The Effectiveness of the California Standards Tests Relative to the SAT in Predicting Freshman Grades

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EQUAL OPPORTUNITY
IN HIGHER EDUCATION

THE PAST AND FUTURE OF CALIFORNIA'S PROPOSITION 209

Edited by ERIC GRODSKY and MICHAL KURLAENDER

Introduction by CHRISTOPHER EDLEY JR. | Foreword by ROBERT J. BIRGENEAU

Origins of Study

- Conducted before first author retired from the University of California Office of the President (UCOP)

- Approached by editors Grodsky and Kurlaender (then both from UC Davis) as topic that would be "good fit" with book on "Equal Opportunity in Higher Education/Prop 209"

- Uses University of California systemwide data and California State Department of Education (CDE) data

- Uses NO data from either Saint Mary's College of California, nor from University of Houston

What?

- Evaluate the feasibility of relying on the California Standards Tests (CSTs) rather than on the SAT for making admissions decisions.   SPECIFICALLY:

  - **Predictive Validity of CST vs. SAT (main purpose)**
  - **Correspondence of CST Scores with SAT Scores**

- STUDY DOES **NOT:** Assess the technical efficacy of the CST (including reliability & validity) for use in college admission decisions beyond predictive validity/correspondence

Why Examine CST vs. SAT?

- **ALIGNMENT:** CST is designed to assess student mastery of the academic standards agreed to by educators and policy makers in the state of California. Using the CST as substitute for SAT allows K-12 tests to have meaning for students beyond "K-12 accountability".

- **FREE:** The CST is taken free of charge and during the regular school day by virtually all elementary and secondary students attending public schools in California.

- **INCREASING ACCESS:** Potential to increase access to the UC System for students who are prepared to succeed in higher education but unable to—for whatever reason—demonstrate their postsecondary potential on the SAT. Accusations of a lack of predictive validity, particularly for women and traditionally underserved students have been among the most charged and persistent criticisms of the SAT which may not be of concern for the CST.

How?

- **DATA SOURCES:**
    - CDE: CSTs for Fall 2006 freshman applicants to UC from California public high schools.
    - UCOP: UC application information, including SAT scores, UC GPA after 1 year of enrollment, retention and "retention in good standing" after 1 year of enrollment for new Fall 2006 freshmen.

- **Matching:** Used algorithms that included student name, birth date, various demographic variables, and school of attendance (no SSNs). Match rate was 79.3% (reduced by strictness of matching procedures)

- **Analyses:**
    - Linear Multiple Regression predicting 1 Year UC GPA : CST vs. SAT
    - Multiple Logistic Regression predicting retention and "retention in good standing" after 1 year: CST vs. SAT
    - Correspondence analysis between CST and SAT

Data Elements

- **DATA ELEMENTS – CST** (Note: Highest scores are not always best predictors)**:**
  - English/Language Arts in 11th Grade
  - Math: Best of Algebra II or Summative Math
  - History: Best of World History or US History
  - Science: Best of Biology, Chemistry or Physics
  - Academic Performance Index (API) of High School

- **DATA ELEMENTS - UC:**
  - SAT Reasoning Test Scores: Critical Reading, Math, Writing
  - SAT Subject Scores: History (Best of World History, US History, American History), Science (Best of Biology, Chemistry, Physics)
  - Weighted-Capped High School GPA (4.40, approximate maximum)
  - Demographic variable self-reported on UC admission application: parent income, parent education, first language, gender, ethnic group (dummy coded)

REGRESSION MODELS

Model Combinations	ALL Applicants	Applicants with SAT Subject Test in History and Science
N	18,029	1,154
REDUCED	Test Scores and High School GPA ONLY	
FULL	ALL Predictor Variables	

