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The President's Initiative on Race

The New Executive Office Building
Washington, DC 20503
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MEMORANDUM

TO: Maria Echaveste, Eddie Correia, Lin Liu, Julie Fernandes, Tanya Martin, Bob Shireman

FROM: Scott Palmer

SUBJECT: Draft Report of the Educational Testing Service

DATE: March 5, 1998

Judy Winston asked me to forward to you the attached draft report of the Educational Testing Service (ETS) that was discussed at our recent meeting with Nancy Cole, Tony Carnevale, and Sharon Robinson from ETS. The report includes a discussion of ETS's "strivers" model. While ETS is pleased to share its research with us, Mr. Carnevale stressed that the report is only a draft and should not yet be distributed too widely. We will forward additional materials to you as we receive them.

If you have any questions or concerns, please feel free to contact me at x51047. Thanks.

Attachments

cc: Judith Winston

Julie,
I have also attached background materials on ETS.
Scott

DRAFT

HOW DO WE CHOOSE?

An Exploration of Alternative Decision-Making Processes in College Admission

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March 1998

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CONTENTS

DECISIONS! DECISIONS! DECISIONS! Getting into college is a stressful time for lots of people. It's stressful because of the many decisions or choices that must be made - students (and people long out of school) need to decide whether to apply to a higher education institution and which ones; parents may need to decide how they will finance a child's education; the colleges, graduate & professional schools must decide how to recruit for the kinds of people they would like to have apply and then decide who to admit and (perhaps) to provide with financial aid. Fortunate applicants may be faced with deciding which offer of admission to accept. Although it would be interesting to explore how any of these choices are made, this paper will focus on the choices made by undergraduate colleges as to whom to admit. We will review the various decision-making models that have been used during the three and a half centuries of higher education in what is now the United States. While each of these models had its origin in a particular historical setting, elements of each persist to the present day. We will then explore the impact of alternative models that may be appropriate for choosing students in the current social and political climate.

I. WHO YOU ARE AND WHO YOU KNOW

During the first two centuries or so of higher education in this country, attending college was a choice open, primarily, to the sons of well-to-do families. Colleges had admission requirements that emphasized classical languages and authors; one prepared to meet those requirements by studying with a tutor or by attending a college preparatory school designed to meet the requirements of the particular college to which one aspired. A student's lineage, the school attended, and one's social/political/religious connections played significant roles in gaining admission. Henry Adams, the son of a well-known family, described his enrollment in Harvard College in 1858 as what members of his father's and mother's family had done for generations, even though it seemed to have little effect on their lives.[1] Although he became a distinguished historian and social critic, he perceived that his admission to Harvard had more to do with his background than with his academic preparation. The growth of public high schools in the latter part of the 19th century and the turn-of-the century agreement among a number of colleges to use common entrance examinations began to broaden the pool of qualified applicants. It is useful to note that in the 1899-1900 school year, there were only 95,000 high school graduates, or 6.4% of the 17-year old cohort. In that same year, there were 977 institutions of higher education. Consequently, very few colleges had significantly more applicants who met the entrance requirements than there were vacancies; the basic admission decision was whether an applicant had too high a risk of failure. Further, college attendance was limited by the ability of family or benefactor to pay the fees. Although some these "status" considerations still enter into a small number of decisions, they continued to be important factors in admission decisions among many private colleges and universities prior to World War II.

II. GIVE 'EM A CHANCE

A forerunner of "open admissions" developed with the growth of public colleges and universities after the passage of the Morrill Act in 1862. The number of institutions went from 563 in 1869-70 to 1708 in 1939-40.[2] During this same period, total enrollments climbed from 52,000 to 1,494,000. Typically, the graduate of any state- approved high school who had the requisite number of Carnegie Units--reflecting the number and distribution of courses taken in high school-- could enter the public university. However, a high proportion of entrants were unsuccessful and dropped out of higher education after one or two semesters. As public institutions, the tuition was minimal for state residents; family resources and "working your way through college" provided the financial means for shelter and food. In a significant number of states, the public colleges and universities were segregated by race -- denying African-Americans access to many programs and professional opportunities.

III. THE BEST AND THE BRIGHTEST

Although a few institutions had started to seek out unusually promising students from less traditional and less advantaged backgrounds prior to World War II, the influx of veterans seeking to attend college with the financing of the GI Bill provided many colleges and universities, for the first time, with larger numbers of applicants than places to be filled. While the number of institutions of higher education grew by a modest 8% from the pre-war number, enrollments in 1949 had increased 78% from their 1939 level.

Table 1
Growth in Enrollments and Number of Higher Education Institutions post-World War II

Year	Number of Institutions	Total Enrollment
1939-40	1708	1,494,203
1949-50	1851	2,659,021

Source: NCES Digest of Education Statistics, 1996, Table 168

The plethora of students forced many institutions to begin to "select" those who should be admitted. The profession of "Admissions Officer" was created to relieve the faculty from dealing with the expanded number of applicants. The applicants were selected on the basis of their merit -- as defined by standardized test scores and grades earned in high school. For those veterans who had not completed high school, another test, the GED*, provided the means of demonstrating that one had the equivalent preparation. This emphasis on "meritocratic"

* The Tests of General Educational Development

selection of women and men became even more important as the leading edge of the "Baby Boom" generation began to seek higher education in the early sixties. During the same period, the federal government became more actively involved in higher education -- intervening to ensure the integration of previously all-white colleges and universities and creating student aid programs that began to lower the financial barriers to attending college.

IV. OPPORTUNITY FOR ALL

In 1954, the Supreme Court in *Brown v. Board of Education* struck down the *de jure* segregation of public schools that was required or permitted in 20 states. This began to improve educational opportunities for African-Americans although issues of equality of preparation for college are still with us more than four decades later. The subsequent, and reluctant, integration of Southern public universities in the early sixties also contributed to a change in expectations regarding African-Americans and other minorities attending college. Colleges and universities, along with other institutions, heeded President Johnson's 1965 call for "affirmative action" to create opportunities for students from marginalized groups. The resulting diversity within the student population (and, to a lesser extent, among the faculty) came to be viewed as educationally important and an asset to various facets of institutional mission. To achieve the goal of a more diverse student body, some institutions adopted dual admission processes, setting different standards for the admission of majority and minority students. The 1978 Supreme Court decision in *Bakke v. Regents of the University of California* ruled that quotas were illegal but that race could be considered along with other characteristics. In practice, affirmative action came into play primarily at those institutions with many more qualified applicants than spaces available where preference could be given to qualified applicants with certain characteristics, e.g. race/ethnicity, unconnected with the applicant's academic achievement. Some analyses[3] suggest the effective weighting of race/ethnicity was similar to the weighting given other non-academic characteristics such as being the child of an alumnus.

During the past thirty years, an increasing proportion of high school graduates have enrolled in institutions of higher education. In 1967, 33.7% of high school graduates enrolled in higher education, while in 1995, 42.3% of high school graduates did so. This trend was similar for Whites, Blacks, and Hispanics.

Table 2
Enrollment rates of 18 - 24 year-olds as a percent of high school graduates

	1967	1977	1987	1996
Total	33.7	31.4	35.4	43.4
White	34.5	31.3	36.6	45.1
Black	23.3	29.1	28.2	35.9
Hispanic	n/a	30.5	26.6	34.5

Source: NCES *Digest of Education Statistics 1997* Table 186

The College Board's *Annual Survey of Colleges*, which focuses on freshman enrollment patterns, also shows a growth in the percent of freshmen who are minorities: In 1984, 14.5% of all freshmen were minorities, in 1995 the figure was 19.5%. Among freshmen at four-year colleges, the 1984 figure was 13.8% and the 1995 figure was 20.2%.

