MINDING THE MATH GATE

April 30 | 9:30am-3:30pm
The Center for Healthy Communities, Oakland
WELCOME & OVERVIEW
Heather Hough, PACE
Pamela Burdman, Just Equations
PACE is an independent, non-partisan research center. PACE bridges the gap between research and policy, working with scholars from California’s leading universities and with state and local policymakers to increase the impact of academic research on educational policy in California.
JUST EQUATIONS

Re-conceptualizing the role of math in ensuring educational equity
the inability to predict mathematics achievement and participation based solely on student characteristics such as race, class, ethnicity, sex, beliefs, and proficiency in the dominant language

- Rochelle Gutierrez, University of Illinois
PREVAILING ARCHITECTURE OF MATH OPPORTUNITY
MATH OPPORTUNITY POLICIES

- Redesigning postsecondary math pathways
- Rethinking postsecondary admissions policies
- Redesigning high school math pathways
FOCUS FOR TODAY

Advance the role of math in fostering, not limiting, equity by:

- Deepening thinking about role of math in educational equity, and the goal of equity in math education.
- Highlight ways that math opportunity issues impact equity in college admissions.
- Surface ways that policy, practice, and research on math opportunity can enhance equity in college admissions.
EMERGING HIGH SCHOOL MATHEMATICS PATHWAYS

Kyndall Brown
California Mathematics Project/UCLA
THE TRADITIONAL HIGH SCHOOL PATHWAY

- Algebra I-Geometry-Algebra II-Precalculus-Calculus
  - If taking 1 course a year, must start in 8th grade
  - If starting in grade 9, summer school or double up
- Pedagogy
  - Teacher Centered
  - Procedural
- Common Core Standards
  - 8th grade standards
    - Expressions and Equations
    - Functions
ALGEBRA II AS A GATEKEEPER (WESTED 2012)

• Cal-PASS data set
• 24,279 students
• 24 unified school districts
ALGEBRA II AS A GATEKEEPER (WESTED 2012)

• Algebra II pass rate in grade 10 when taking Algebra I for the first time in grade 8-70.50%
• Algebra II pass rate in grade 11 when taking Algebra I for the first time in grade 9-40.46%
• Proportion of the sample who ever passed two semesters of Algebra II-44.24%
• Algebra II pass rate among students who first took Algebra I in grade 9-16.74%
• Algebra II pass rate among students who did not take math in grade 12-32.06%
NEED FOR ALTERNATIVES

- Pedagogical Shifts
  - Standards for Mathematical Practice
- Algebra II as a pre-requisite for 4\textsuperscript{th} year mathematics courses
- Statistics validates Algebra I and Algebra II
OPPORTUNITIES AND CHALLENGES

• California Mathematics Readiness Challenge Initiative Grant (CMRCI)
  • 4th Year Mathematics Courses
  • A-G Requirements
• High School Counselors
• College Admissions Counselors
BIG DATA IN HIGH SCHOOL CLASSROOMS:
OPENING NEW MATH PATHWAYS

Suyen Machado
UCLA Center X

Introduction to Data Science
OVERVIEW

- The genesis of the IDS curriculum
- Challenges to new mathematics pathways
THE BIRTH OF A CURRICULUM
Teach students how to analyze data using simple tools.

Present relevant Algebra II topics from an different perspective.

Give students a chance to study something meaningful in their lives/communities.

Do all of the above in 4 - 8 weeks.
WE LEARNED:

- Even with simple tools, it's hard to analyze data.
- 4 - 8 weeks isn't enough time to scratch the surface of data analysis.
- Algebra II teachers are compelled to teach to standardized tests.
PROPOSED SOLUTION

✓ Create a year long course about Data Science

✓ Use a mix of "large" data sets and data sets generated by students.

