

SATs and UCLA Admissions

Richard Berk
UCLA Department of Statistics
with
David Freedman and Philip Stark
UCB Department of Statistics

April 2, 2002

1. What are the issues at hand?
 - (a) The UCOP Report — Can the data analysis reported be used to justify dropping the SAT 1 from the admissions process?
 - (b) What might happen if SAT 1 were dropped?
 - (c) Are the conclusions the same or different for UCLA alone?
 - (d) What might be learned from UCLA admissions data?
2. Some problems with the UCOP data analysis
 - (a) What did they claim to find? (See Figure 1)

- (b) Be clear that this is a study of correlates of freshman UC GPA.
 - (c) Sample Selection Bias — Students who complete their first year in the UC system are a non-random sample of all UC applicants. (See Figures 2 and 3.)
 - (d) Ambiguous Measure of UC Performance — more talented and motivated students tend to take more advanced courses.
 - (e) Limited Measure of UC Performance — there is more to success in college than freshman GPA
 - (f) Fragile Results — SAT 1 and SAT 2 are very highly correlated and both are correlated with high school GPA. (See Figure 4)
 - (g) Better Models are Easy to Construct — the story could well change. (See Figure 5)
3. UCLA Admission: SAT 1 v. SAT 2 — Pretty much like systemwide (See Figure 6)
- (a) But a slippery slope (See Figure 7)
4. What if at UCLA SAT 1 were dropped?
- (a) Ethnic differences on all academic measures the same — you would need to entertain other fac-

tors. Gender an issue too. (See boxplot Figures 8-13)

- (b) Score distributions as additional complexity (See boxplot Figures 14 and 15)
- (c) Ethnic differences are about the same after controlling for measures of school quality and household income — no obvious levers to pull (See regression output Figures 16-18)

5. Some Conclusions

- (a) You can't justify dropping SAT 1 based on the UCOP Study
- (b) More generally, it is very difficult to learn much about factors related to UC performance without a fundamentally different research design
- (c) All high school performance measures essentially rank ethnic groups the same way, even after trying to control for school quality and family financial resources — dropping SAT 1 won't help.
- (d) Female applicants have higher GPAs and male applicants have higher tests scores (same holds within ethnic groups), even after controlling for school quality and family resources — dropping SAT 1 could disadvantage male applicants.

- (e) What then can do be done if a goal is to increase diversity, given that explicit affirmative action is prohibited? Make the case that for underrepresented minorities, the conventional performance indicators underestimate future performance at UCLA. Here's what you'd have to do.

Step-I Show that the usual indicators of UCLA performance are generally useful — they really do predict well.

Step-II Show that these indicators “underpredict” UCLA performance for underrepresented minorities — make a predictions based on the usual indicators and then see how well the students actually do at UCLA.

Step-III Show that the underprediction can be explained by observable and well measured attributes of underrepresented minorities that might capture, for instance, their living situation, neighborhood, and school quality.

Step-IV Show that by properly taking these measures into account, the UCLA performance of all applicants is equally well predicted.

Variance Partitions for UCOP Study

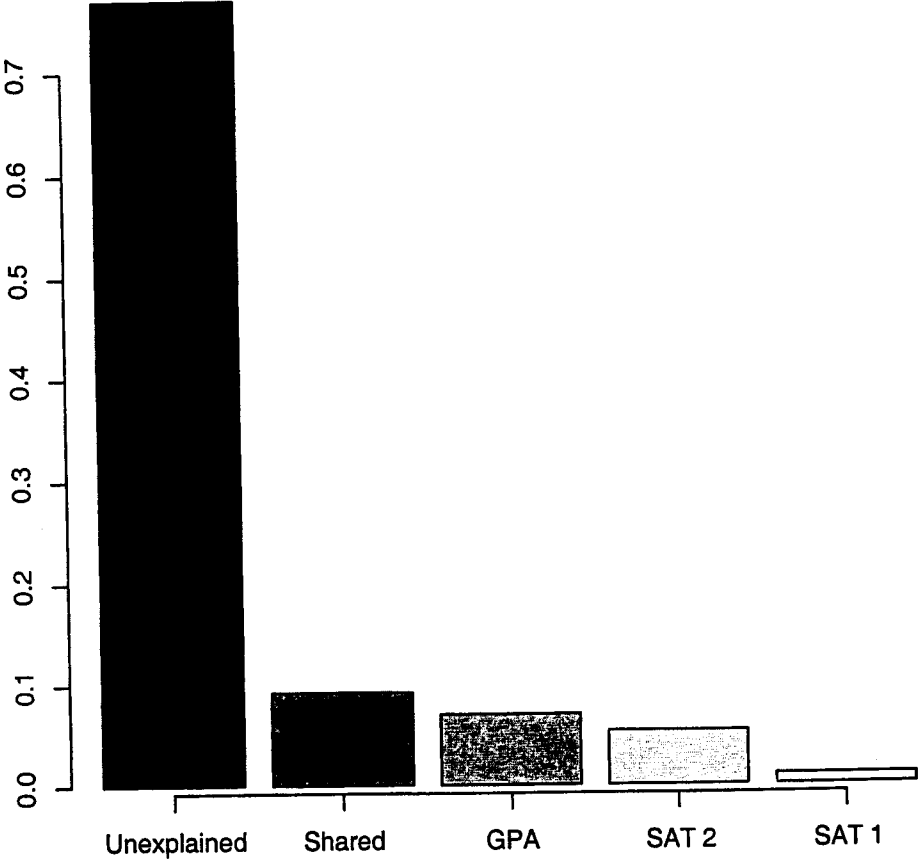


Figure 1: VARIANCE PARTITIONS FOR UC FRESHMAN GPA

Seems to show that SAT 1 not as good a predictor as SAT 2.

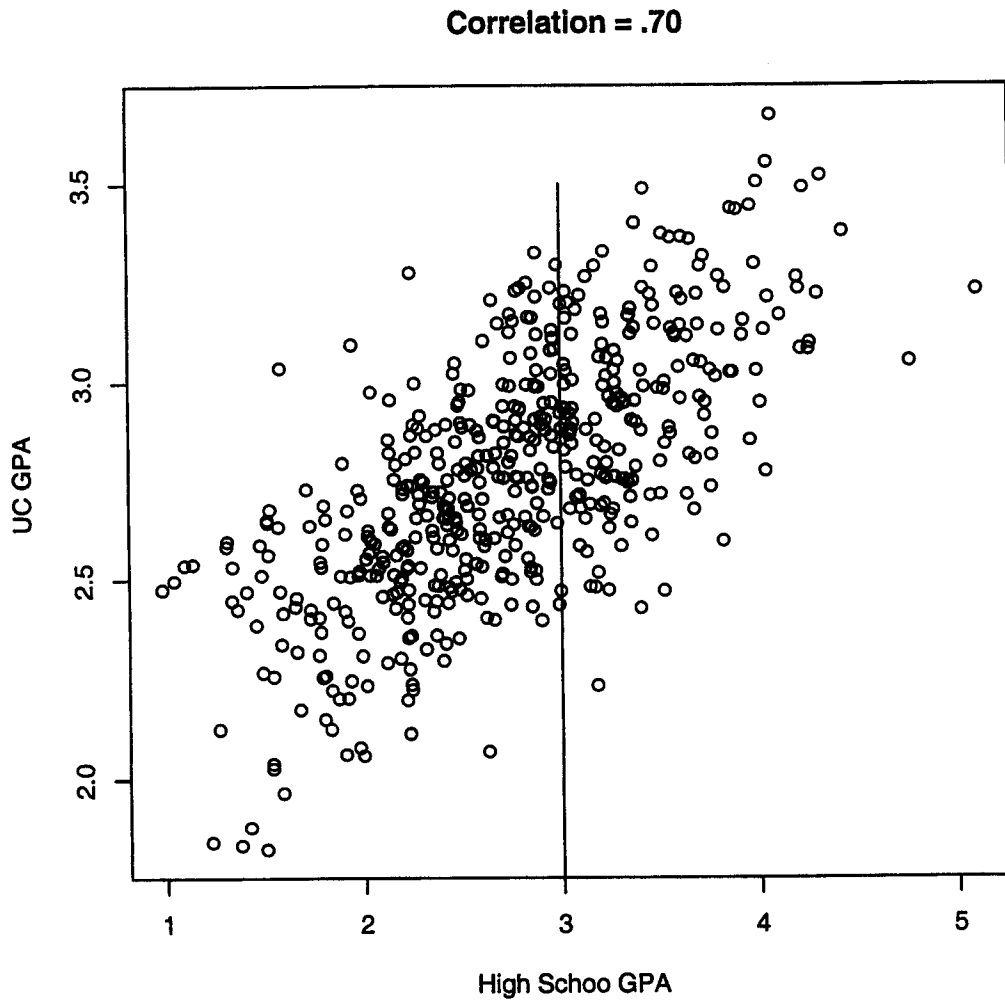


Figure 2: HYPOTHETICAL SCATTER PLOT

Scatter plot and correlation for fictitious data.