Nettles[4] has provided a benchmark against which to judge the effect of alternative admission strategies. He studied the racial distribution of students entering college in 1995. The patterns at the 120 most selective colleges are shown in Table 3. It is the admission practices among these very selective colleges that attracts the greatest public attention. Because of the depth of their applicant pool, they can use non-academic criteria to make choices among academically qualified applicants.

Table 3
A Comparison of the Racial Distribution of Entering Students at the 120 Most Selective Colleges: 1995

	African American	Asian American	Hispanic	White	Total
Number of Freshmen	7,574	14,710	7,524	97,867	132,525
Percent	5.7	11.1	5.7	73.8	

Clearly, the efforts by these highly selective colleges and universities to recruit and admit a diverse student body were having results.

V. IF NOT AFFIRMATIVE ACTION, THEN WHAT?

During the early 1990s, a growing portion of the population felt that it was inappropriate to use race-based preferences to achieve diversity. This trend was reflected in political and judicial actions such as the 1996 *Hopwood v. University of Texas* decision by the 5th Circuit Court of Appeals barring the use of race as an admission consideration and the passage of Proposition 209 in California in 1996 which eliminated any race or gender preferences in all public activities, such as admission to a public college or university. Similar lawsuits, e.g. *Gratz v. University of Michigan*, have been filed in other parts of the country and ballot initiatives similar to Proposition 209 are underway in other states. Public opinion polls[5] show considerable support for "special educational programs to assist minorities in competing for college admissions" (63% for, 28% opposed) or "government financing for job training for minorities to help them get ahead" (69% in favor, 24% opposed). On the other hand, only a minority (24%) are content with leaving "affirmative action programs giving preference to some minorities" as they are. In the face of such social opinion, it is likely that colleges and universities will need to develop new admission strategies that do not rely on racial/ethnic preferences to obtain a diverse student body. Finding an alternative to race-based affirmative action is especially important to the limited number of 4-year colleges that have many more applicants than they can admit. It is also of critical importance to graduate Ph. D. programs where the acceptance rates range between 20% and 50% of applicants and professional schools such as law, where about two-thirds of applicants get accepted somewhere, and medicine, where fewer than 40% of all applicants gain admission.)

VI. THE TEN-PERCENT SOLUTION

In response to the Hopwood decision, and with the desire to continue to include substantial numbers of minority students in higher education, the Texas Legislature has mandated that all Texas students who are in the top 10% of their high school graduating class be assured admission to one of the public universities in Texas. Because of the substantial racial isolation observed in school populations in Texas and elsewhere, this would result in a higher proportion of Blacks and Hispanics gaining admission to selective institutions than is true of other alternatives. On a national basis, the racial distribution of those who are in the top 10% of their high school class would be approximately as shown in Table 4 below.

Table 4
Percent of Students by Racial/Ethnic Group
Top 10% of Class

	African-Americans	Asian-Americans	Hispanics	Whites
Top 10% of HS Class	6.0%	7.8%	7.7%	78.5%
Top 10% of HS Class and took Admission Test	5.2%	8.2%	6.6%	79.8%

Source: NELS:88 Students who took an admission test

Because of the wide variations in the quality of education in different high schools, as well as variation in how "class rank" is computed, it is likely that some unknown proportion of the students admitted under this alternative will not be able to do college academic work at the level that has been expected at places such as the University of Texas. Gaining admission, only to be overwhelmed by the academic expectations, will not serve the interests of the individual students, the universities, the community, nor the broader public. Widespread adoption of this alternative could lead to colleges and universities reverting to the older pattern (see II above) of using the first year of college as the "selection" tool.

VII. ROLL THE DICE

Some social critics have argued that the tests are the culprit for the comparatively low proportion of Blacks and Hispanics in elite educational institutions and, therefore, that admissions should be determined by lottery (usually with the proviso that some minimum floor be set regarding whom to include in the lottery pool. Professor Lani Guinier, formerly of the University of Pennsylvania Law School, has written:

> The real issue is how we define merit. Should we be trying to predict a student's future achievement by a single measure that mainly reflects past opportunity? Putting less emphasis on test scores doesn't mean giving up on excellence. One alternative is for schools to set a minimum test score as acceptable and then hold what is in effect a lottery for admission among applicants who meet the minimum standard.
>
> Prospective students who offer qualities that are considered valuable would have their names entered more than once in this lottery, to increase their chances of being selected. These could be students who have overcome adversity, who have particular skills or credentials, who have outstanding academic records or who have special and worthy career aspirations.[6]

Although outstanding academic records in high school are consistently shown to be good predictors of college grades, (and are heavily used in making admissions decisions) there is consistent evidence from the law schools that LSAT scores are a better predictor of first-year grades than is the undergraduate grade point average.[7] Other dimensions for which Prof. Guinier would award extra chances in the lottery appear to require the application of subjective judgment to ephemeral "characteristics" such as career aspirations. Using the 1997 senior cohort data from SAT, we can model, however, the distribution of members of racial/ethnic groups that would result from random selection among students above particular minimum qualifying scores on the SAT. These are shown in Table 5.

Table 5
Racial/Ethnic Distributions Resulting from Random Selection of Students above specified Minimum Qualifying Scores.

Minimum Qualifying Score	African-Americans	Asian-Americans	Hispanics	Whites
1200	2.2%	12.2%	3.6%	77.3%
1000	4.3%	9.6%	5.3%	76.3%
800	7.7%	8.8%	7.2%	71.8%

Source: 1997 Senior Cohort of SAT-takers

Because a V+M score of 800 is near the minimum needed to meet the NCAA requirement for Division 1 athletic eligibility for freshmen, it seems unlikely that even moderately selective colleges would set a lower minimum score for entry into their admission lottery.

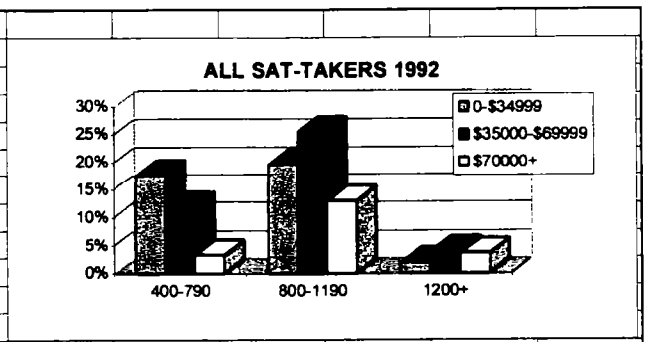
VIII. THE "STRIVERS" MODEL

It is in this context that ETS has been conducting research to evaluate the impact of an alternative model that we have called the "Strivers Model." It is well known that scores on college admissions tests such as the SAT reflect the opportunities that individuals have had to develop strong academic skills such as reading, nuanced understanding of English vocabulary, and quantitative reasoning and computation skills. In U. S. society, the opportunities to develop the skills are fostered or limited by the quality of schooling one receives and the emphasis and support of learning that is found in the home and community. Such opportunities are related to a family's economic status, parental education, and the nature of one's neighborhood and community. Recognizing and giving some preference to students whose academic performance is significantly better than would be expected on the basis of their socio-economic background would appeal to the long-standing American appreciation of the Horatio Alger-style person who overcomes difficulties to "make it."

It is important to note that students from all socio-economic backgrounds earn a wide range of scores on the SAT. Table 6 shows the distribution of students clustered by their SAT V+M combined scores and by three categories of family income--below $35,000 (roughly in the lower half of family incomes in the U.S.); between $35,000 and $70,000 (approximately the next __% of the U.S. distribution of family incomes); and $70,000 or higher (the upper ____%) of U.S. families. Presumably, the 10% of the students who scored at or above 1200 had little difficulty in getting into a very selective college if they chose to apply. The group where difficult choices are made by college admission officers is in the large middle score range and it is among this group that we sought to identify "strivers."

