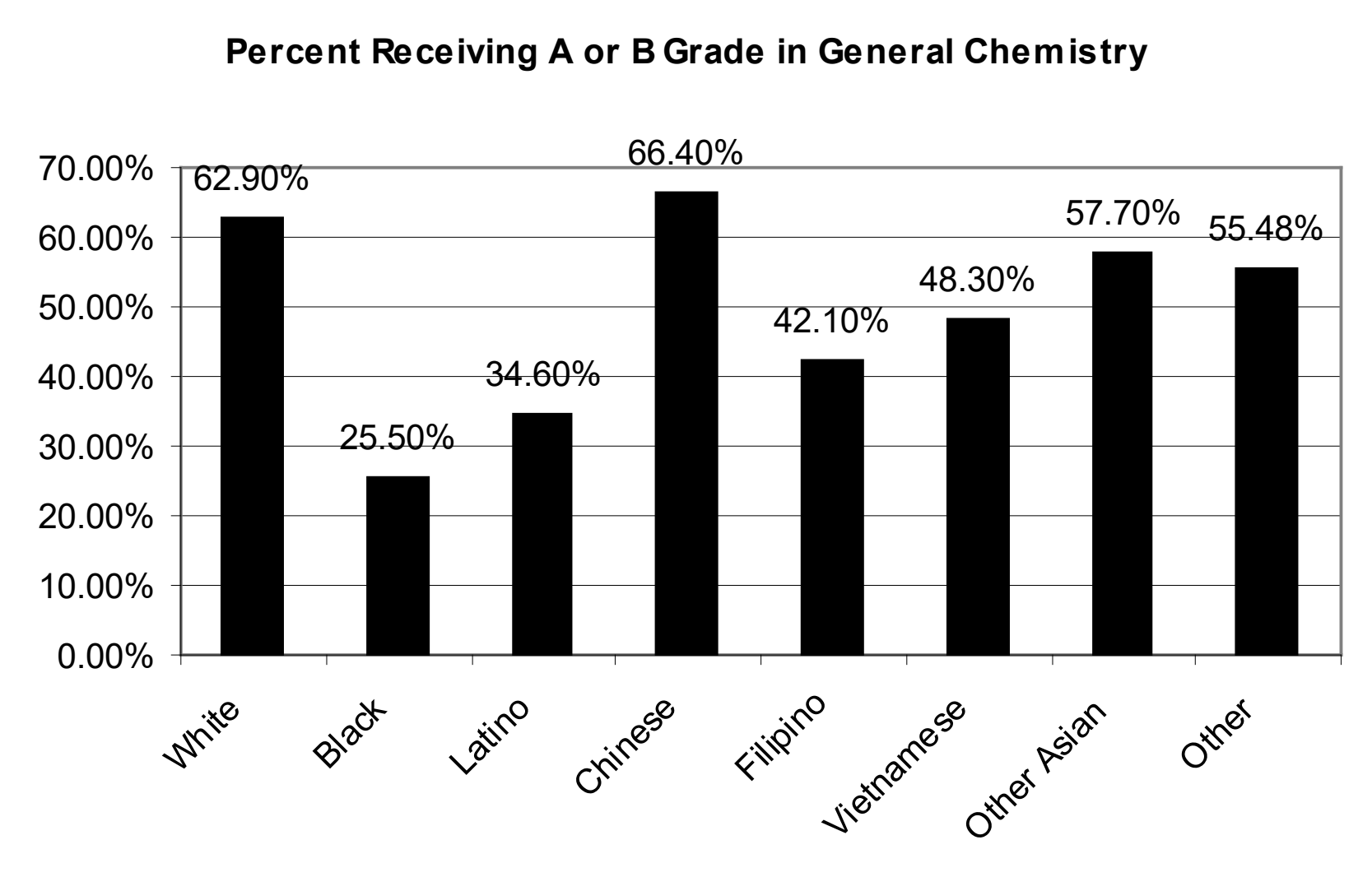


RESULTS- BIOLOGY



* Adjusted OR Significantly lower than White at $p<0.05$

RESULTS- GENERAL CHEMISTRY



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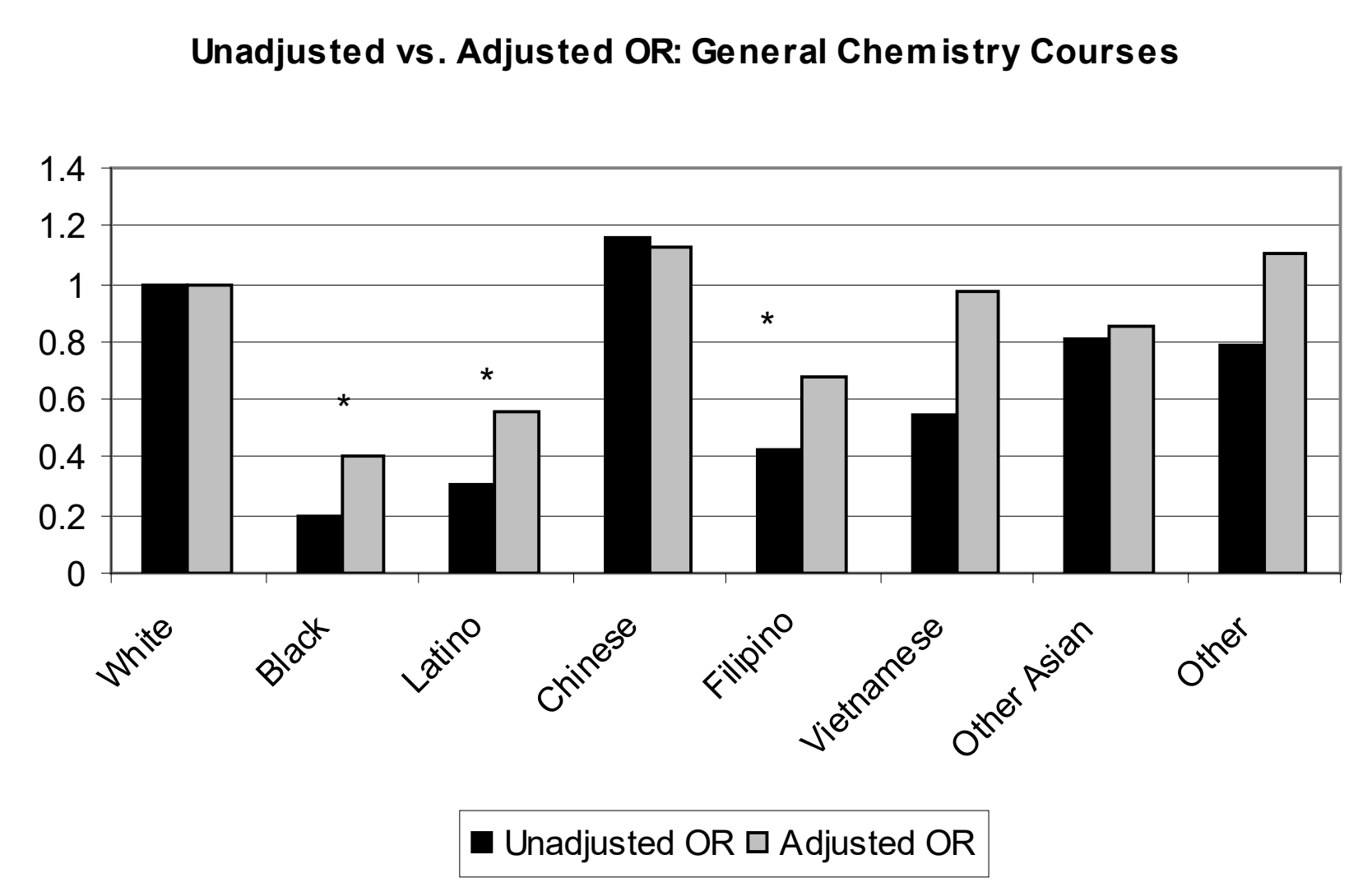