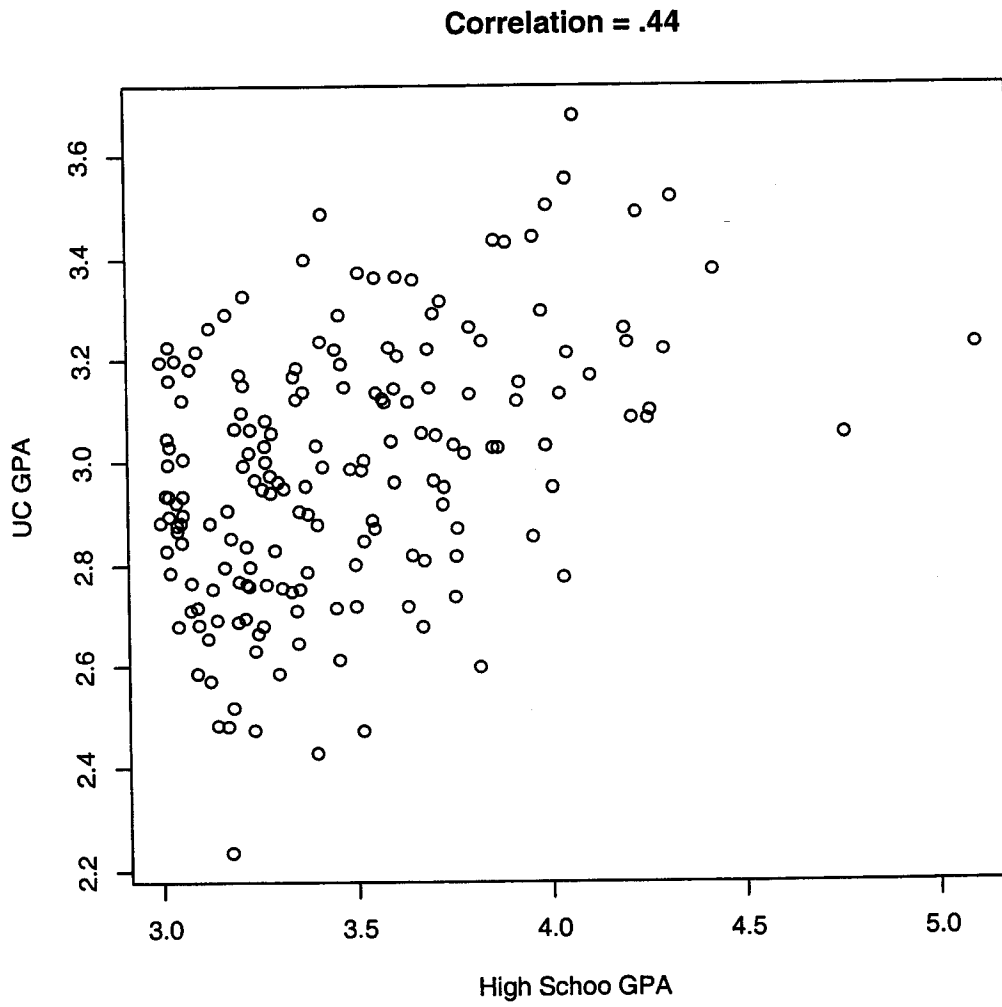


Figure 3: CENSORED SCATTER PLOT

By eliminating High School GPAs less than 3.0, the correlation is altered dramatically.

SAT 1 and SAT 2: Correlation = .84

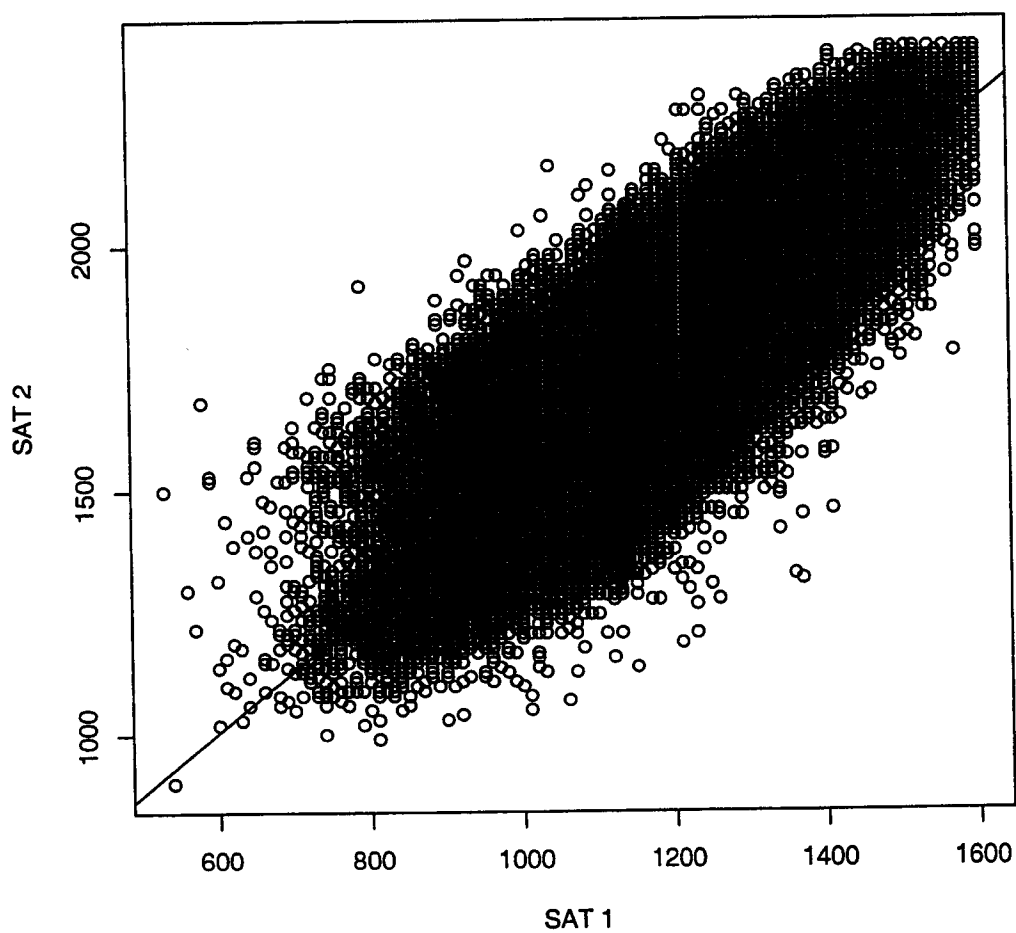


Figure 4: CORRELATION BETWEEN SAT 1 AND SAT 2

As an empirical matter, it is difficult to distinguish between the two tests.