Table 6
Score Level by Family Income - 1992

	ALL STUDENTS		
	400-790	800-1190	1200+
0-$34999	17%	20%	2%
$35000-$69999	12%	25%	4%
$70000+	3%	13%	4%



The 1992 senior cohort of test-takers was chosen because that is the group of students that was sampled as eighth-graders in 1988 for the National Educational Longitudinal Study of 1988 (NELS:88). There were subsequent follow-up surveys in 1992 (when they were seniors) and in 1994. The analyses reported below are based on the 1992 data.

Family income is not the only indicator of the complex set of background characteristics that influence a student's opportunity to develop the kinds of academic knowledge and skill that is tapped by admissions tests. In seeking to identify "strivers," we included in our model a number of variables clustered as: personal & family characteristics, the school context, and personal academic characteristics of the student. The variables are shown in Table 7 and further defined in Appendix B..

Table 7
Variables used in "Strivers" Analysis

Personal & Family characteristics	
RACE & ETHNICITY	5 categories: Asian, Pacific Islander Hispanic Black, not Hispanic White, not Hispanic American Indian, Alaskan Native
GENDER	Sex of the student
SES	Socioeconomic status of the student's family. This is an index of the education of both parents, occupation, and total family income. The index also incorporates a number of measures of living standards such as number of books in the household, kinds of electrical appliances, etc.
MO-EMPL	Is the student's mother currently employed.
School Context	
SCHOOL SES	If the student attends a school where more than 50% of the students receive a subsidized lunch.
LOW COLLEGE-BOUND	If a student attends a high school where less than 50% of its previous year graduates entered a four-year college.
PUBLIC	Whether the student attends a public high school.
URBAN	Whether the high school is in an urban area.
RURAL	Whether the high school is in a rural area.
SOUTH	The school is located in the South compared to other census regions.
Student's Academic Characteristics	
RIGOR	Whether student took rigorous academic courses
LANGUAGE	If English is not the student's native language
OLDER	Whether the student is two (or more) years older than peers
CORE COURSE GPA	An average of student's grades in English, mathematics, science, social studies, computer science, and foreign languages.

All of the students in the NELS:88 data set who had admissions test scores** were included in the analysis that examined the relationship among the background variables

**ACT scores were converted to the SAT scale using the conversion table shown in Appendix B.

described above and the test scores. The regression analysis provided a way to predict the SAT score that would be expected to be earned by a student with a particular configuration of background characteristics. For example, the model indicated that a typical student from an "advantaged" background (high socioeconomic status, suburban college-oriented school, etc.) might be predicted to earn a fairly high SAT score, say 1000, while a student from a "disadvantaged" background (lower SES, school in a poor area, etc.) might be predicted to earn a lower score, say 800. The relationship of the several background variables to performance on the SAT are shown in Table 9a. Each successive model adds a new set of background variables to the regression equation, progressively "explaining" more of the differences reflected in the test scores. Each of the models in Table 9a include race/ethnicity as one of the variables; Model 5 is the full, race-inclusive, model for predicting how a student might score on the SAT from what is known of the background. Because there may be situations where race can not be used in estimating an expected score, Table 9b provides the full model with race excluded as a background variable. Tables 9a & 9b show the unstandardized regression coefficients for the several models.

Table 9a

Regression Coefficients of personal, family , school and academic characteristics variables, with admission tests (SAT and/or ACT)

Variables included in the models	MODEL 1 race/ ethnicity	MODEL 2 race + family	MODEL 3 race + family+ school	MODEL 4 race + family + school + academics	MODEL 5 race + family + school + academics + core GPA
I: PERSONAL/ FAMILY CHARACTERISTICS:					
Race/Ethnicity:					
Asian-American	40.63*	34.91*	27.38+	24.18+	-1.33
Latino	-128.19*	-65.74*	-61.09*	-60.98*	-51.81*
African- American	-180.97*	-136.64*	-124.69*	-117.70*	-66.68*
Native American	-292.70*	-254.15*	-239.71*	-218.27*	-183.60*
Gender (Female=1, male=0)		-4.21	-4.55	-9.39*	-46.89*
Family SES		94.41*	84.20*	79.17*	58.58*
MOM employed		22.73	28.25*	28.28*	25.79*
II: SCHOOL CONTEXT:					
School SES			-23.50*	-24.81*	-29.79*
Low coll_bound			-36.29*	-35.54*	-25.29*
Public			-4.16	-3.88	-16.96*
Urban			-3.57	-4.22	-16.54*
Rural			-7.39	-7.65	-32.78*
South			-37.78*	-40.39*	-23.36*
ACADEMICALLY- RELATED CHARACTERISTICS:					
Academically rigorous courses				79.11*	37.80*
Non-native speaker				-1.91	-6.16
Older than peers				-148.0*	-108.24*
Core course performance (GPA)					129.89*
number of cases	7482	7482	7482	7482	7482
intercept	917.46	863.96	906.02	888.37	610.75
adjusted R-square	.1324	.2380	.257.1	.2949	.4976

* significant at .05 level, + significant at .1 level

Note: Only unstandardized coefficients are presented

Source: ETS, Office of Public Leadership analysis of NELS:88, representative sample of high school seniors in 1992 who took SAT and/or ACT.

Table 9b
Regression Coefficients of explanatory variables with admission tests, Race/ethnicity excluded from the model

Variables included in the model	Full model, race/ethnicity excluded
I: Family Characteristics	
Gender (Female=1, male=0)	-48.80*
family SES	66.07*
MOM employed	28.25*
II: School Context	
School SES	-39.35*
low Coll_bound	-25.70*
public	-13.46*
urban	-25.33*
rural	-31.14*
south	-32.46*
III: Academically-related characteristics:	
academically rigorous courses	37.77*
non-native speaker	-21.44*
older than peers	-130.42*
core course performance (GPA)	135.48*
number of cases	7482
intercept	582.56
adjusted R-square	.4784

* significant at .05 level
Only unstandardized coefficients are presented
Source: ETS Office of Public Leadership analysis of NELS:88, representative sample of high school seniors in 1992 who took SAT and/or ACT.

One of the interesting aspects of the regression analysis shown in Table 9a is the ability to examine which background factors are most closely related to the sizable score differences between Whites and the racial/ethnic groups. As can be seen in Table 9a, Asian-Americans, on average, scored 40 points higher than Whites, while Hispanics scored 128 points and African-Americans 181 points lower. Table 10 shows the impact of controlling for background variables on the score differences. Controlling for family variables reduces the score differences between Hispanics and Whites by over 40%. The family variables make much less of a difference for Asians and African Americans. Adding School variables and Academic variables into the equation reduces the score differences a little bit for each of the three comparisons. The last variable added was the grade average earned in a set of core courses. This had a major impact in reducing the Black-White and Asian-White differences. However, it had only a minimum

impact on the Hispanic-White differences. Native Americans were excluded from this and subsequent analyses because the small numbers in the NELS:88 sample made any estimates very unreliable.

Table 10
Score Differences Between Whites and Other Racial/Ethnic Groups: Impact of Controlling for Background Variables

	Observed Differences	Controlled for Personal, Family Variables	Controlled for Personal, Family & School Variables	Controlled for Personal, Family, School, & Academic Variables	Controlled for Personal Family, School, Academic, and Core GPA
SCORE DIFFERENCES					
African-American	-180.97	-136.64	-124.69	-117.70	-66.68
Asian-American	+40.63	+34.91	+27.38	+24.18	-1.33
Hispanic	-128.19	-65.74	-61.09	-60.98	-51.81
PERCENT BY WHICH DIFFERENCES ARE REDUCED					
African-American		24%	31%	35%	63%
Asian-American		14%	33%	40%	103%
Hispanic		49%	52%	52%	60%

Source: NELS:88 data for college-bound students (1992 seniors)

Using the results of the regression analyses shown in Tables 9a and 9b, we returned to the students in the NELS sample who had scored between 1000 and 1190 and examined the differences between their predicted SAT (based on the regression analysis) and their actual SAT. Those who scored at least 100 points higher than their predicted score were categorized as "educational strivers."[***] This was a group of students who, in spite of what one would expect from their family and school background, earned SAT scores that place them in serious contention for admission to selective or very selective colleges.