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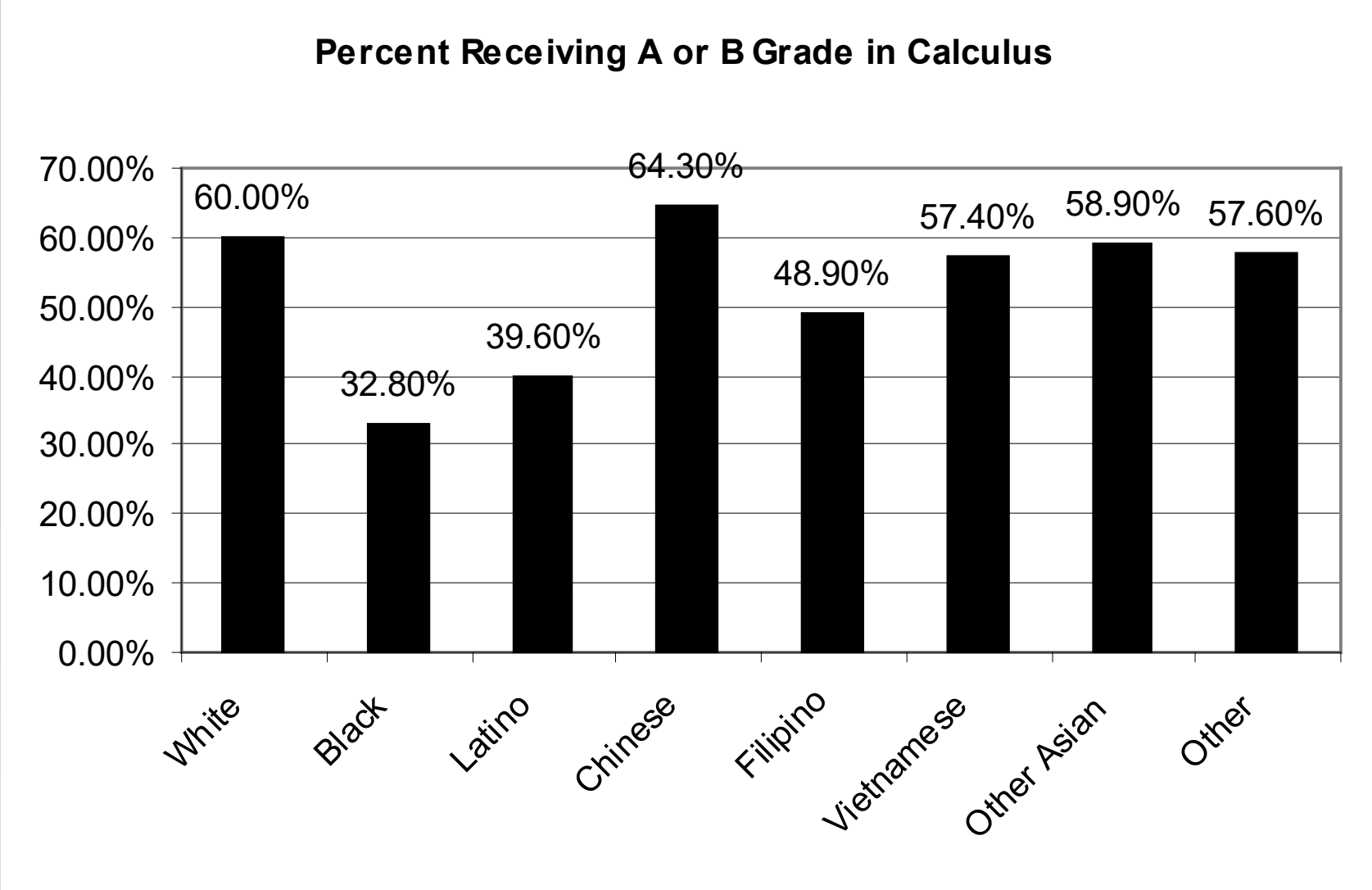
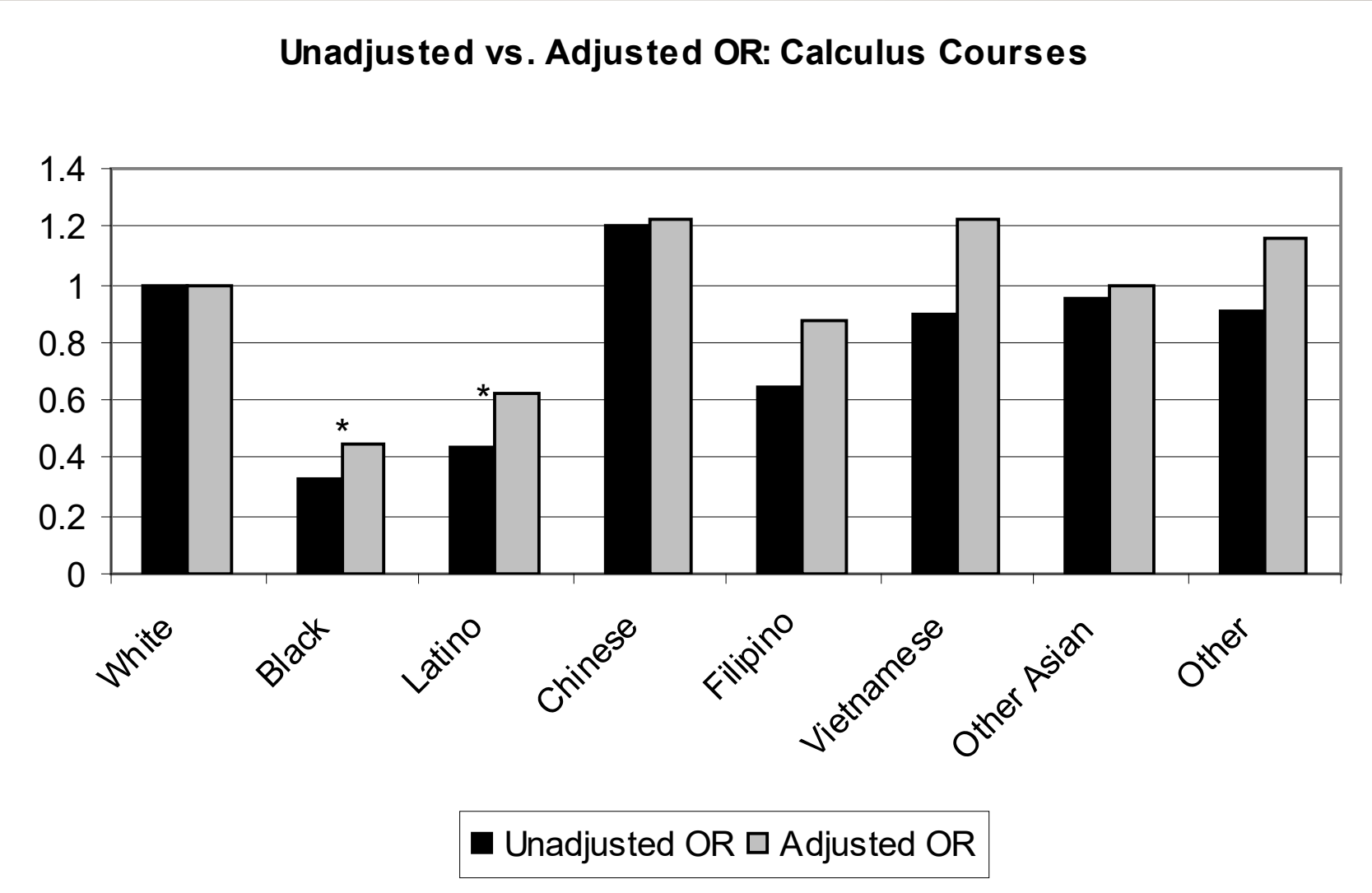
RESULTS - CALCULUS