Tree Model for UC GPA

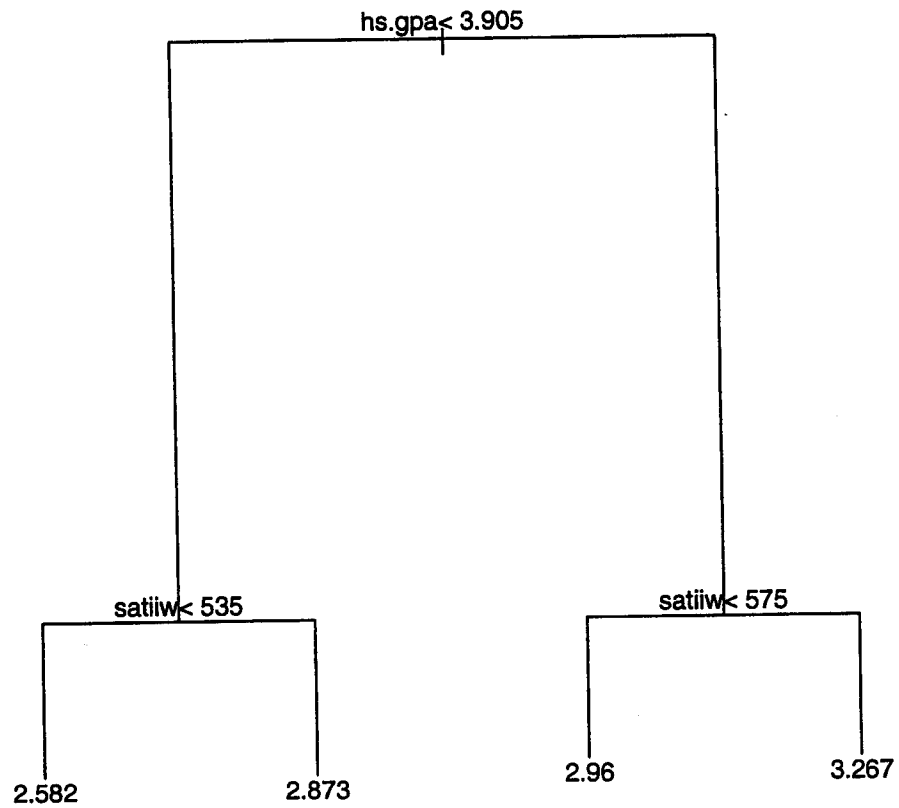


Figure 5: SIMPLE CART MODEL FOR UC FRESHMAN GPA

You can explain 50 percent more variance just by pushing a few different buttons.

Variance Partitions for UCLA Freshman GPA

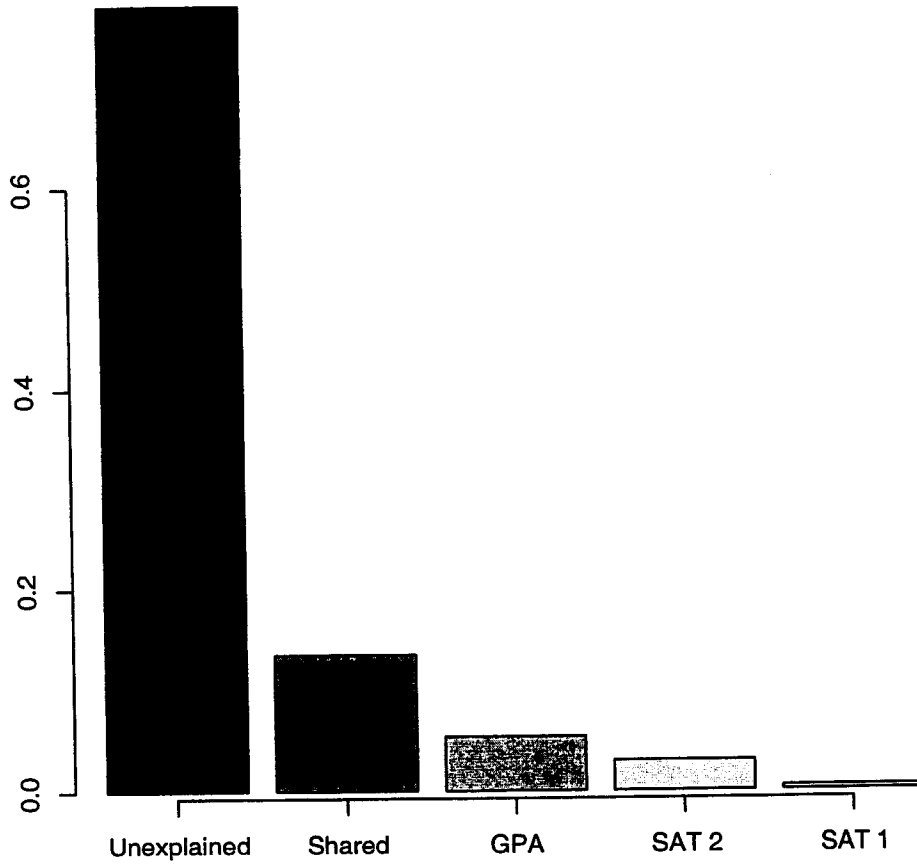


Figure 6: VARIANCE PARTITIONS FOR UCLA FRESHMAN GPA

Again, it looks like SAT 1 is not useful.

Variance Partitions in UC Freshman GPA, with School Quality and Academic Rank Added

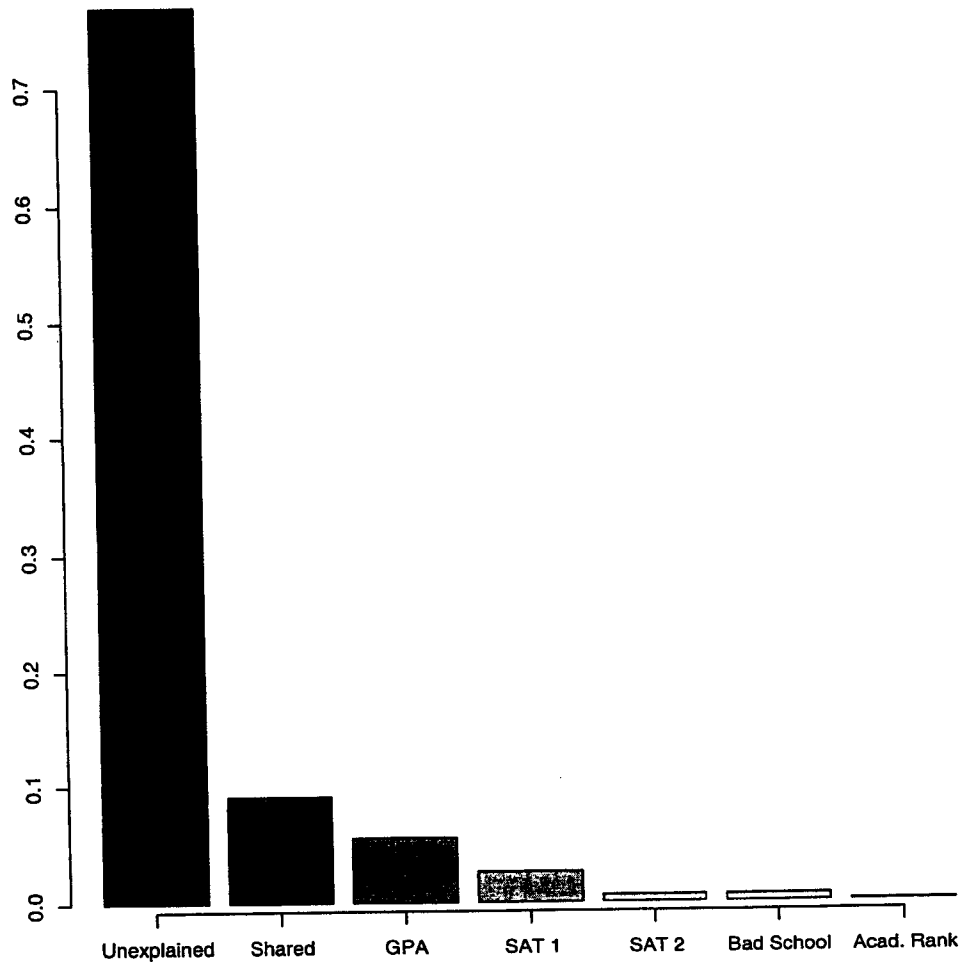


Figure 7: VARIANCE PARTITIONS FOR UCLA FRESHMAN GPA WITH SCHOOL QUALITY AND ACADEMIC RANK ADDED

It looks like high school quality and judgments of the admissions office do not matter.