✓ Address as many Algebra II topics as possible while emphasizing probability and statistics standards

✓ Teach students how to analyze data with code.
USING R, STUDENTS WOULD BE:

✓ Creating and interpreting statistical plots

✓ Conducting inference using bootstrap based methods

✓ Creating multiple linear regression models, CART, k-means

✓ Learning about different sources of data including web scraping
THE CURRICULUM WOULD:

✓ Provide teachers with daily lessons
✓ Teach students concepts using in-class activities
✓ Apply what they've learned using R based labs
INTRODUCTION TO DATA SCIENCE (IDS)

- Meets “c” requirement (mathematics) for A-G
- IDS = Statistics, so validates Algebra II in California
- As of 2019-2020, offered in 17 Southern California districts at 57 schools by 62 teachers
RESULTS FROM LAUSD

✓ Students score 10% higher on the Levels Of Conceptual Understanding in Statistics (LOCUS) Assessment

✓ IDS students met their requirements at the same rate as students who did not take it for high school graduation & CSU/UC admissions
Students score 8% higher on the Levels Of Conceptual Understanding in Statistics (LOCUS) Assessment

About 25% of students who took the course met the requirements for high school graduation and CSU/UC admissions
CHALLENGES
 IMPLEMENTATION

✓ High school math teachers are brave

✓ Need lots of professional development to get them comfortable teaching topics they're largely unfamiliar with

✓ High-level support is essential for their success

✓ Build online communities for teachers to exchange ideas
TECHNOLOGY

Servers are beautiful things

Servers are challenging
MATH REQUIREMENTS

✓ Counselors & administrators are reluctant

✓ UC/CSU admissions messaging re: math pathway

✓ Common Core Mathematics Standards: Moving the goal post + admissions requirements not revised/revisited
NEW PATHWAYS OFFER A CHANCE FOR:

✓ Students who struggled with or failed Algebra II to be lured into mathematics via data science

✓ Students to see more relevance of mathematics in their lives

✓ The Algebra II gateway barrier to college removed

✓ Meeting the mathematics demands of 21st century
WANT MORE INFO? VISIT: WWW.IDSUCLA.ORG
THANK YOU
Discrete Math Project Collaborative

https://dmpc.sdsu.edu/

Osvaldo Soto (San Diego State University)
Trang Vu (San Diego Unified School District)
Anne Marie Almaraz (Sweetwater Unified High School District)
Melody Morris (Sweetwater Unified High School District)
Outline

- Overview
  - Brief history of DMPC
  - Who DMPC serves (districts, students)
  - Early outcomes

- Challenges
History of DMPC

- Began with CA Mathematics Readiness Challenge Initiative (2016)
  - Ovie Soto (Director), Bill Zahner (SDSU Math Dept), Randy Philipp (SDSU College of Education), Mike O’Sullivan (SDSU Math Dept. Chair)
  - SUHSD Admin/ToSA’s
  - Focus on advance Standards for Mathematical Practice
  - Beyond symbol manipulation: **Something to LOVE in math for everyone!**
  - Discrete Math includes many non-traditional topics…
  - Wrote a curriculum that supports desired pedagogical shifts: targeting SMPs
A Typical Day: Goals

What do **STUDENTS** DO in a DMPC class?

- Learn through problem-solving
- Present their thinking
- **Write and reflect** on *their* work and peers’ work
- Engage in **sense-making**
- Propose and **refine definitions**
- Habitually asking “Why?”
- Reason at a variety of levels of formality

College Readiness:

- Advance SMP’s
- Changes in Ways of thinking
- Dispositions toward math
- Status
- Identity
- Content knowledge
Example: Thai 21 – Game Rules

- Number of players: 2
- Starts with 21 flags.
- Take turns
- On each player's turn, they must take 1, 2, or 3 flags.
- (Version 1) The player who takes the last flag wins.