RESULTS - CALCULUS



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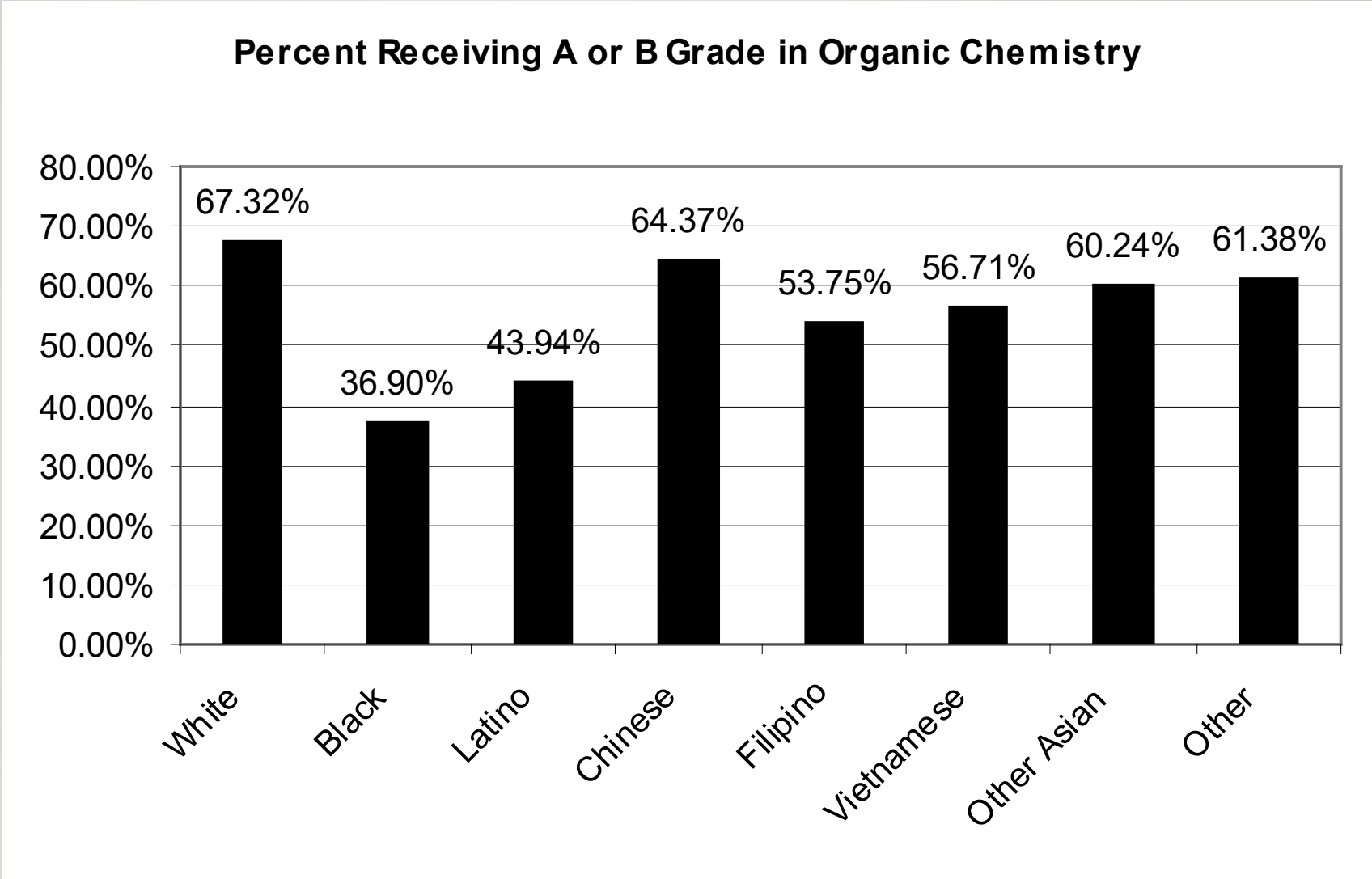
RESULTS – ORGANIC CHEMISTRY