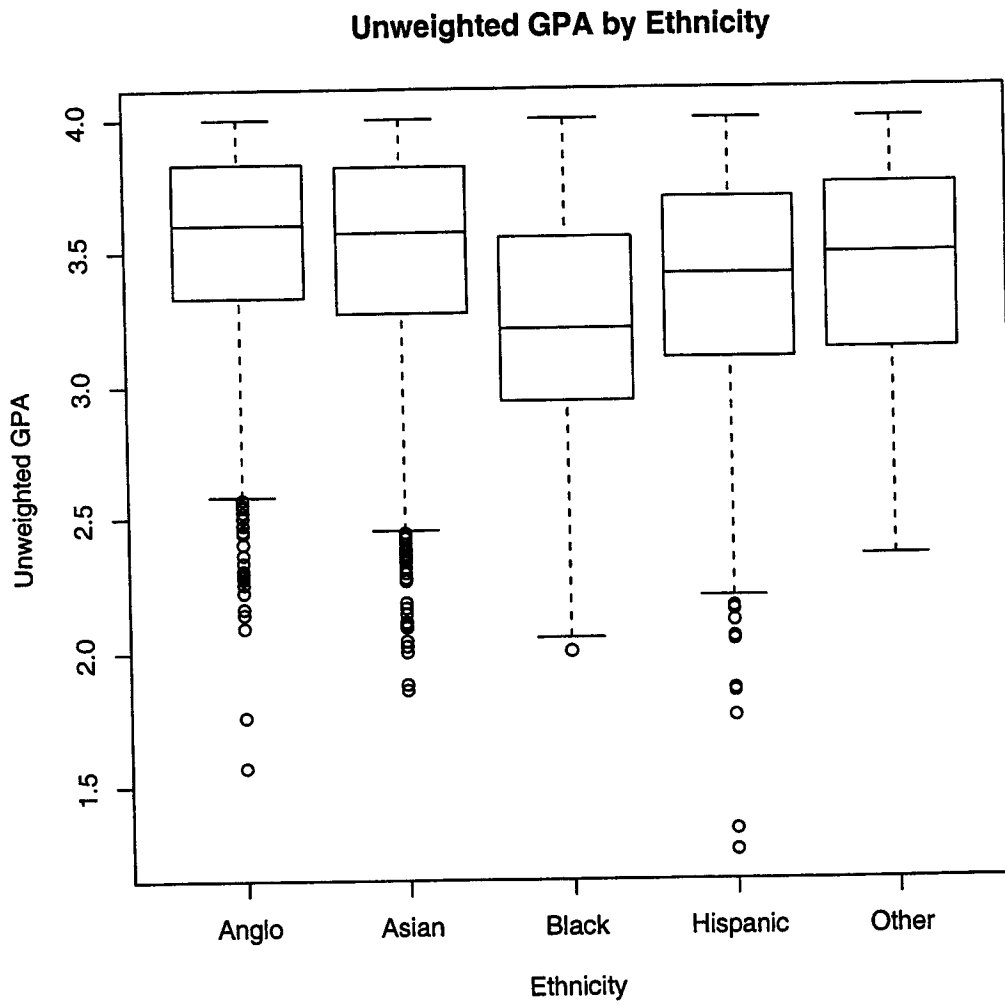


Figure 8: BOXPLOT OF UNWEIGHTED HIGH SCHOOL GPA BY ETHNICITY

Ethnicity is related to high school GPA.

Sat 1 by Ethnicity

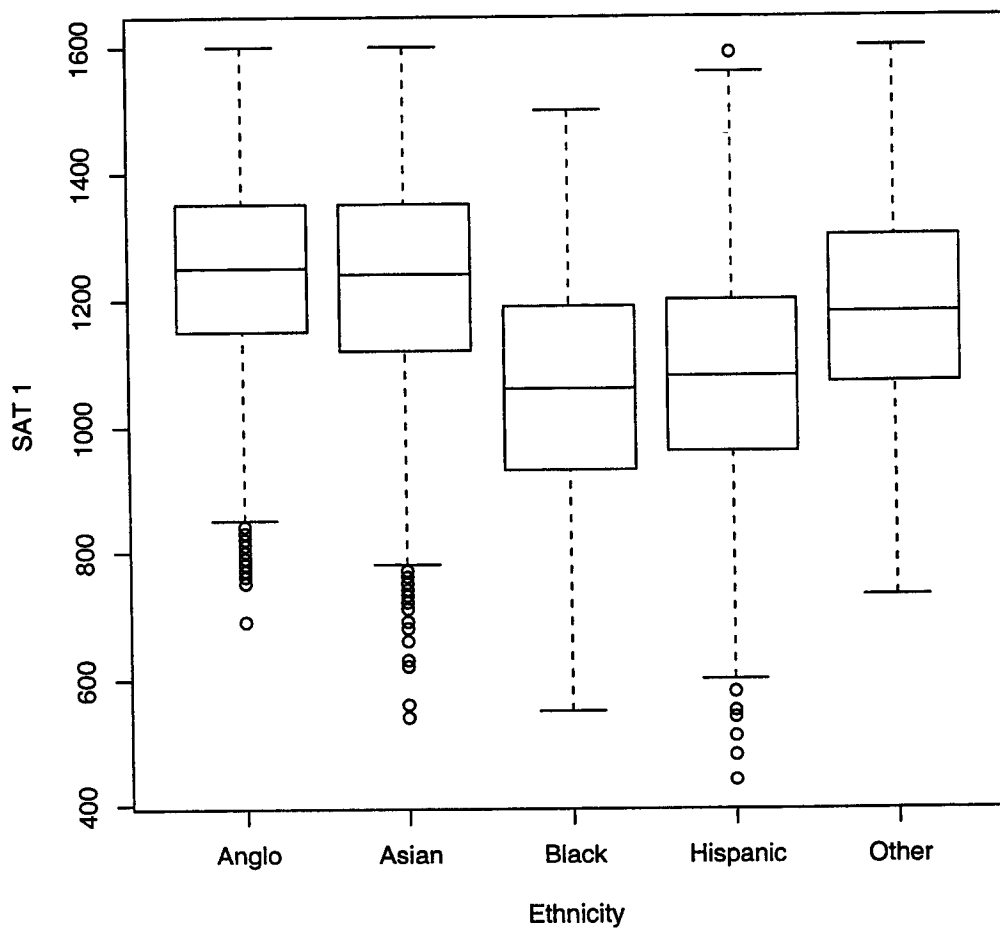


Figure 9: BOXPLOT OF SAT 1 BY ETHNICITY

Ethnicity is related to performance on SAT 1.