The next question to be examined was whether there was a high proportion of minority students among the "educational strivers" than among the total group of students scoring between 1000 and 1190. Table 11 presents that information.

[***] The average standard error of measurement for the 400-1600 combined SAT scale is estimated to be about 42 or 43 scaled score points per personal communication from N. Dorans. Thus an increase of 100 points would occur by chance less than 2 times in a hundred students.

Table 11
Distribution by race/ethnicity of students scoring between 1000 and 1190 on SAT

Group	1992 SAT Population*	NELS:88 Sample	Strivers Model including race & gender	Strivers Model excluding race & gender
African-American	3.6%	4.71%	7.70%	4.71%
Asian-American	8.9%	4.72%	3.16%	3.36%
Hispanics	4.3%	5.01%	8.66%	7.33%
Whites	83.2%	85.25%	79.79%	84.09%

* Based on 201,547 students in the 1992 Senior Cohort reporting membership in one of these racial/ethnic groups.

Using the race & gender inclusive Strivers model to predict an expected SAT score, there would be about a 3 percentage point increase in the proportion of Blacks given serious consideration and a somewhat larger increase in the proportion of Hispanics. Using the Strivers model that excludes race and gender, a slightly greater proportion of Blacks would be included than by using the scores without any consideration of background. For Hispanics, there would be about a 2 percentage point increase.

The next question of interest was whether the addition of "strivers" in the 1000 - 1190 range to the students who scored 1200 and above would be sufficient to maintain the number of underrepresented minority students at the elite colleges as were in the class that entered in 1995. To answer this, we developed the ratio of strivers to all students in the 1000-1190 range in the NELS:88 sample. This was done separately for each racial/ethnic group. We then applied that ratio to the 1992 SAT Senior Cohort, the population from which the NELS:88 sample was drawn, to estimate the actual number of students who could be termed "Strivers." These data are presented in Table 12. The bottom of Table 12 shows the size and proportionate distribution of the pool that would be available to the highly selective colleges if everyone who scores 1200 or more is combined with the Strivers in the 1000-1190 range. Note that even with the addition of the Strivers, there may not be enough African-Americans in this pool to maintain their numbers at the elite colleges.

Table 12
Estimated Impact of Using the Strivers Model on Applicant Pool for Most Selective Colleges

	Total	African-American	Asian American	Hispanic	White
1995 Entering Class at 120 Most Selective Colleges					
Number	132525	7574	14710	7524	97867
Percent		5.7%	11.1%	5.7%	73.8%
Mean SAT*	1162	974	1222	1072	1167
Potential applicant Pool					
Number at SAT 1200 & Up	82770	1389	12061	2310	67010
Percent at 1200 & Up		1.7%	14.6%	2.8%	81.0%
Number of Strivers w/race**	87485	5216	5384	6737	70148
Number of Strivers wo/race	94127	3848	6419	5778	78082
Number in Pool w/ Race***	170256	6605	17445	9047	137158
Percent in Pool w/ Race		3.9%	10.2%	5.3%	80.6%
Number in Pool wo/Race	176896	5237	18480	8088	145092
Percent in Pool wo/Race		3.0%	10.5%	4.6%	82.0%

* SAT & converted ACT combined

** Strivers scored between 1000 and 1190 and exceeded their predicted score by 100 or more points. The prediction equations are based on family, school, and academic background factors; one included race/ethnicity as a covariate, the other did not. The numbers are estimated by applying the within race ratios observed in the adjusted NELS sample to the population figures in the 1992 senior cohort.

*** The Pool of potential students is the sum of those scoring over 1200 and the Strivers in the 1000-1190 range. Note that this underestimates the selective pool in that it does not include the high-scoring ACT-only test takers comparable to the SAT 1200 & up group.

IX. WHICH ALTERNATIVE ADMISSION MODEL TO USE

None of the alternative admission models considered in this paper is a completely satisfactory substitute for the recent practice of the very selective colleges and universities giving some consideration to race/ethnicity in selecting their freshman class from a large pool of applicants capable of being academically successful. That present "affirmative action" practice has resulted in something over 11% of the entering classes at the very selective institutions being African-American or Hispanic. The only alternative considered here that would result in

TABLE 13
PROPORTION OF STUDENTS BY RACIAL/ETHNIC GROUP FOR MOST SELECTIVE COLLEGES: A COMPARISON OF ALTERNATIVE ADMISSION MODELS

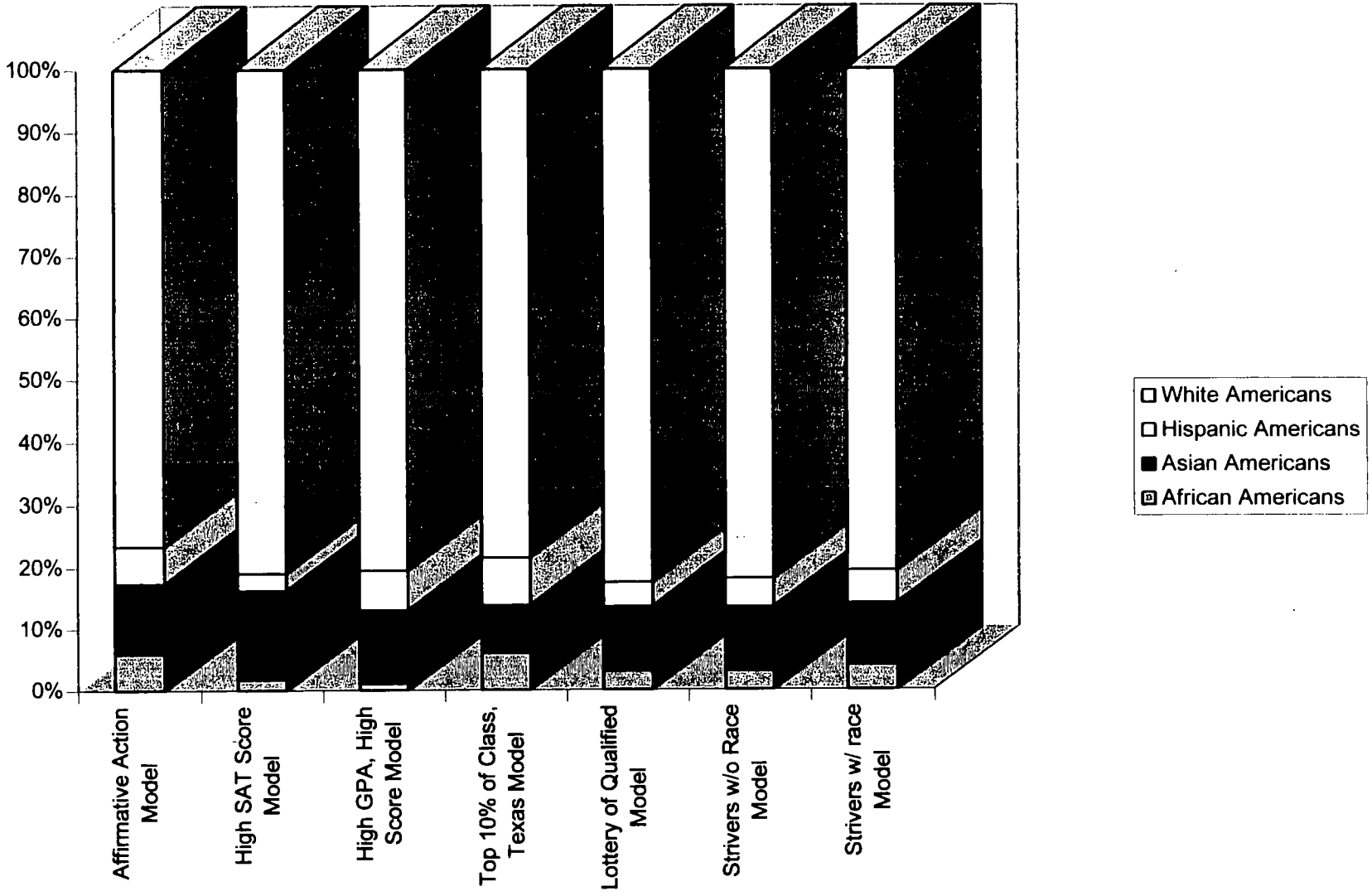
	1 Affirmative Action	2 High Scorers	3 High GPA High Score	4 Top 10% HS Class	5 Lottery of Qualified	6 Strivers w/o Race	7 Strivers w/ Race
African-American	5.7%	1.7%	1.0%	6.0%	3.0%	3.0%	3.9%
Asian-American	11.1%	14.6%	12.1%	7.8%	10.6%	10.5%	10.2%
Hispanic	5.7%	2.8%	6.4%	7.7%	3.9%	4.6%	5.3%
White	73.8%	81.0%	80.5%	78.5%	82.6%	82.0%	80.6%