RESULTS – ORGANIC CHEMISTRY

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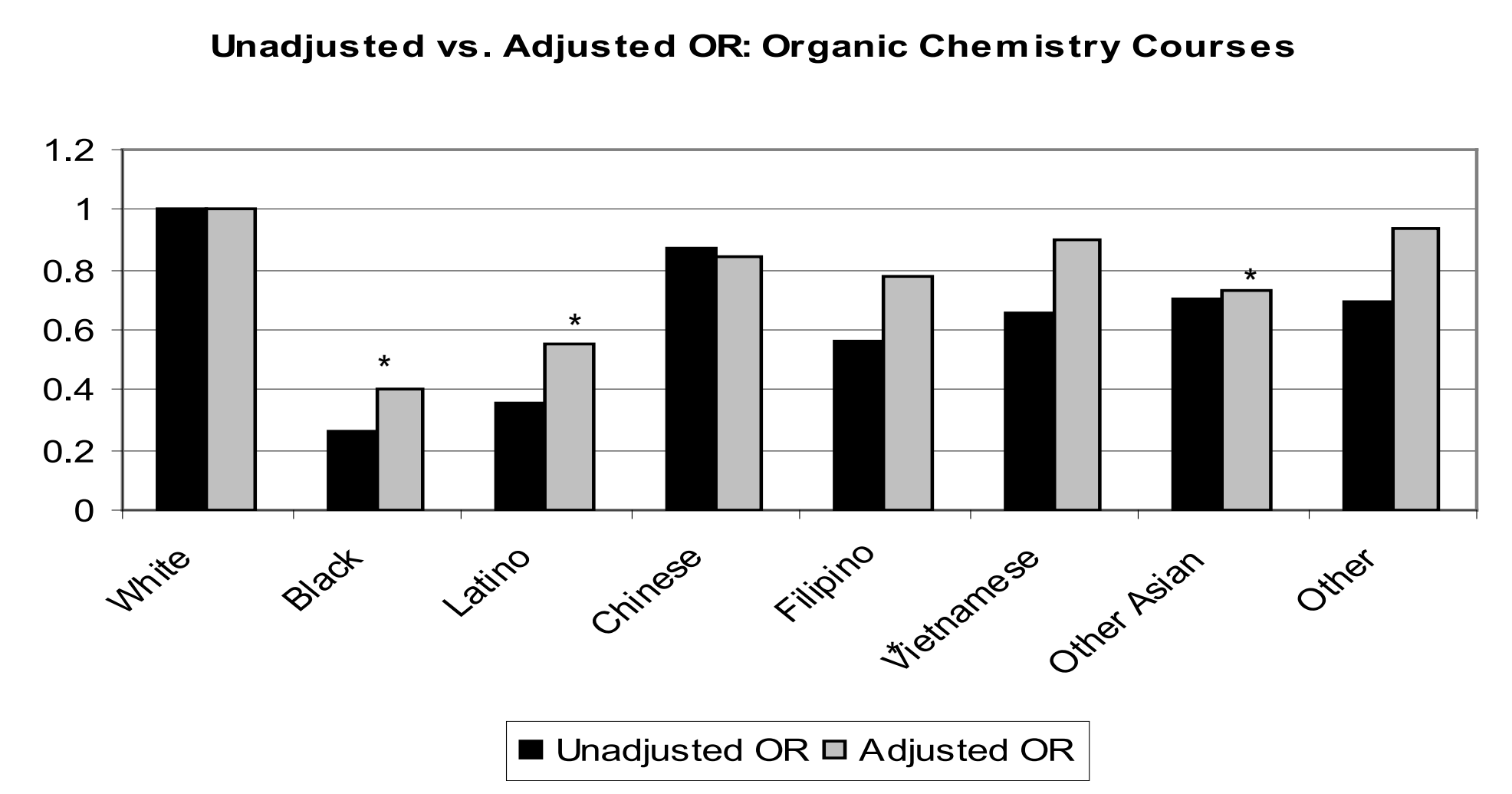
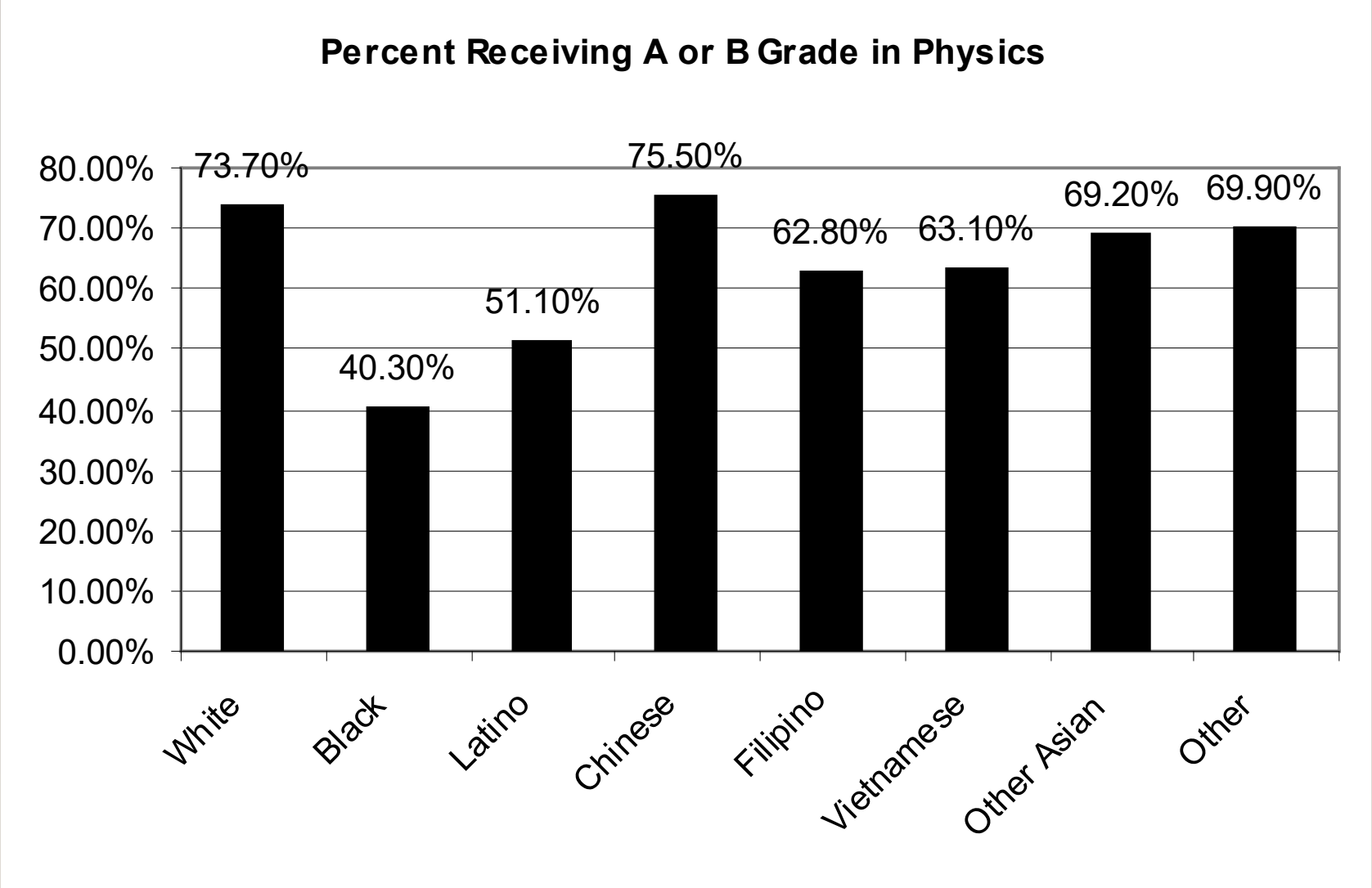