Sat 2 by Ethnicity

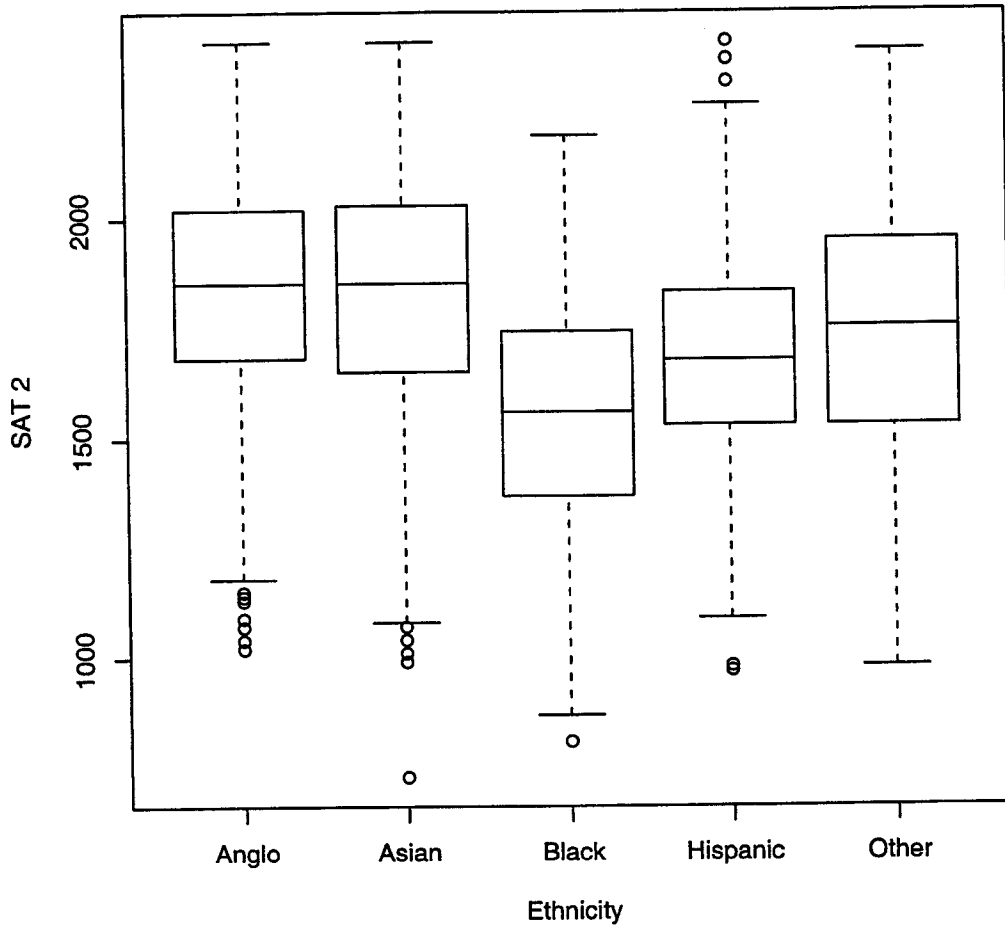


Figure 10: BOXPLOT OF SAT 2 BY ETHNICITY

Ethnicity is related to performance on SAT 2.