RESULTS

Correlations of UC GPA with Select Predictor Variables

Predictor Variable	ALL Applicants N=18,029	With SAT History+Science N=1,154	Reduced Model
Weighted, Capped High School GPA	0.45	0.45	Yes
SAT Critical Reading	0.41	0.36	Yes
SAT Math	0.33	0.36	Yes
SAT Writing	0.43	0.41	Yes
SAT World History or US History	--	0.42	Yes
SAT Biology, Chemistry, or Physics	--	0.43	Yes
CST English/Language Arts-11th Grade	0.36	0.35	Yes
CST Algebra II or Summative Math	0.33	0.36	Yes
CST World History or US History	0.35	0.34	Yes
CST Biology, Chemistry or Physics	0.35	0.35	Yes
Academic Performance Index (API)	0.22	0.19	
Female (1=Yes, 0=No)	0.07	0.08	
Parent Income	0.16	0.09	
Highest Years of Parent Education	0.25	0.18	
First Language (1=English, 3= Other)	-0.14	-0.13	

Comparison of SAT with CST in Prediction of UC GPA after 1 Year: Standardized Weights on Predictors

	All Applicants		With SAT History+Science	
SAT Reasoning Models	**Reduced**	**Full**	**Reduced**	**Full**
Critical Reading	0.083 ***	0.066 ***	0.008	-0.009
Math	0.012 *	0.010	0.019	0.015
Writing	0.110 ***	0.077 ***	0.081 ***	0.058 *
History			0.043	0.049 *
Science			0.077 **	0.077 **
Weighted, Capped HS GPA	0.193 ***	0.200 ***	0.169 ***	0.177 ***
R-Square	**0.286**	**0.312**	**0.282**	**0.312**
CST Models	**Reduced**	**Full**	**Reduced**	**Full**
English/Language Arts	0.082 ***	0.045 ***	0.068 ***	0.050 *
Math	0.034 ***	0.033 ***	0.059 **	0.052 *
History	0.063 ***	0.070 ***	0.041 *	0.047 *
Science	0.033 ***	0.019 ***	0.050 *	0.035
Weighted, Capped HS GPA	0.191 ***	0.190 ***	0.186 ***	0.192 ***
R-Square	**0.267**	**0.311**	**0.264**	**0.304**
N	18,029	18,029	1,154	1,154

* p < .05   ** p < .01   *** p < .001

Prediction of Retention and Retention in Good Standing using SAT vs. CST Variables
## (Nagelkerke R-square Coefficients)

Outcome	SAT Variables	CST Variables
Retention	0.073	0.068
Retention in Good Standing	0.165	0.163

Correspondence of Freshmen SAT Scores with California Standards Tests (CST) English and Summative Math.

2006-07 (full year) freshmen applicants who have both SAT and CST exams.

	All Applicants with SAT and CST	Top 20%			21 - 40%			41 - 60%		
		SAT	CST	CST% - SAT%	SAT	CST	CST% - SAT%	SAT	CST	CST% - SAT%
N	33,360									
Race/Ethnicity										
White	33.9%	39.0%	36.6%	-2.3%	44.6%	40.3%	-4.3%	39.3%	38.4%	-0.9%
Asian/Pacific Islander	39.4%	47.6%	48.8%	1.1%	39.1%	40.4%	1.4%	37.8%	37.7%	-0.1%
Chicano/Latino	17.2%	4.5%	6.0%	1.5%	8.2%	10.8%	2.7%	13.5%	15.0%	1.5%
African American	3.3%	0.5%	0.8%	0.3%	1.6%	1.6%	0.0%	2.7%	2.9%	0.2%
American Indian	0.6%	0.5%	0.5%	0.0%	0.6%	0.6%	-0.1%	0.8%	0.7%	-0.2%
Other Demographics										
Female	55.3%	44.6%	45.8%	1.1%	50.3%	52.1%	1.8%	53.9%	55.9%	2.0%
First Generation College	36.4%	13.2%	18.3%	5.1%	22.6%	26.5%	3.9%	34.2%	35.9%	1.7%
Median Parent Income	$69,500	$100,000	$90,186	-$9,814	$90,000	$80,000	-$10,000	$75,000	$69,000	-$6,000
State Rank of High School on Academic Performance Index (API) (1=Lowest, 10=Highest/Best)										
State Rank of 1, 2, 3, or 4	17.6%	5.1%	6.3%	1.1%	7.8%	9.5%	1.8%	12.2%	14.9%	2.7%
State Rank of 5, 6, or 7	24.9%	17.5%	18.3%	0.8%	23.0%	25.0%	2.0%	27.6%	26.9%	-0.7%
State Rank of 8, 9, or 10	51.3%	72.6%	70.8%	-1.8%	63.9%	59.3%	-4.6%	53.6%	52.4%	-1.1%
No API Rank	6.8%	5.5%	5.5%	-0.1%	6.0%	7.0%	1.0%	7.4%	6.3%	-1.1%
High School GPA										
Mean Weighted, Capped	3.50	3.71	3.74	0.03	3.86	3.88	0.02	3.76	3.69	-0.07