RESULTS - PHYSICS



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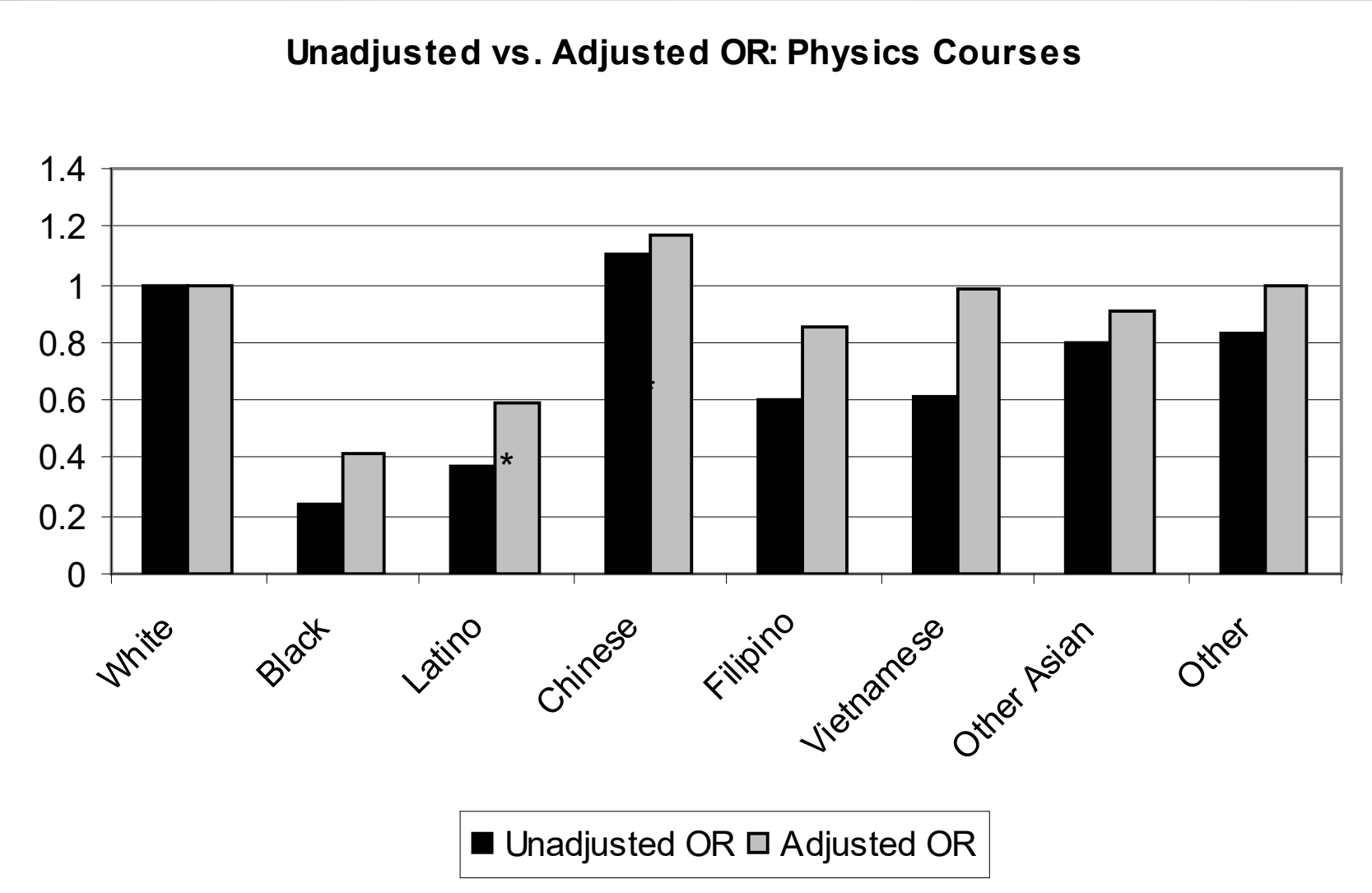