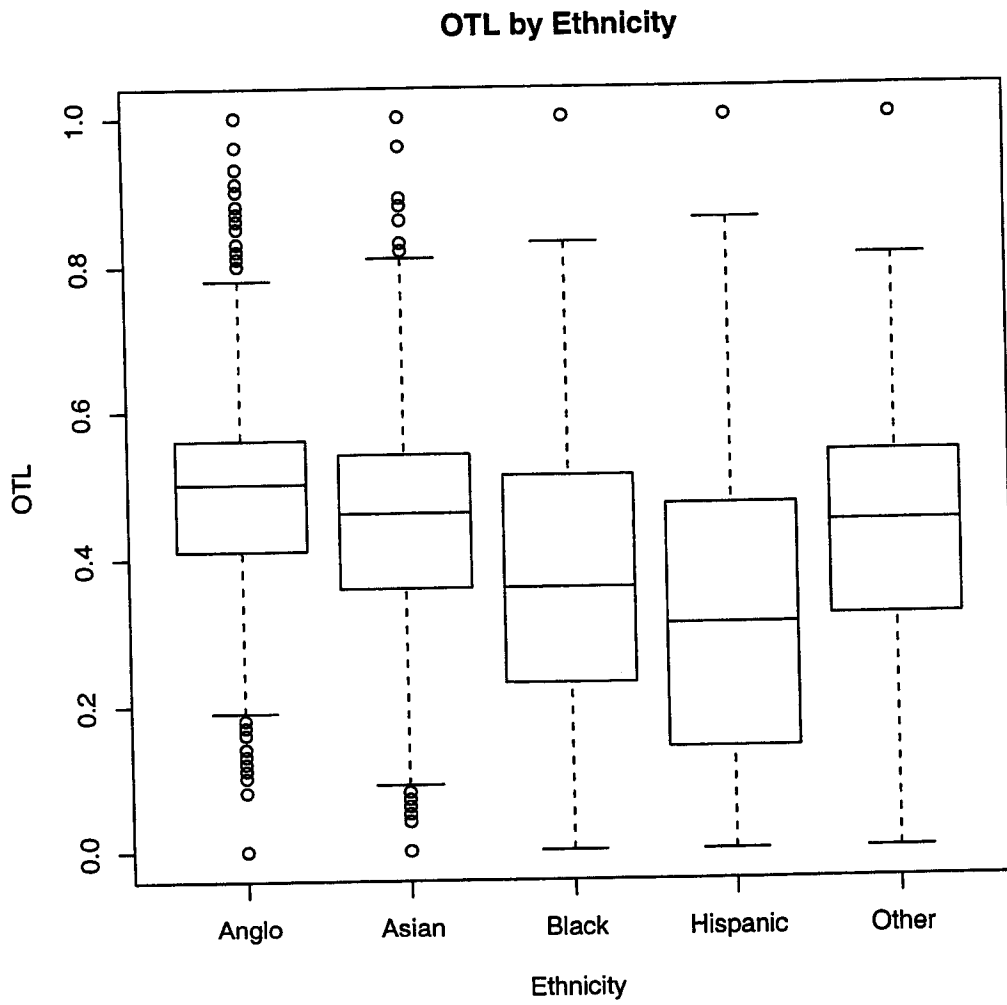


Figure 11: BOXPLOT OF SCHOOL QUALITY BY ETHNICITY

Ethnicity is related to school quality

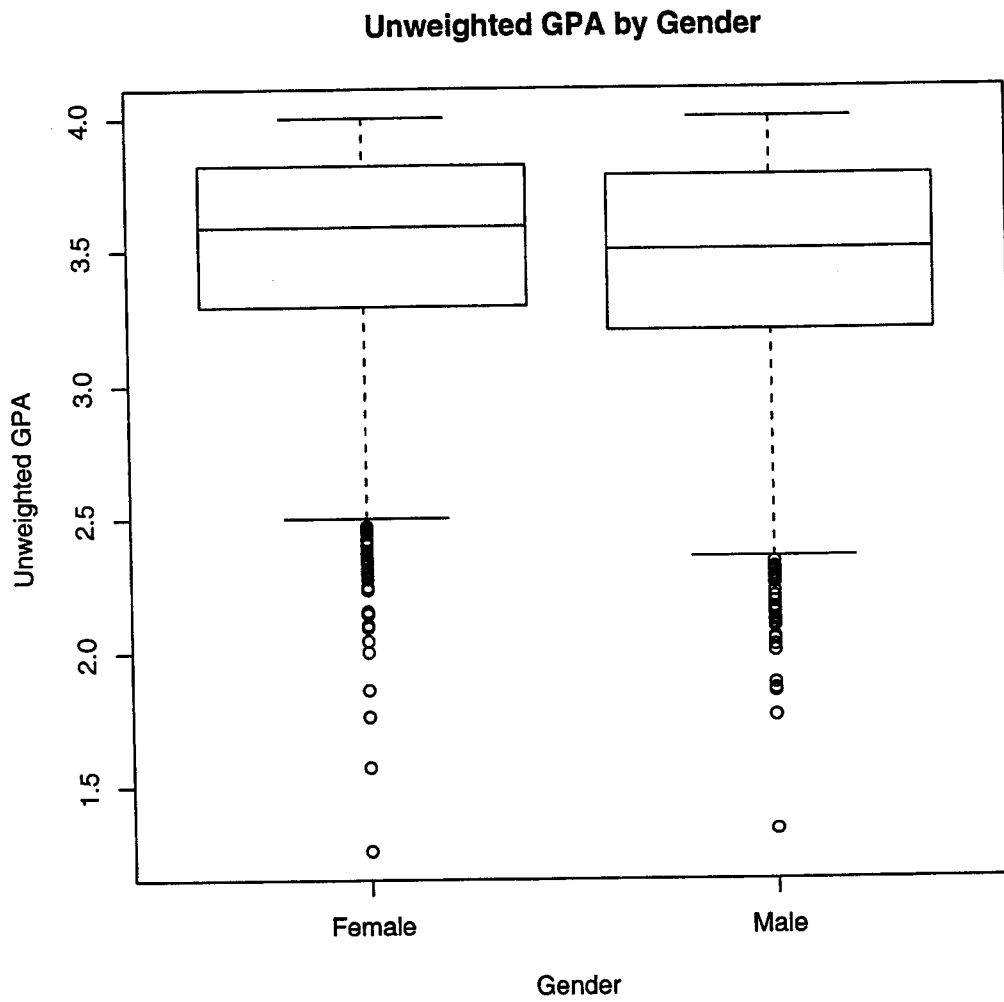


Figure 12: HIGH SCHOOL GPA BY GENDER

Female applicants have higher GPAs.

SAT 1 by Gender

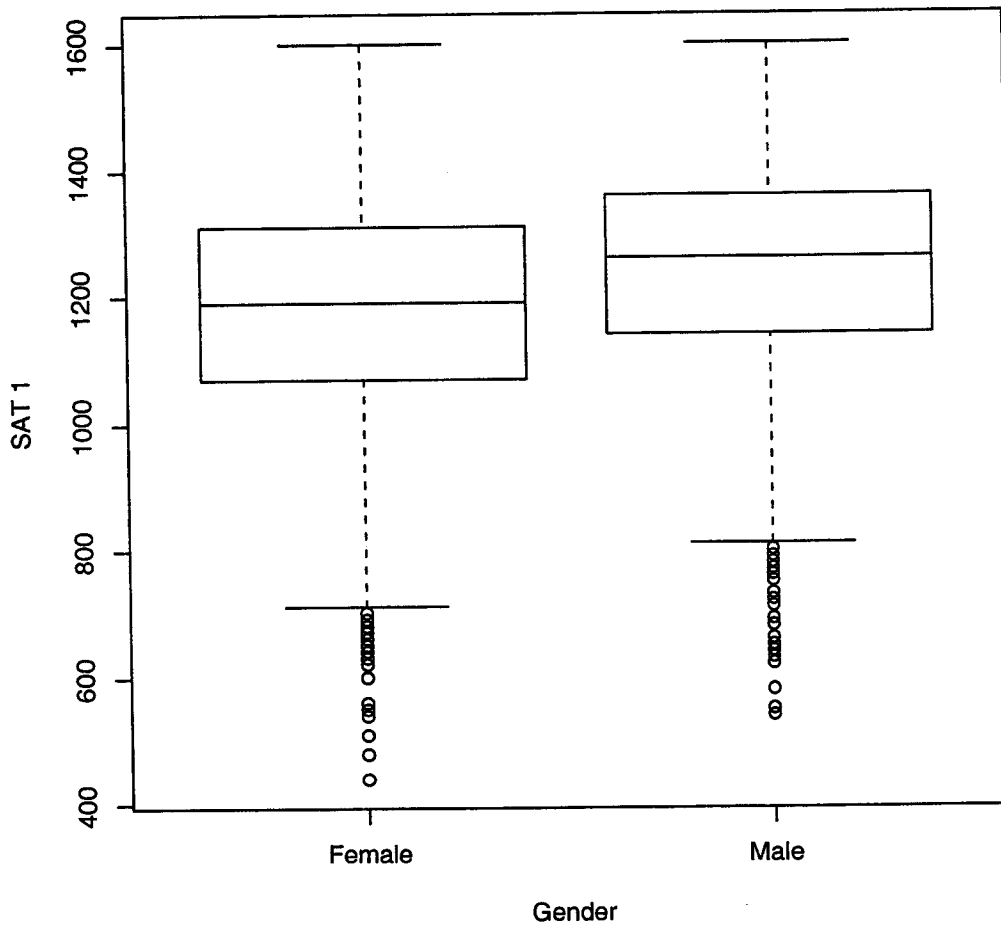


Figure 13: SAT 1 BY GENDER

Male applicants have better scores on the SAT 1.

SAT 2 by Gender

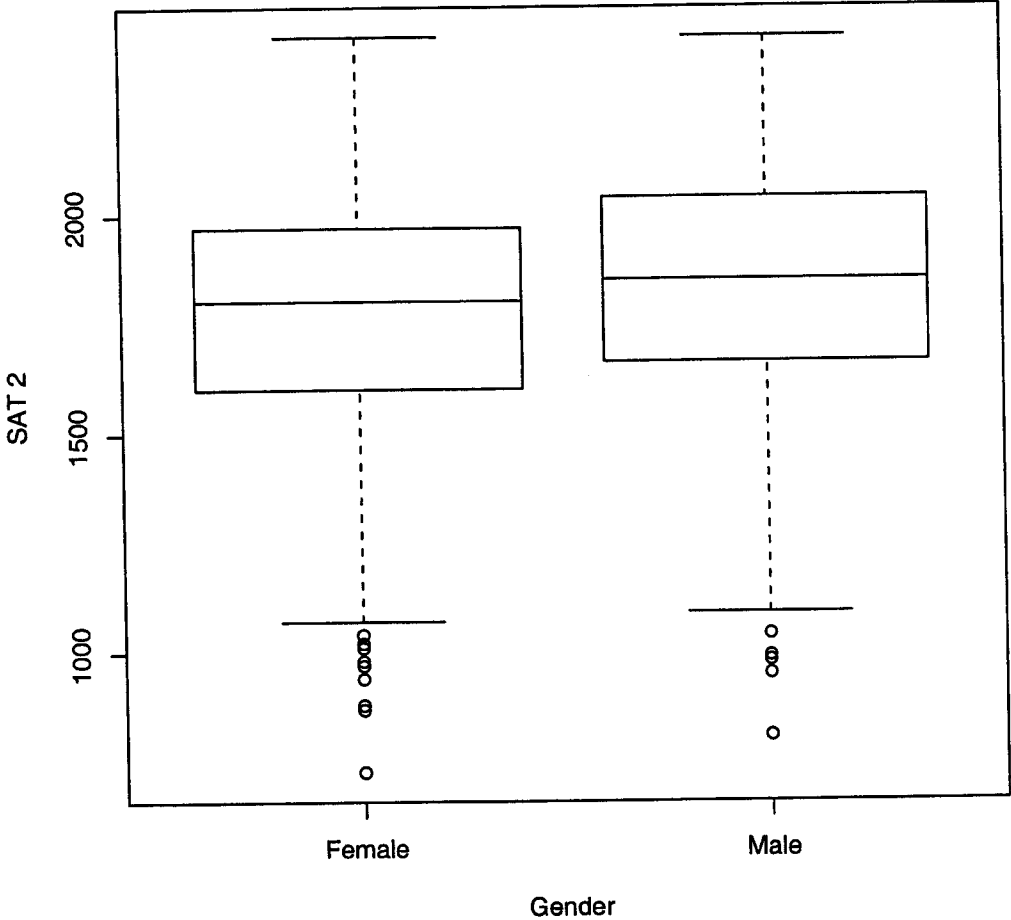


Figure 14: SAT 2 BY GENDER

Male applicants have better scores on the SAT 2.