NOTE: All scores are expressed in terms of the older SAT scale, i.e., before April 1995.

MODELS

1. Distribution achieved in 1995 entering class with some consideration of race/ethnicity.
2. Distribution that would result from selecting only students with scores of 1200 or better.
3. Distribution that would result from selecting on a combination of GPA of 3.0 or better and a score of 1200 or better.
4. Distribution that would result from applying the Texas Legislature rule of admitting everyone in top 10% of class.
5. Distribution that would result from randomly selecting from a pool that included everyone who scored 1000 or better.
6. Distribution that would result from selecting from a pool that included everyone who scored 1200 or better PLUS those in the 1000-1190 band who exceeded by 100 points or more the score predicted from their family, school, and academic background.
7. Distribution that would result from selecting from a pool that included everyone who scored 1200 or better PLUS those in the 1000-1190 band who exceeded by 100 points or more the score predicted from their family, school, academic, and racial background

Chart 1 : Proportion of Students by Racial/Ethnic Group for Most Selective Colleges: A Comparison of Alternative Admission Models



maintaining or improving the proportion of underrepresented minorities entering the elite institutions is the "Top 10% of the Class" model and given the great disparities among high schools, it is likely that many of those in the top 10% of some schools would be poorly prepared to meet the academic demands of these selective colleges. The Striver model that includes race/ethnicity as one of the variables in predicting a student's expected SAT score produces a higher proportion of underrepresented minorities than any of the remaining alternative models, but using this as a basis for selection would still be a net reduction in the numbers of African-Americans and Hispanics entering the very selective colleges. Whether race can be used in this way as one of the background variables used in setting an expectation is open to debate, especially in states which preclude any consideration of race in making admission decisions.

The Recentered SAT-I Scale

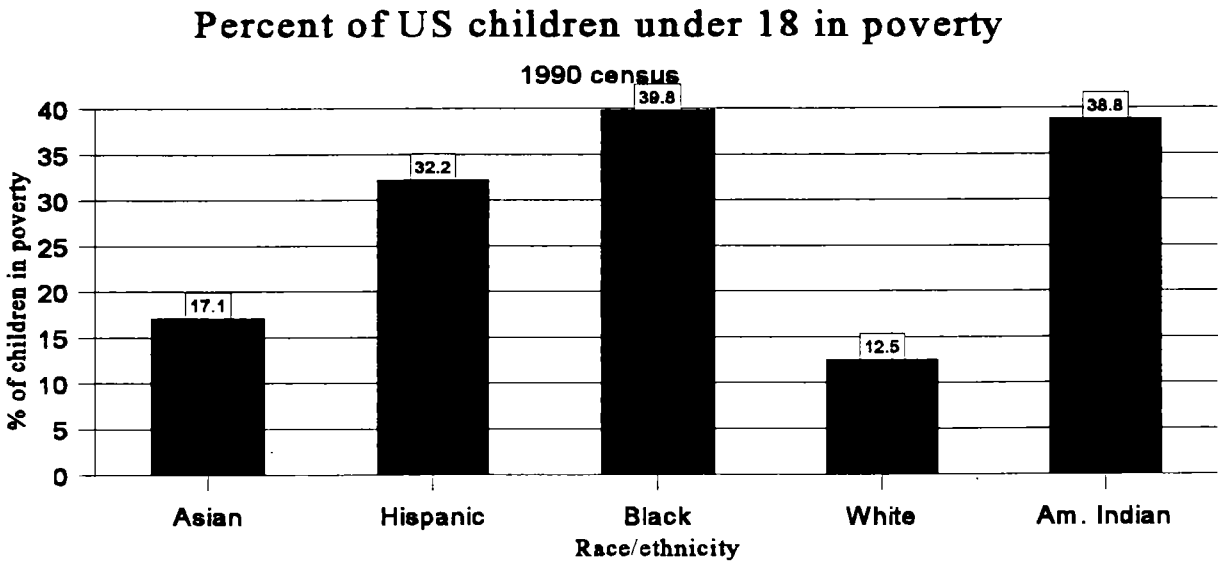
The test scores used in the Strivers analysis are from 1992, that is, before the SAT-I score scale was re-centered in 1995. A quick look at current distributions will show that there are more students of all groups scoring at the high levels. However, the average scores at the selective colleges have also shifted upward.

X. Why Does Race Continue to Have Such an Impact?

The disparity in elementary & secondary educational achievement between Whites and Asian-American's on one hand, and Blacks and Hispanics on the other, underlies their underrepresentation among students who enter the most selective colleges and universities. Affirmative action or other alternative admission processes would be less critical if the racial disparities were reduced at the lower levels of education. What factors contribute to this continuing disparity?

The National Center for Educational Statistics, using the same NELS:88 data set as was used in the Strivers analyses, has compiled a useful set of evidence that pertains to these issues.[8] Figures 1 - 7 below are from that study. One of the factors that they identified is that a large percentage of Black and Hispanic students lack adequate learning resources and educational activities at home because of low family income and low educational and career attainment by the parents.

Figure 1



One of the first factors in understanding the differences in educational achievement is to recognize that Black, Hispanic, and American Indian children are two to three times more likely to live in poverty than White or Asian children. As can be seen from Figures 2 & 3, they are more likely to have parents who did not complete high school and less likely to have parents or guardians in high-skill jobs.