Play the game several times with a partner. (10 - 15 min)

Can you find a way to win every time... regardless of what your opponent does?
What We Chose: Content

What’s in our Discrete Math Course? Modules

- Combinatorial Games
- Graph Theory: Connectivity, Traceability, Planarity, Colorability
- Iteration and Recursion/Sequences and Series
- Cryptography
- Counting/Combinatorics
DMPC’s Target Student Population: A DMPC Teacher’s Perspective

Students who:

- Could benefit from looking at math from a problem solving perspective
- Believe **all** of math is symbol manipulation
- Have potential math skills that have not been tapped in previous courses
DMPC’s (Original) Target Student Population

- College-intending **Seniors**
- ‘STEM undecided’ (… but we want them back)
- Passed Int 1 – 3 with “C” or better or struggled in IM 3
  - Already took pre-calc
  - Did not want to take calculus
  - Intending computer science majors
  - Already took calculus
- Imperial Valley: **Can it work as a 3rd year course?**
“I didn’t know this was math” – Anonymous Student

Students who may not have taken a fourth year are taking and succeeding at a fourth year (!)

Groups of students building agency in mathematics

Students growing in their identity as doers of mathematics
Early Outcomes

- Survey results indicated that students’ dispositions towards mathematics were positively influenced by taking the course.

### Affective

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>If I can’t solve a problem in five minutes, I usually give up.</td>
<td>2.87</td>
<td>340</td>
<td>1.173</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td>2.28</td>
<td>340</td>
<td>1.120</td>
<td>0.061</td>
</tr>
<tr>
<td>I feel that struggling with a math problem is an important part of</td>
<td>3.55</td>
<td>337</td>
<td>1.048</td>
<td>0.057</td>
</tr>
<tr>
<td>learning math.</td>
<td>3.39</td>
<td>337</td>
<td>1.029</td>
<td>0.054</td>
</tr>
<tr>
<td>When another student or the teacher challenges my solution, I feel</td>
<td>2.96</td>
<td>339</td>
<td>1.069</td>
<td>0.058</td>
</tr>
<tr>
<td>uncomfortable.</td>
<td>2.60</td>
<td>339</td>
<td>1.034</td>
<td>0.056</td>
</tr>
<tr>
<td>I feel comfortable sharing my mathematical ideas or asking</td>
<td>3.31</td>
<td>340</td>
<td>1.142</td>
<td>0.062</td>
</tr>
<tr>
<td>questions about another person’s ideas in a whole class discussion.</td>
<td>3.71</td>
<td>340</td>
<td>1.104</td>
<td>0.060</td>
</tr>
<tr>
<td>In mathematics, you can be creative and discover things by yourself.</td>
<td>3.32</td>
<td>339</td>
<td>1.124</td>
<td>0.061</td>
</tr>
<tr>
<td></td>
<td>3.30</td>
<td>339</td>
<td>1.102</td>
<td>0.056</td>
</tr>
<tr>
<td>I like solving math problems.</td>
<td>3.27</td>
<td>337</td>
<td>1.147</td>
<td>0.063</td>
</tr>
</tbody>
</table>

### Achievement: Grades

<table>
<thead>
<tr>
<th>Course</th>
<th>D or F 2017-2018</th>
<th>A or B 2017-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTEGRATED MATH III-B</td>
<td>21.88%</td>
<td>41.26%</td>
</tr>
<tr>
<td>PRE-CALCULUS-B</td>
<td>9.59%</td>
<td>54.79%</td>
</tr>
</tbody>
</table>

### SDSU Course-taking & Achievement

Coming Soon: Summer 2019
Challenges

Continue refining:

- Curriculum & assessments
- PD for principals and counselors, new (and veteran) teachers to sustain the program at SUHSD

Evaluation:

- Do changes in students’ affects and dispositions lead to higher levels of mathematical content knowledge?
- Are students who took Discrete Mathematics successful in their college mathematics courses?
- What college math courses do they take? (Course-taking pathways/obstacles)
- What are their grades in college mathematics?
Group Discussions
What skills and experiences do we want students to have at high school graduation to support college and career readiness and success?

What do we still need to know about how course sequences support this vision?

What are the implications for policy, including admissions policy?