Scattergram: Correlation of 0.80
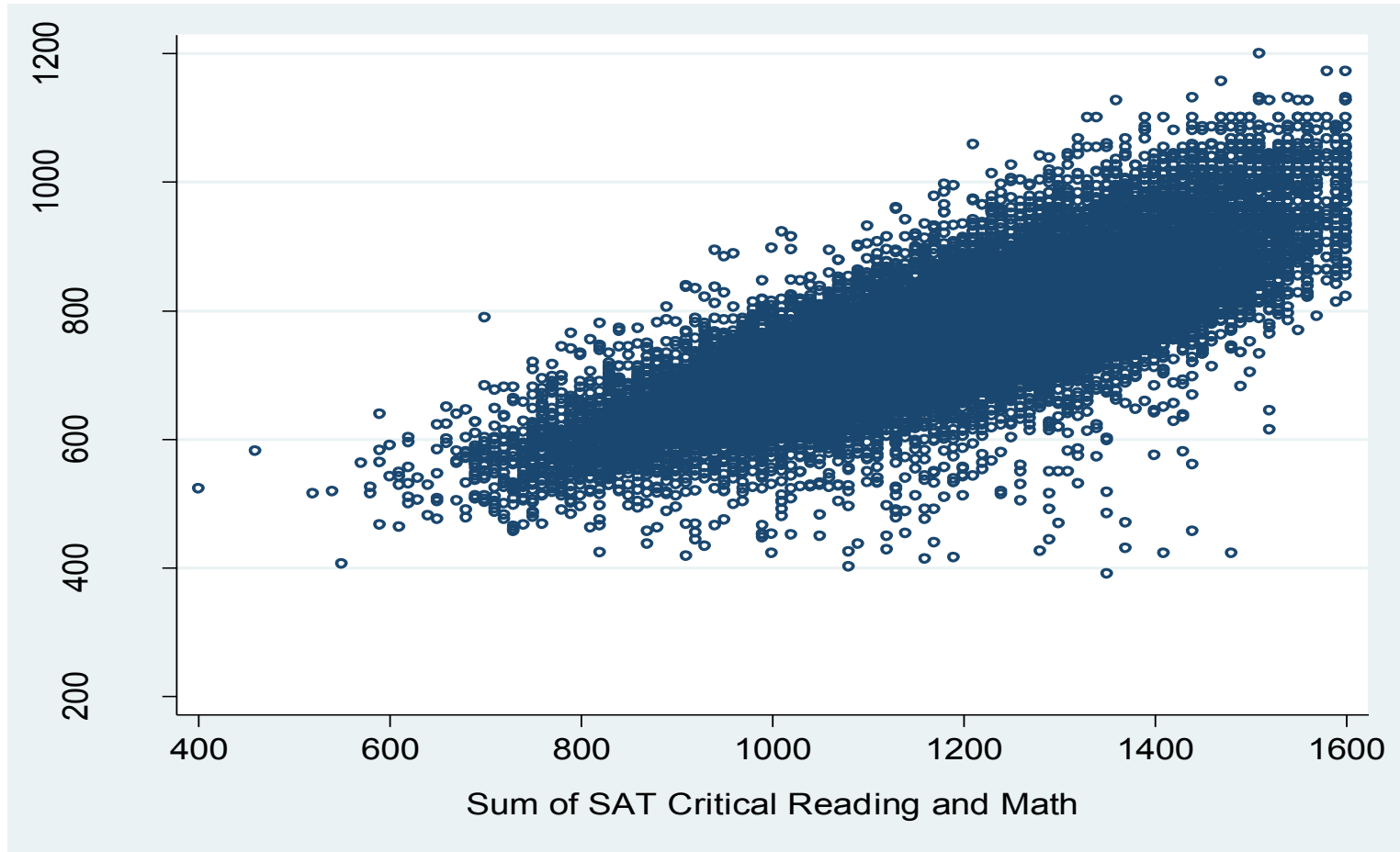
		SAT Reading + Math				
Sum of CST English and Summative Math		400-1040	1050-1150	1160-1240	1250-1340	1350 - 1600	Total
	847 or more	0.0%	0.3%	1.6%	5.3%	13.0%	20.2%
	789 - 846	0.3%	2.0%	5.2%	7.7%	5.2%	20.4%
	742 - 788	1.2%	5.2%	7.3%	5.1%	1.6%	20.4%
	690 - 741	4.8%	7.5%	4.9%	1.9%	0.3%	19.4%
	Less than 690	13.2%	4.4%	1.4%	0.4%	0.1%	19.6%
	Total	19.6%	19.4%	20.4%	20.4%	20.2%	100.0%