Figure 2

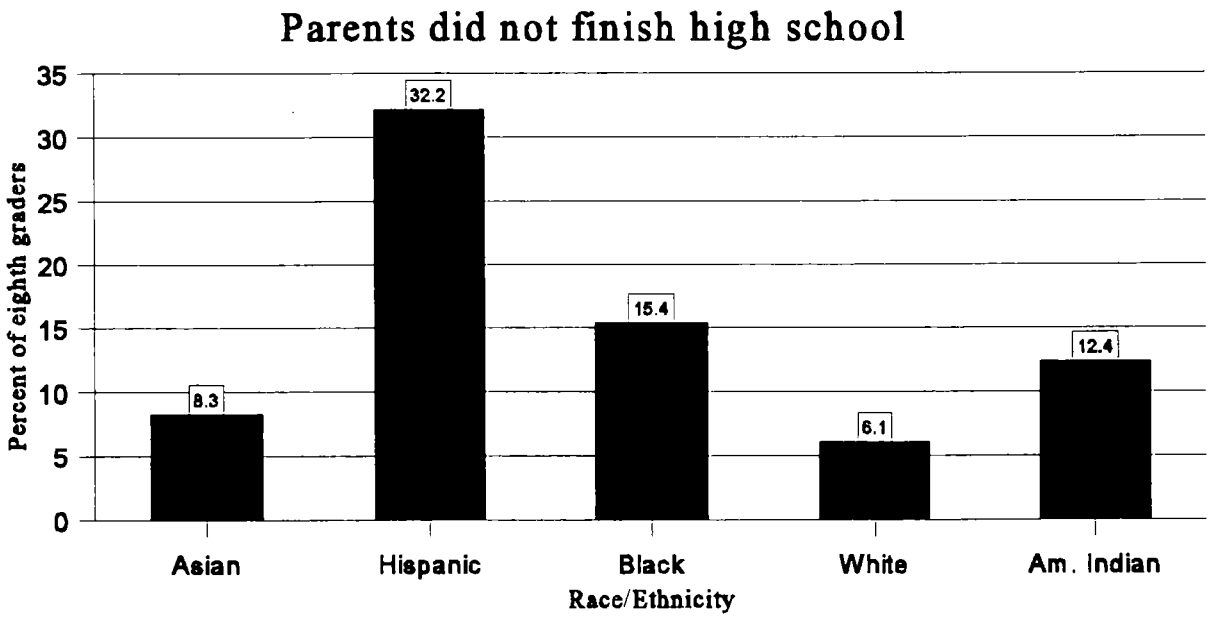
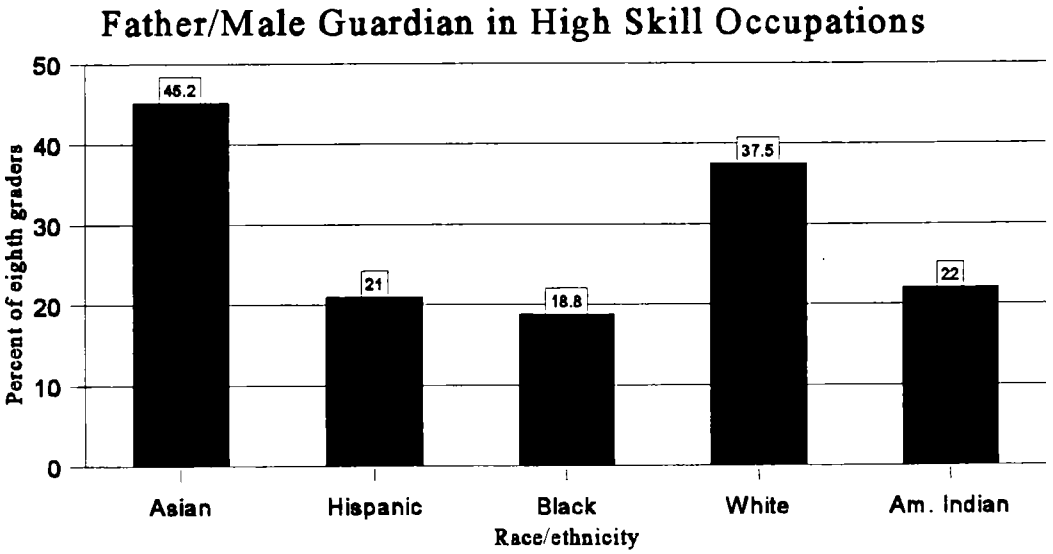
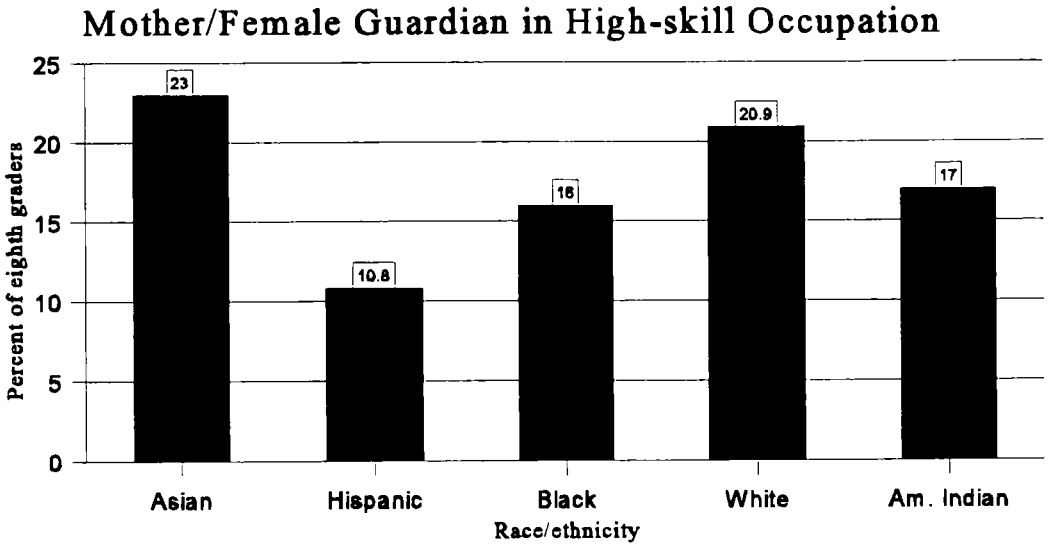


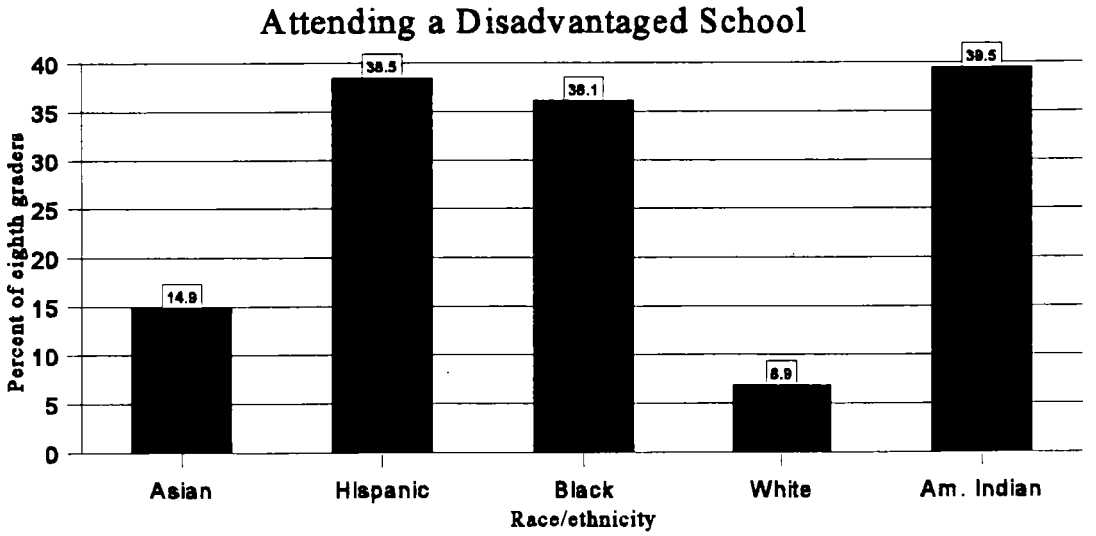
Figure 3





Not only do a large percentage of Black, Hispanic, and American Indian students come from homes where learning resources and educational activities can not be provided and where parents themselves are unfamiliar with education, but they are also two to five times more likely to attend disadvantaged schools than are White and Asian students. In the NCES study, a disadvantaged school was defined as those that had over 50% of the students in a subsidized lunch program. Figure 4 provides a picture at this schooling disparity.