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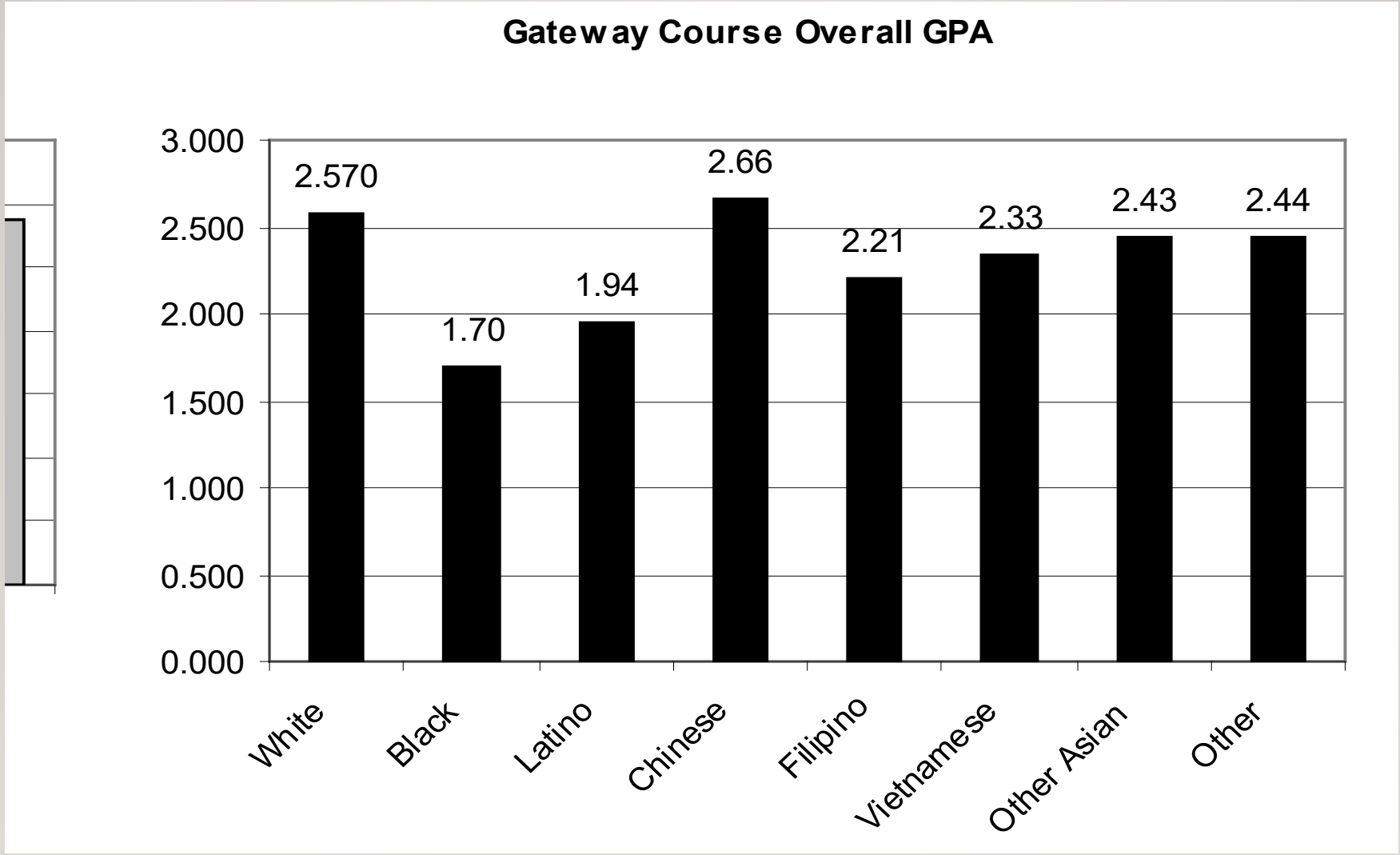