What are the next steps for policy, practice, and research?
Working Lunch
12:00pm-1:00pm
EMERGING EVIDENCE ON COLLEGE ADMISSIONS TESTING

Mayra Lara, The Education Trust-West
Saul Geiser, Center for Studies on Research in Higher Education
Michal Kurlaender, UC Davis, PACE
UC and the SAT/ACT

RESEARCH FINDINGS
1994 - 2019

Saul Geiser
Center for Studies in Higher Education
University of California, Berkeley
Prop 209 and its impact

- 1995: Regents’ resolution SP-1 barring use of race
- 1996: Prop 209 passed
- 1998: Prop 209 takes effect
- Underrepresented minority admissions fall by half at top UC campuses; cascade effect
College Destinations of Top Applicants
Denied Admission to Berkeley and UCLA, 1997 to 2002

University of California

<table>
<thead>
<tr>
<th>Year</th>
<th>All Students</th>
<th>Underrepresented Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>55.8%</td>
<td>54.7%</td>
</tr>
<tr>
<td>1998</td>
<td>54.6%</td>
<td>45.2%</td>
</tr>
<tr>
<td>1999</td>
<td>58.3%</td>
<td>50.0%</td>
</tr>
<tr>
<td>2000</td>
<td>60.9%</td>
<td>49.3%</td>
</tr>
<tr>
<td>2001</td>
<td>61.5%</td>
<td>43.3%</td>
</tr>
<tr>
<td>2002</td>
<td>56.9%</td>
<td>41.5%</td>
</tr>
</tbody>
</table>

Private Selective Institutions

<table>
<thead>
<tr>
<th>Year</th>
<th>All Students</th>
<th>Underrepresented Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>14.1%</td>
<td>9.3%</td>
</tr>
<tr>
<td>1998</td>
<td>15.6%</td>
<td>9.0%</td>
</tr>
<tr>
<td>1999</td>
<td>18.5%</td>
<td>11.6%</td>
</tr>
<tr>
<td>2000</td>
<td>22.7%</td>
<td>12.6%</td>
</tr>
<tr>
<td>2001</td>
<td>24.1%</td>
<td>12.1%</td>
</tr>
<tr>
<td>2002</td>
<td>24.4%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Prop 209 and its impact</td>
<td>UC policy responses</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>• 1995: Regents’ resolution SP-1 barring use of race</td>
<td>• School-centered outreach</td>
<td></td>
</tr>
<tr>
<td>• 1996: Prop 209 passed</td>
<td>• Top 4% Plan/ELC</td>
<td></td>
</tr>
<tr>
<td>• 1998: Prop 209 takes effect</td>
<td>• Holistic review</td>
<td></td>
</tr>
<tr>
<td>• Underrepresented minority admissions fall by half at top UC campuses; cascade effect</td>
<td>• Class-based admissions preferences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Admissions testing: search for alternatives to the SAT/ACT</td>
<td></td>
</tr>
</tbody>
</table>
Standardized Regression Coefficients for HSGPA, SAT I and SAT II Scores by UC Campus, 1996-1999

Regression equation:  \( UCGPA = HSGPA + SAT\ I + SAT\ II \)

<table>
<thead>
<tr>
<th></th>
<th>HSGPA</th>
<th>SAT I</th>
<th>SAT II</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Berkeley</td>
<td>.21</td>
<td>-.02*</td>
<td>.27</td>
</tr>
<tr>
<td>UC Davis</td>
<td>.30</td>
<td>.04</td>
<td>.27</td>
</tr>
<tr>
<td>UC Irvine</td>
<td>.25</td>
<td>.09</td>
<td>.21</td>
</tr>
<tr>
<td>UC Los Angeles</td>
<td>.23</td>
<td>.05</td>
<td>.26</td>
</tr>
<tr>
<td>UC Riverside</td>
<td>.31</td>
<td>.16</td>
<td>.10</td>
</tr>
<tr>
<td>UC San Diego</td>
<td>.27</td>
<td>.03*</td>
<td>.25</td>
</tr>
<tr>
<td>UC Santa Barbara</td>
<td>.36</td>
<td>.11</td>
<td>.15</td>
</tr>
<tr>
<td>UC Santa Cruz**</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>UC System</td>
<td>.27</td>
<td>.07</td>
<td>.23</td>
</tr>
</tbody>
</table>

* Not statistically significant at <.01 level.
** Does not assign conventional grades.
Initial Findings

Curriculum-based achievement exams like the SAT II Subject Tests predict UC performance at least as well as nationally norm-referenced exams like the SAT or ACT.