SAT 2 Distribution for Asisan Applicants

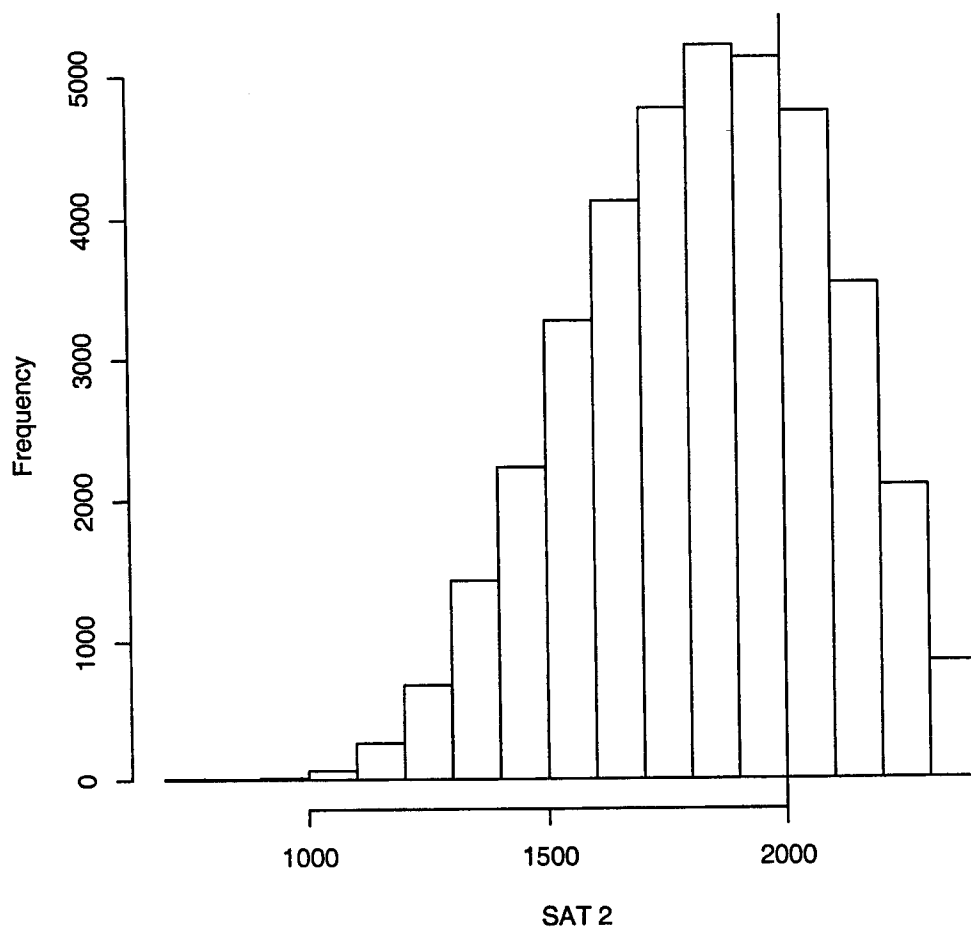


Figure 15: SAT 2 FOR ASIAN APPLICANTS

30% score better than 2000

SAT 2 Distribution for Hispanic Applicants

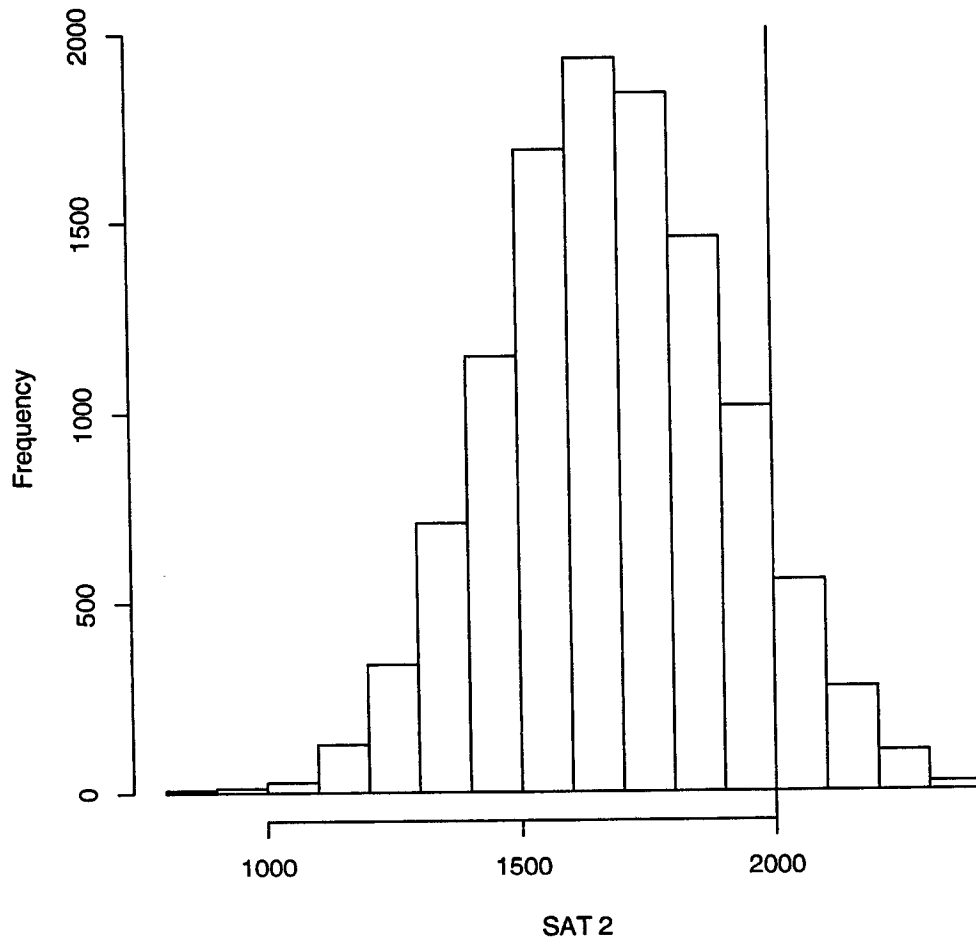


Figure 16: SAT 2 FOR HISPANIC APPLICANTS

18% score better than 2000

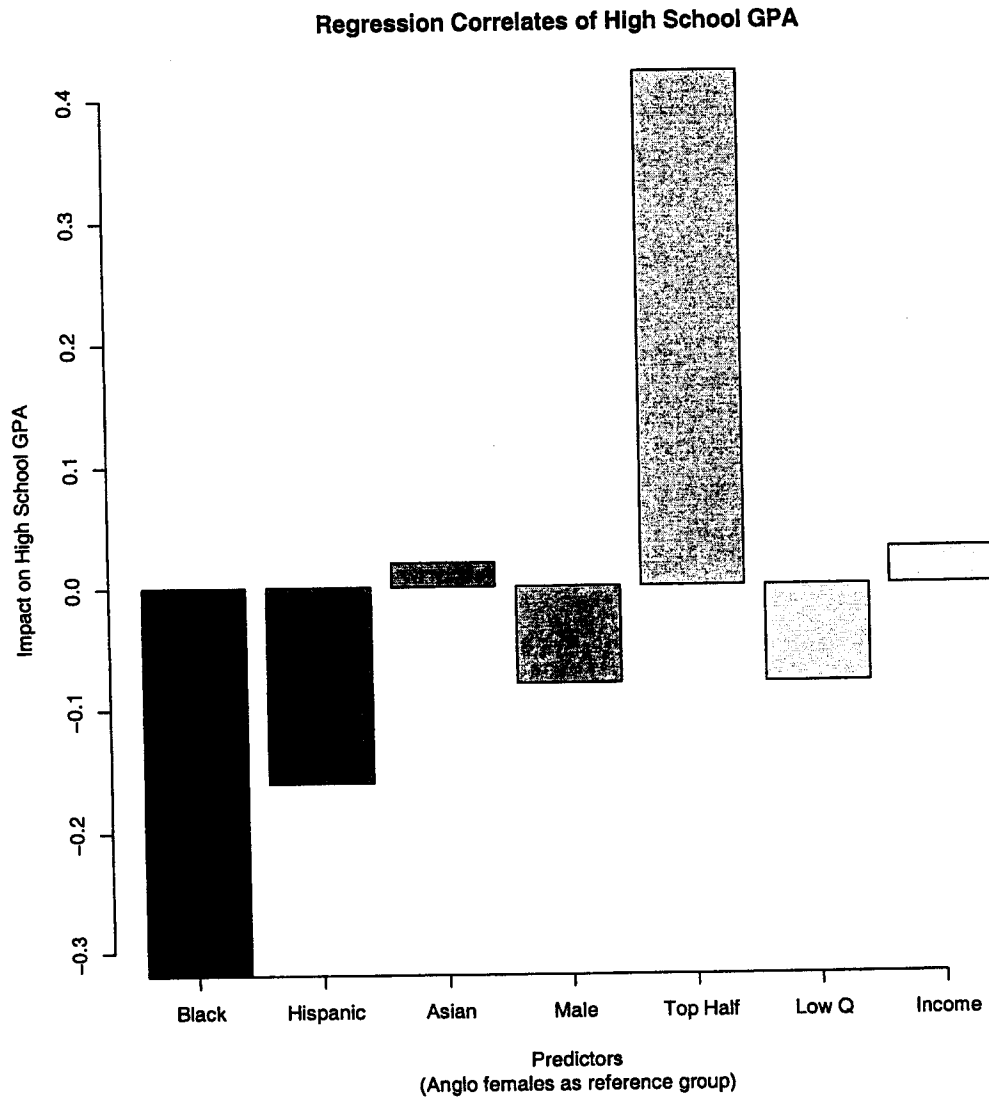