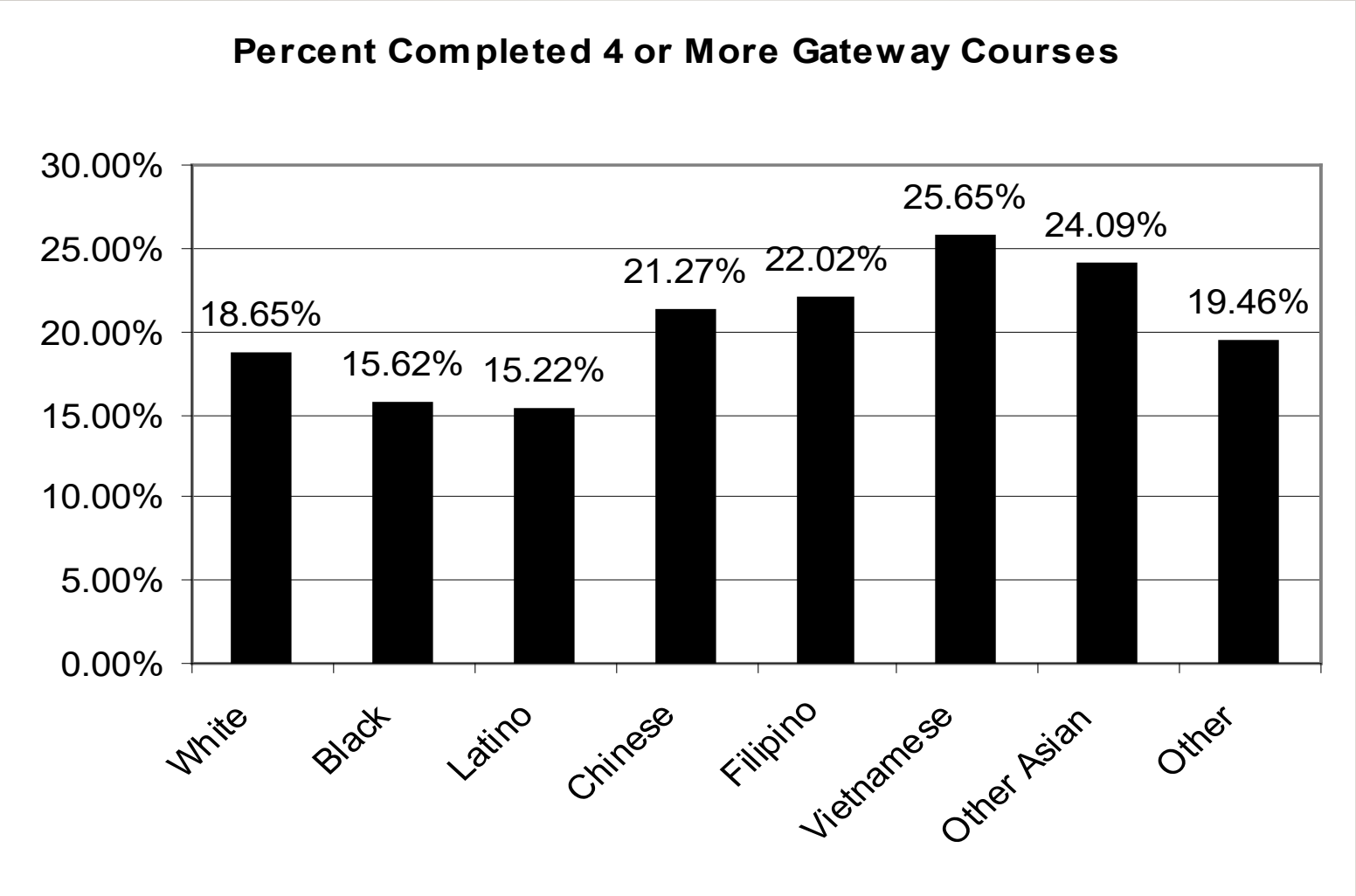
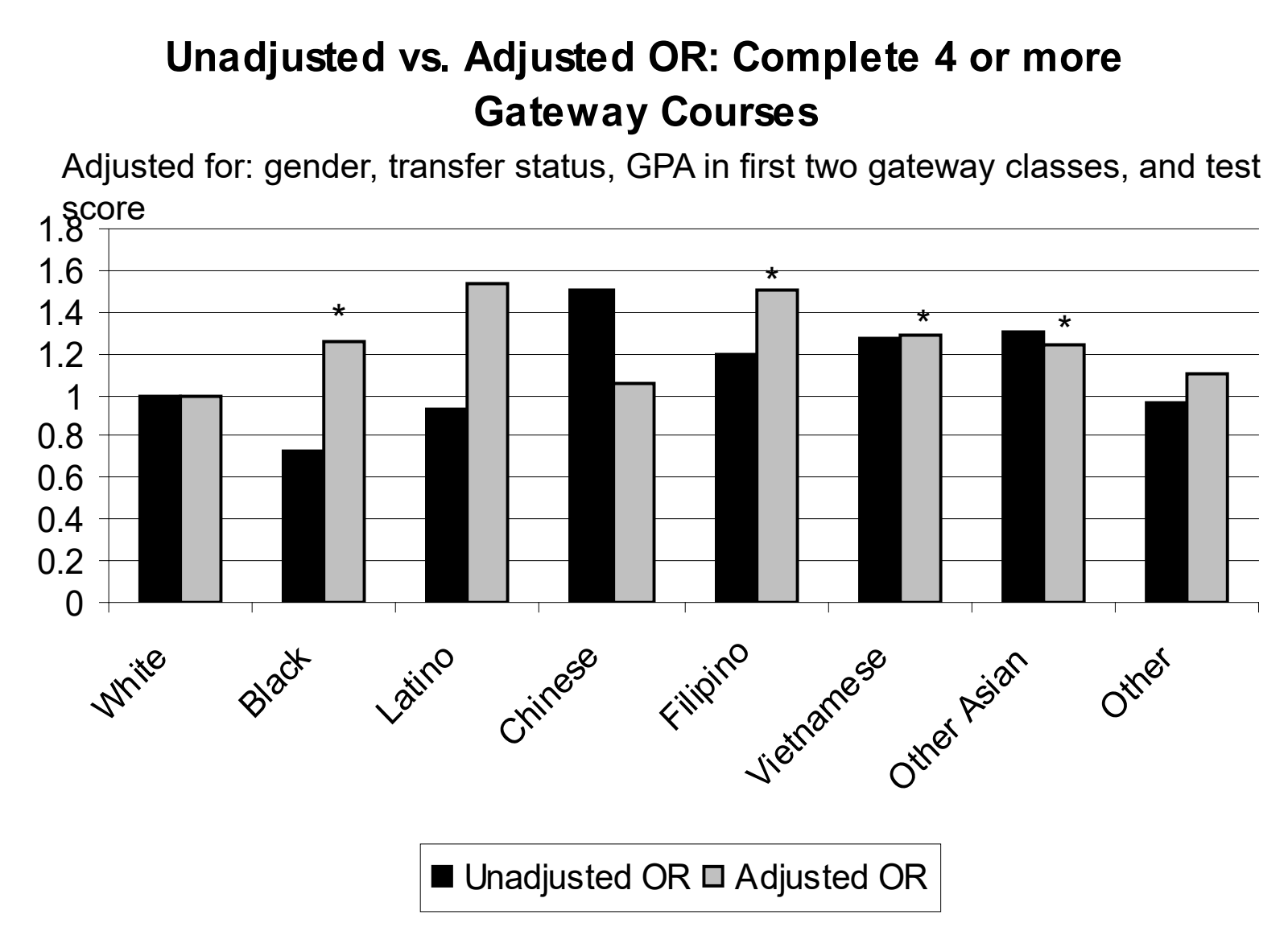
RESULTS –GATEWAY COURSES GPA