“The benefits of achievement tests for college admissions – greater clarity in admissions standards, closer linkage to the high school curriculum – can be realized without any sacrifice in the capacity to predict success in college.”

Beyond Prediction: Testing for Achievement

Desirable properties of achievement tests:
- Criterion- vs. norm-referenced assessment
- Better alignment with K-12 standards
- Minimize test prep
- Less adverse impact
- “Signaling effect” for disadvantaged students and schools

- President Atkinson’s 2001 address to ACE
- BOARS’ 2002 Policy on Admissions Testing
# The SAT and ACT Respond to UC

<table>
<thead>
<tr>
<th>What changed</th>
<th>What didn’t change</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAT drops verbal analogies and quantitative comparisons</td>
<td>• Both SAT and ACT retain norm-referenced design</td>
</tr>
<tr>
<td>• Both ACT and SAT add Writing Test</td>
<td>• Bell-curve assumption is last remaining vestige of IQ tradition in college admissions</td>
</tr>
<tr>
<td>• Intended to position national exams as achievement tests</td>
<td>• “A test at war with itself”: Norm-referenced assessment for college admissions vs. standards-based assessment for K-12 accountability</td>
</tr>
<tr>
<td>• Foreshadows later efforts to have college admissions tests adopted for state K-12 accountability purposes</td>
<td></td>
</tr>
</tbody>
</table>
Creating the Bell Curve

Raw score: Number of questions correctly answered

Number of students

Scaled score

Raw score: Number of questions correctly answered
Frequency Distribution of Scaled Scores Among California SAT Takers
Norm-referenced tests are designed to produce the same distribution from one year to the next and are ill-suited to measure change over time in educational achievement.
Study Variables

Sample: All California resident applicants for UC freshmen admission from 1994 through 2016

- SAT scores
  - Composite of verbal + math
  - Includes ACT-equivalent scores
- High school GPA
  - “Weighted” for AP/honors
- Family income
  - Log of family income in constant 2012 $
- Parents’ education
  - Highest-educated parent
- Underrepresented minority status
  - Self-identification as Latino/a or Black
  - Excludes Native Americans
<table>
<thead>
<tr>
<th>Conditioning effect of socioeconomic background on SAT/ACT scores vs. HSGPA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Family Income</th>
<th>Parents’ Education</th>
<th>Race/Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school GPA</td>
<td>.11</td>
<td>.14</td>
<td>-.17</td>
</tr>
<tr>
<td>SAT/ACT scores</td>
<td>.36</td>
<td>.45</td>
<td>-.38</td>
</tr>
</tbody>
</table>
Variance in SAT/ACT Scores and High School GPA Explained by Family Income, Education and Race/Ethnicity, 1995 to 2016

Regression equation: SAT score or HSGPA = $b_1$(Log of Income) + $b_2$(Parent Ed) + $b_3$(URM Status)

Source: UC Corporate Student System data on all California residents who applied for freshman admission from 1995 through 2016 and for whom complete data were available on all covariates.
Compared to other admissions criteria like high school GPA, SAT/ACT scores are more sensitive to social background factors like parental education, income, and race/ethnicity.

The conditioning effect of socioeconomic background has grown substantially over the past quarter century and now accounts for 39% of all test-score variation among UC applicants.