Figure 17: Partial Regression Coefficients Times the Range of the Predictor for Performance on High School GPA

Regression Correlates of SAT 1

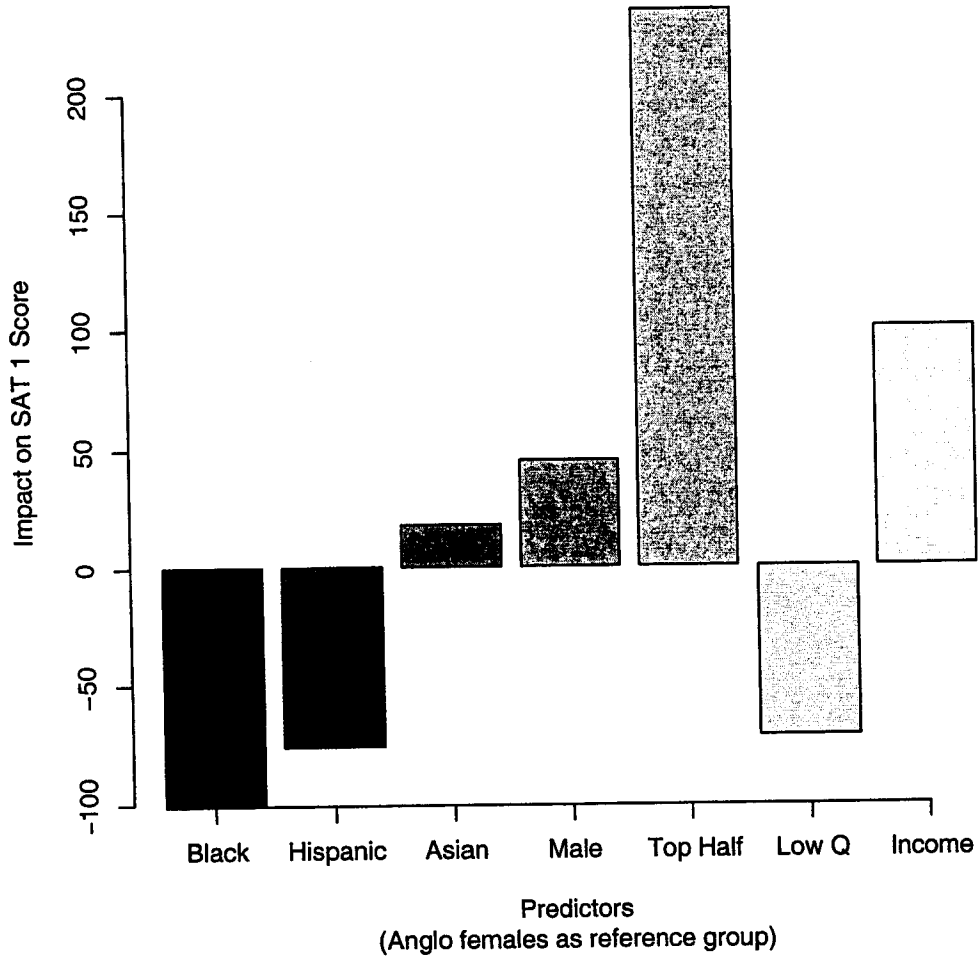


Figure 18: Partial Regression Coefficients Times the Range of the Predictor for Performance on SAT 1

Regression Correlates of SAT 2

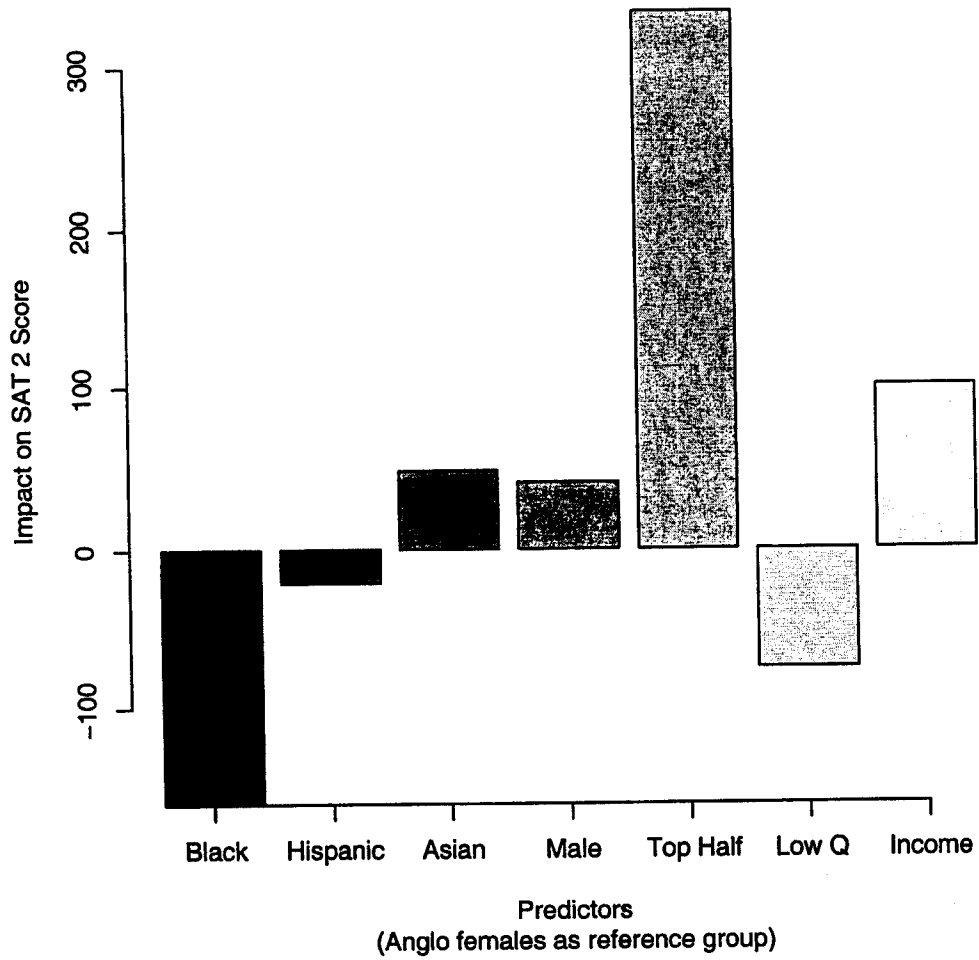


Figure 18: Partial Regression Coefficients Times the Range of the Predictor for Performance on SAT 2