Figure 4



Not only do more of the underrepresented minority children attend disadvantaged schools, but they are also less likely to be placed into demanding academic programs that will help them be prepared for further education. Figures 5 illustrates the disparity among racial groups in 10th grade enrollment in college preparatory programs, while Figure 6 shows the disparity among 8th graders in being in the highest mathematics track.

Figure 5

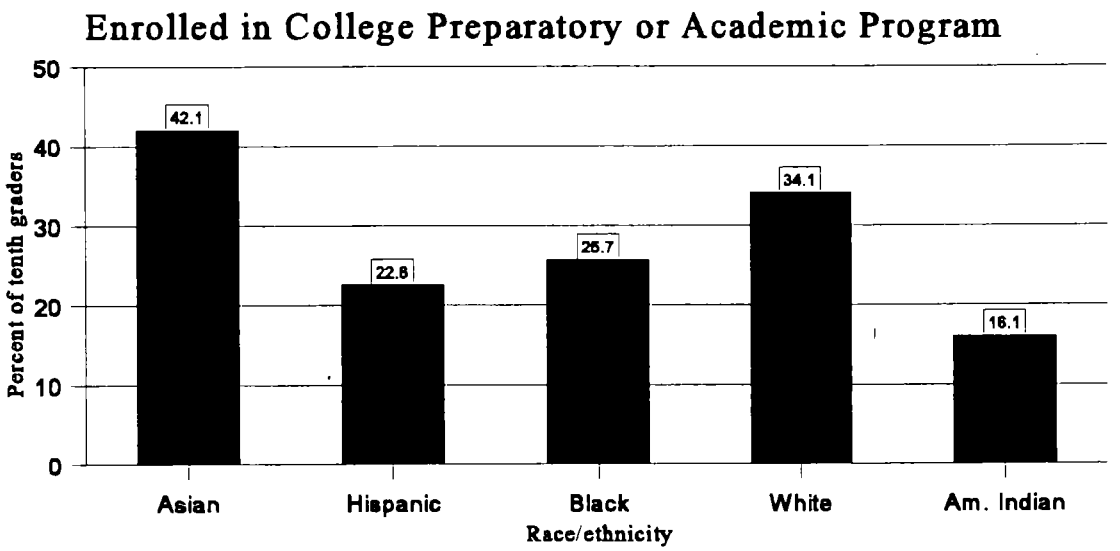
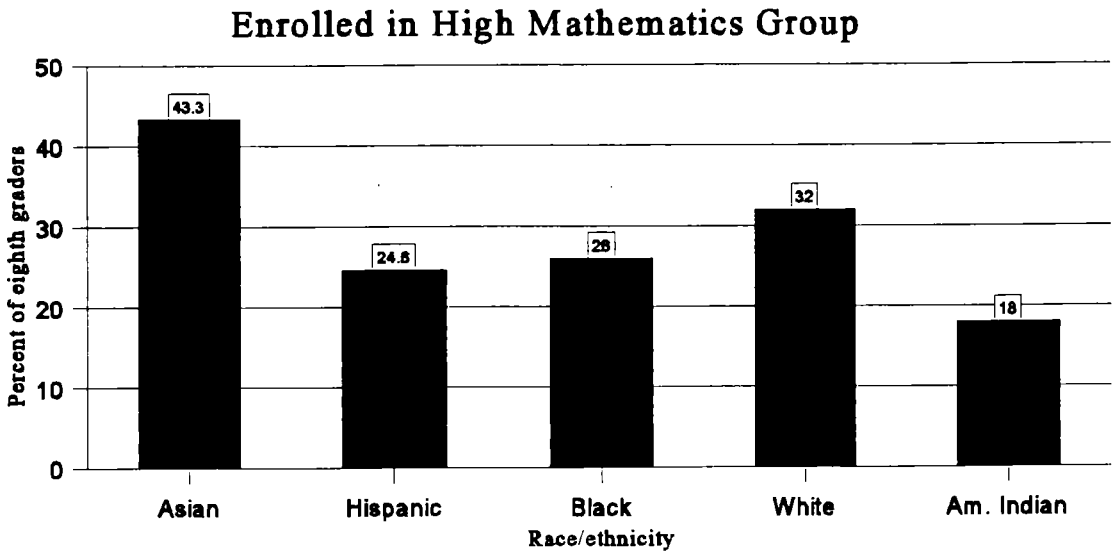
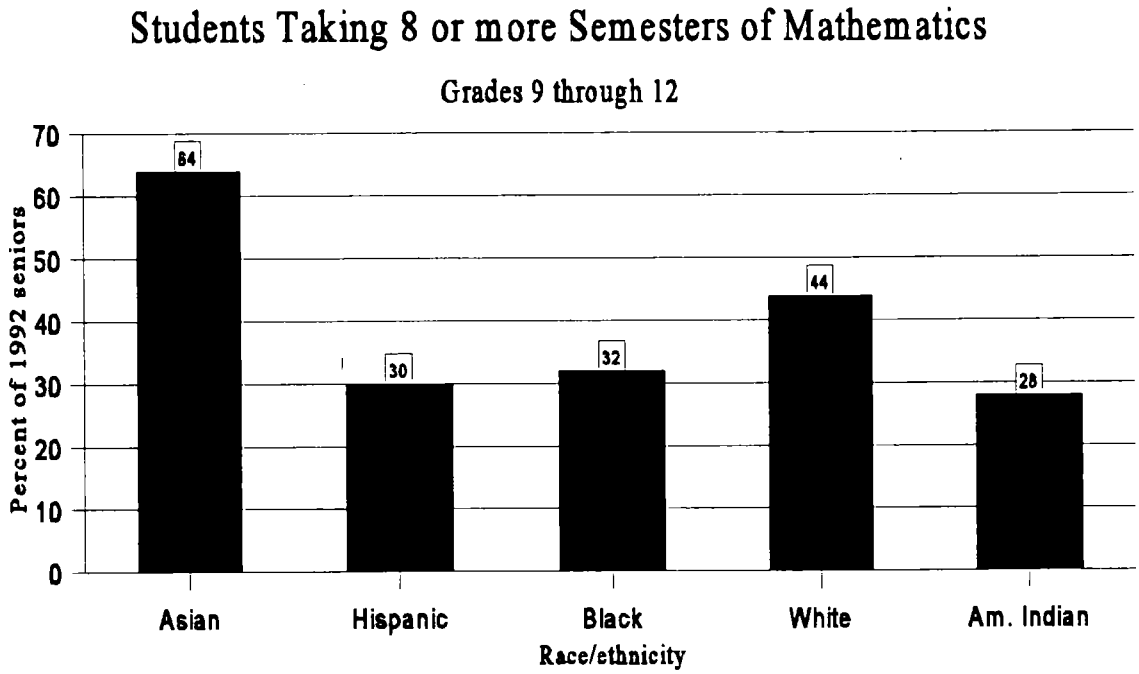


Figure 6



These differences in the rigor of the academic program are only magnified by the time students complete high school. The proportion of Asian students taking 8 or more semesters of mathematics is twice that of Blacks and Hispanics as illustrated in Figure 7.

Figure 7



This same study from NCES reports on many other variables that affect subsequent educational achievement. Because many Black, Hispanic, and American Indian children attend disadvantaged schools where the average achievement is low and where there are discipline and safety problems, they are more likely to face stressful environments and less likely to have strong peer group or community support to encourage them to work hard in school. A high percentage of these students respond by not showing persistent effort or active involvement in school with high rates of tardiness and absenteeism.

Racial disparities in the opportunities to develop and become educationally and economically competitive are so pervasive that it is not surprising that some preference has been necessary for Blacks and Hispanics to have the opportunity to attend the elite colleges that produce many leaders of our society. Our analyses suggest that the make-up of the student bodies of the most selective colleges will be less diverse if race is not included among the criteria used for selecting students. Family background, school background, and academic background can be used to identify the students who seem to be "beating the odds" but it seems unlikely that, in the near term, these strategies will identify enough under-represented minority students to satisfy the enrollment needs of the most selective colleges. We are likely to see a reduction in Black and Latino students in those colleges; they will be redistributed from the elite schools to the next tier of colleges.