Policy implication: The growing correlation between social background and SAT/ACT scores makes it difficult to rationalize treating scores purely as a measure of individual merit or ability, without regard for group differences in opportunity to learn.
Relative Weight of Family Income, Education, and Race/Ethnicity in Explaining SAT/ACT Scores, 1995 to 2016

Regression equation: \( \text{SAT/ACT score} = b_1(\text{Log of Income}) + b_2(\text{Parent Education}) + b_3(\text{URM Status}) \)

Source: UC Corporate Student System data on all California residents who applied for freshman admission from 1995 through 2016 and for whom complete data were available on all covariates.
### Los Angeles Schools by Level of Segregation (2016)

<table>
<thead>
<tr>
<th>Level of Segregation</th>
<th>Number of Schools</th>
<th>Percent of schools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Majority nonwhite</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(50-100% nonwhite)</td>
<td>958</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Intensely segregated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(90-100% nonwhite)</td>
<td>785</td>
<td>78%</td>
</tr>
<tr>
<td><strong>Apartheid schools</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(99-100% nonwhite)</td>
<td>264</td>
<td>26%</td>
</tr>
</tbody>
</table>
Racial Segregation in California Public Schools

Over the past 25 years, California public schools have become among the most racially segregated in the US


Rapid increase in “intensely segregated” schools (90% or more URM)

Over half of all Latino/a students, and 39% of African Americans, attend intensely segregated schools

Double segregation by race and poverty

Black students on average attend schools that are two-thirds poor, while the average for Latinos is 70%.

Racial segregation is associated with multiple forms of disadvantage that combine to magnify test-score disparities among racial minorities

New Findings, Part 2

Race/ethnicity has an independent conditioning effect on SAT/ACT scores after controlling for family income and education.

The conditioning effect of race on SAT/ACT scores has grown substantially in the past 25 years, mirroring the massive re-segregation of California public schools during the same period.

Statistically, race/ethnicity has become more important than either family income or education in accounting for test-score differences among California high school graduates who apply to UC.

Policy implication: “Class based” or “race neutral” affirmative action is unlikely to prove an effective proxy for redressing racial/ethnic disparities in college admissions.
Percent Latino and Black Applicants by SAT/ACT vs. High School GPA Deciles

Source: UC Corporate Student System data on all CA resident freshman applicants from 2016 for whom complete data were available on all covariates.
Percent First-Generation College Applicants by SAT/ACT vs. HSGPA Quintiles

Source: UC Corporate Student System data on California residents who applied for freshman admissions between 1994 and 2011 for whom complete data were available on all covariates.
Conclusion

National standards for fairness in testing encourage colleges and universities to take into account the conditioning effects of socioeconomic background on test performance. UC considers family income and education in evaluating applicants’ test scores, but Prop 209 bars it from considering race/ethnicity.

Race has an independent effect on SAT/ACT scores among UC applicants, mirroring the growing concentration of Latino and Black students in California’s poorest, most intensely segregated schools.

Policy implication: If UC cannot legally consider the effect of race and racial segregation on test performance, neither should it consider SAT/ACT scores. Race-blind implies SAT/ACT-blind admissions.
UC and the SAT/ACT
Research Findings: 1994 to 2019

ADDITIONAL SLIDES
FOR Q & A

Source: College Board College-Bound Seniors Reports for California.
ACT Writing: Scaled Score vs. Number Correct
Probing the UC findings

Changes in racial/ethnic composition of UC applicants vs. all California SAT takers

Underrepresented Minorities as a Proportion of California High School Graduates, SAT Takers, and UC Applicants, 1998 to 2011

Source: UC Corporate Student System, College Board Annual College-Bound Seniors Reports, California Department of Finance.
Probing the UC findings

Problem of missing SES data for California SAT takers

Percent Not Responding to SAT Questionnaire Items on Family Income, Parents' Education, and Race/Ethnicity: California SAT Takers, 1998 to 2013

Source: College Board annual College-Bound Seniors Reports for California, 1998 to 2013.
SAT Scores (all other factors held constant)

<table>
<thead>
<tr>
<th>SAT Score</th>
<th>Predicted College GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>(3.00)</td>
</tr>
<tr>
<td>1300</td>
<td>(3.81)</td>
</tr>
<tr>
<td>1400</td>
<td>(3.94)</td>
</tr>
<tr>
<td>1500</td>
<td></td>
</tr>
</tbody>
</table>