RESULTS –TOTAL GATEWAY COURSES



RESULTS –TOTAL GATEWAY COURSES,
RESTRICTED TO BIOLOGY MAJORS



* Adjusted OR Significantly Different than White at p<0.05

CONCLUSIONS

- Black and Latino students on average receive lower grades than White, Asian and other students in gateway courses.

- This disparity in grades persists even after adjusting for measures of prior academic performance and preparation such as standardized college admission test scores and high school API score.

CONCLUSIONS

- Despite receiving lower grades in gateway courses, Black and Latino students persist in the sequence of gateway courses at nearly the same rates as White students.

- In terms of persistence in the gateway course series, Black and Latino students appear to be less deterred than White students by receiving a low grade in their initial gateway course

LIMITATIONS

- Unable to directly measure pre-health professions students
  - Biology majors that proceed to careers outside science and health
  - Non-biology majors that may begin prerequisite courses as undergraduates, then complete courses as postbacs
- Major requirements at individual campuses may not require students take full gateway course sequence
  - Berkeley: 1 semester of general chemistry for Biology majors
  - SFSU, Riverside, CSU-LA: 2 semesters of general chemistry
- Different paths toward fulfilling pre-requisite courses
  - Take courses that our campus liaisons said were highly populated with pre-health professions students
  - Lower division science/engineering courses also qualify as graduate health program pre-requisites
- Not Generalizable
  - Restricted to six schools in CA

IMPLICATIONS FOR EFFORTS TO ENHANCE URM COLLEGE STUDENT SUCCESS IN THE HEALTH PROFESSIONS PIPELINE

- College pipeline support needs to occur throughout the gateway course series. There is no single critical course that poses a unique hurdle for URM student success.

- There appears to be considerable resiliency and determination among URM students in gateway courses to complete the series of courses that would make them eligible for application to health professions schools. URM students are not more likely than White students to abandon the gateway course series despite their greater academic challenges in these courses.

IMPLICATIONS FOR EFFORTS TO ENHANCE URM COLLEGE STUDENT SUCCESS IN THE HEALTH PROFESSIONS PIPELINE

The lower academic achievement of URM students in gateway courses does not appear to be completely explained by less academic preparation prior to college. Further research should investigate why URM students experience major challenges in gateway courses, even when they have similar prior academic preparation and achievement to non-URM students who experience greater success in these gateway courses.

HIGH AIMS TODAY

	Enrolled	DNC	Attending HPS		Completed Degree-Gap Year	Still enrolled		
Cohort 1	11	0	9		11	0		(6 med., 2 Pharm, 1 Pub. Health)
Cohort 2	19	1	9		19	0		(6 med, 2 pharm, 1 vet)
Cohort 3	10	0	6		10	0		(6 Med)
Cohort 4	10	1	3		9	0		(1 Pub. Health, 2 Med)
Cohort 5	10	1	4		9	5		(2 Med, 1 Dent, 1 Pub. Health)
Cohort 6	10	0	1		4	4		(1 Med, 1 M.S.)
Cohort 7	10	0	0		0	10		
Cohort 8	16	0	0		0	16		
Total in Program since starting= 96					**32 attending/attended a Health Professions School**			
	Male	**Female**						
AfrAm/Blk	3	25	28					
Asian*	9	17	26					
Lat	15	25	40					
NatAm	0	2	2					
Total	27	69	96					

QUESTIONS/ANSWERS/DISCUSSION