Summary of Findings

- There were small, negligible, differences in the prediction of university GPA between the SAT vs. CST models.

- There were small differences in the prediction of retention in good standing between the SAT vs. CST models.

- Those whose test scores placed them in one of the upper three quintiles of the CST were more diverse in terms of ethnicity (higher percentages from Chicano/Latino, African American, and Asian/Pacific Islander groups), had lower incomes, were from less educated families, and were more likely to come from low API high schools than those who earned test scores in the corresponding quintile of the SAT. Also the simple correlations (not shown) of these socioeconomic measures with SAT are higher versus the CST.

What it All Means: Predictive Validity

- **WHY CSTs PREDICT ALMOST AS WELL AS SAT:**

  - CST exams measure the depth of subject matter knowledge across a variety of exams. While there is some content overlap between what is measured on the SAT and what is measured on the CST exams, <u>the more comprehensive subject-specific information gathered by the CST allows for a richer understanding of student performance</u> that is helpful in anticipating college classroom performance.

  - <u>Burgeoning relationship between the K–12 and UC communities that has fueled a steady improvement in the alignment</u> of curricular expectations for college entry (e.g., a-g courses; partnerships between campuses across levels). To the extent that CST exams are a good measure of whether or not students have met these expectations, it is not surprising that they also would be reasonable predictors of success.

- **ADD WRITING TEST TO CST:** <u>Adding an assessment of writing to the CST would notably improve the CST's ability to predict UC GPA</u>. It is clear that, in this study and in past research at the University of California, the SAT writing test was the most important predictor of first-year GPA among the SAT exams in the general population of UC enrollees.

What it All Means:
Advantages of CST over SAT

- The <u>CST appears to be less affected by the socioeconomics</u> of the test takers than the SAT.

- The accessibility of the <u>CST as a no-cost (to the student)</u> exam required of everyone adds appeal to the substitution of the CST for the SAT.

- Considering CST exam results in lieu of SAT scores in the UC admission process is in line with the argument that "K–12 standards and assessments that are aligned with postsecondary education standards and assessments can provide clear signals and incentives, if they are high-quality standards and assessments." <u>In an increasingly K–16 policy framework, standards taught and tested in the K–12 years should provide the necessary information to evaluate college readiness and success.</u>

- From a <u>consumer's point of view</u>, it should not be necessary for students to take SATs and other exams external to the high school curriculum. Consumers would hope that the relationship between high school education and university curricular demands is more seamless than it actually is.

Final Conclusions

We recognize that using the CSTs in university admission makes them more "high stakes" for individuals (as opposed to primarily K–12 schools, in the current accountability regime). But CSTs, if used responsibly by both educational communities, would provide motivation and purpose for individual student learners in addition to institutional accountability, which, in our opinion, greatly outweigh any and all negatives that might arise.