Prediction Errors

"false negatives"

Student A: (3.00)  Student B: (3.13)

"false positives"

(2.19)  (2.32)
Relative Weight of High School GPA and SAT/ACT Scores in Predicting 5-Year Graduation Rates, Before and After Controlling for SES: All UC Freshmen vs. Underrepresented Minorities

Source: UC Corporate Student System data, 1994 to 2005. All estimates are statistically significant at .001 confidence level.
Percent of Variance in UCGPA Predicted by HSGPA and Test Scores With and Without Bonus Points for AP/Honors

Regression equation: \(\text{UCGPA} = \alpha \text{HSGPA} + \beta \text{SAT I} + \phi \text{SAT II}\)

<table>
<thead>
<tr>
<th>HSGPA Weighting</th>
<th>1998 R²</th>
<th>Rank</th>
<th>1999 R²</th>
<th>Rank</th>
<th>2000 R²</th>
<th>Rank</th>
</tr>
</thead>
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<tr>
<td>No Bonus Point</td>
<td>21.32%</td>
<td>1</td>
<td>21.46%</td>
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<td>23.54%</td>
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<td>Half Bonus Point</td>
<td>20.67%</td>
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<td>21.10%</td>
<td>2</td>
<td>22.87%</td>
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<tr>
<td>Full Bonus Point</td>
<td>19.22%</td>
<td>3</td>
<td>19.82%</td>
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<td>21.19%</td>
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<th>Rank</th>
<th>1999 R²</th>
<th>Rank</th>
<th>2000 R²</th>
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<td>13.88%</td>
<td>1</td>
<td>16.37%</td>
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<tr>
<td>Half Bonus Point</td>
<td>14.33%</td>
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<td>13.34%</td>
<td>2</td>
<td>15.79%</td>
<td>2</td>
</tr>
<tr>
<td>Full Bonus Point</td>
<td>13.16%</td>
<td>3</td>
<td>12.28%</td>
<td>3</td>
<td>14.65%</td>
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</table>

Frequency Distribution of SAT I Scores:
All CA SAT I Takers vs. SAT I Takers Who Also Took SAT II

![Graph showing frequency distribution of SAT I scores for all California SAT I takers versus those who also took SAT II. The graph displays two bell curves, one for all California SAT I takers and another for SAT I takers who also took SAT II. The y-axis represents the number of students, and the x-axis represents SAT I scores.]
New California Resident Admits and Enrolled Freshmen as a Percentage of California High School Graduates

Source: UC Corporate Student System (for CA resident admits and new freshmen), California Department of Finance Demographic Research Unit (for CA public high school graduates), California Postsecondary Education Commission (for CA private high school graduates from 1994 to 2009), and Western Interstate Commission on Higher Education (for CA private high school graduates from 2010 to 2012).
Percent Latino and Black Applicants by SAT/ACT vs. High School GPA Deciles

Source: UC Corporate Student System data on all CA resident freshman applicants from 1994 through 2011 for whom complete data were available on all covariates.
“In addition, BOARS Testing Principles should explicitly prefer tests that are not only curriculum-based but also scored by reference to achievement standards.”

-- BOARS’ 2009 revision of UC Principles for Admissions Testing
“BOARS’ review of the history of the development of admissions tests and of their use at the University of California points clearly to the fact that the original decision to adopt the testing requirement and create the Eligibility Index was driven only in part by policy goals. Pragmatic needs to reduce the size of the eligibility pool and to rank-order applicants to selective campuses in a simple, efficient way also played substantial roles. In BOARS’ current view, these pragmatic reasons—while important—are insufficient justification in themselves for the adoption of a test requirement or the selection of a specific test battery.”

-- BOARS’ 2002 policy
Group Discussions
Based on the existing research, how should we think about college admissions testing?

What else do we still need to do know about admissions testing?

What are the next steps for policy, practice, and research?
Pulling it Together
Wrap-Up
THANK YOU

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