APPENDIX A:

The National Education Longitudinal Study of 1988

The National Education Longitudinal Study of 1988 (NELS:88) is a longitudinal study designed to provide trend data about critical transitions experienced by students as they leave elementary school and progress through high school and into college or the job market****. Underlying the many features of NELS:88 is the central theme that education in the U.S. must be understood as a lifelong process enmeshed in a complex social context. To achieve this goal, policy-relevant data about processes and outcomes are collected over time, especially as it pertains to student learning, early and late predictors of dropping out, and school effects on student's access to programs and equal opportunity to learn.

NELS:88 is the third major study in the National Education Longitudinal Study program designed to produce a general purpose data set for the development and examination of federal educational policy. It was developed in response to the need for policy-relevant longitudinal data in accordance with congressional mandate to collect and disseminate statistics and statistical analyses. The three NELS programs include the National Longitudinal Study of the high school class of 1972 (NLS-72), High School & Beyond study (HS&B) and National Education Longitudinal Study of 1988 (NELS:88).

NELS:88 began in 1988 with an initial survey of 8th grade students. Information was also collected from their parents, teachers, and school principals in order to get a complete glimpse of the family, school and community context in which the student lives. Follow-up surveys of the same students were conducted in 1990, 1992 and 1994. We analyze the follow-up survey of 1992 (when most students were in their senior year), and 1994 (when most had been out of high school for two years.)

One distinctive feature of NELS:88 is that it can be analyzed both longitudinally and cross-sectionally. For instance, mathematics assessment gains or losses throughout secondary school can be studied utilizing the NELS:88 base year in conjunction with the first and second follow-ups. The capacity to measure *change* from one point in time to the next is a distinctive strength of NELS:88. The data from the base-year and any of the follow-up surveys can also be analyzed cross-sectionally. For instance, in this study, we used the second follow-up to study the students in this nationally representative sample of 12th graders in 1991-92 who took college admissions tests..

****The source of information on this appendix is from numerous NCES publications such as *NELS:88 Second Follow-up: Student Component Data File User's Manual (NCES 94-374), National Education Longitudinal Study 1988-94 Descriptive Summary Report (NCES 96-175), NELS:88 Trends Among High School Seniors, 1972-1992, NELS:88 Survey Item Evaluation Report (NCES 97-052).*

NELS:88 entails a complex sampling design and includes such features as augmentation (through 'freshening') to provide a representative sample of students at each phase of the survey through high school (e.g., so that the sample is representative of the 10th grade population in 1990, the 12th grade population in 1992 and so on). The sample design also includes a two-stage stratified probability design used to select a nationally representative sample of 8th graders and their schools.***** The first stage involved school sampling while the second stage involved selecting students within the selected schools******:

I: School Sampling:

A pool of some 1000 schools was selected through stratified sampling with probability of selection proportional to 8th-grade size and with over-sampling of private schools. Then a pool of another 1000 replacement schools was selected by the same method. If schools were considered ineligible or refused to participate, they were replaced by other schools pulled from the "replacement" pool.

II: Student Sampling:

Among the selected schools, some 26,000 students were randomly selected through stratified probability sampling design. On average, each of participating schools was represented by 23 student participants.

In sum, NELS:88 is a rich database providing trend data as well as snapshots of critical transition points as the students develop, attend school, and embark on their careers. Data were collected from students, and their parents, teachers, and high school principals and from existing school records such as high school transcripts. Cognitive tests (math, science, reading, and history) were administered during base year (1988) and the first (1990) and second (1992) follow-ups. SAT and ACT college admission tests were recorded in the high school transcript. In this study, we analyze the sample of students who were 12th graders in 1992 and who had taken the SAT and/or ACT college admission tests.

*****A stratified sample is obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from within each stratum.

******Some features of NELS:88 worth mentioning:

NELS:88 consists of certain over-sampled populations. For instance, Asian students were over-sampled, non-Catholic private schools were over sampled as well.

School dropouts who had obtained alternative credentials such as GED were considered and included as students, not dropouts. Early graduates were also counted as students, not early dropouts.

APPENDIX B: GLOSSARY

Specification of the Variables Used in the Study

This glossary describes the variables used in the study. The items were taken directly from NELS:88. The explanatory variables are divided into three categories: I: Personal/Family Characteristics, II: School Context and III: Academically-Related characteristics.

I: Personal/Family characteristics

Race-ethnicity

F2RACE1

To capture as many cases as possible and avoid missing cases, the composite race variable was used. Composite variables include imputed information. For instance, if the respondent skipped, refused to answer the question, gave multiple responses, NCES imputed the information by obtaining the answer from other files such as the student's parents, teachers, school files.

Asian or Pacific Islander (Asian-Am)
A person having origins in the Far East, Southeast Asia, the Indian subcontinent, or Pacific Islands. This includes people from China, Japan, Korea, the Philippine Islands, Samoa, India, and Vietnam.

Hispanic, regardless of race (Hispanic-Am)
A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture origin, regardless of race.

Black, not of Hispanic origin (Black-Am)
A person having origins in any of the Black racial groups of Africa, except those of Hispanic origin.

White, not of Hispanic origin (White-Am)
A person having origins in any part of Europe, North Africa, or the Middle East (except those of Hispanic Origin).

American Indian, Alaskan native (Native-Am)
A person having origins in any of the North American native tribes.

Gender

F2SEX1

Sex of the respondents was included in the analysis as a control variable since male and female students differ in their academic performance. To avoid missing cases, the composite sex variable was used. Female is coded 1 and male is coded 0 in the analysis.

Family Socio-economic Status (Family SES)

F2SES1
F2SES1Q

This composite variable measures socioeconomic status of the student's family. This variable is constructed as an index of the education of both parents, occupation, and total family income. A number of variables from parent and student questionnaire was used to create this index. If insufficient information on family income existed, the composite would have been calculated and is based on parents education and occupation as well as the number of selected items that existed in the household as reported in the student file. Therefore in many cases, this index incorporates a number of measures of living standards such as if the student has a specific place to study or has his/her own room. Items such as number of books in the household, kinds of electrical appliances, presence of a computer, books, pocket calculator are also taken into consideration. To quantify the information on the parents' occupational status, Duncan's SEI values were assigned to the regression models while the quartile version is used in cross tabulations and descriptive analysis of the data. To quantify the information on the parents' occupational status, Duncan's SEI values were assigned to each occupation and those values were used in the construction of the index. F2SES1 is a continuous variable ranging from -2.56 to +2.54 while F2SES1Q indicates the quartile into which F2SES1 falls.

Mother's Employment Status

F2N4

This variable measures the respondent's mother's employment status and consists of the following categories: 'Currently working,' 'retired,' 'unemployed,' 'not living,' 'no step-mother/guardian.' If the student answered 'currently working' the respondent's mother was considered employed (coded as 1). Answers of 'retired' and 'unemployed' were considered "not employed' (coded as 0). 'Not living' and 'no step mother/guardian' were coded missing.

II: School Context

School Socio-economic Status

F2C25A

This variable is a measure of school socioeconomic status based on the percent of students who participated in subsidized school lunch programs. Schools were grouped into two categories: 'disadvantaged' when 50 percent or more of the students participated in the lunch programs (coded as 1) and 'not disadvantaged' otherwise (coded as 0).

College-bound high school

F2C27B

This variable measures college aspiration at the school the student attends. The question asks for the approximate percent of the 1990-91 academic year graduating class who attended a 4-year college after graduation. Schools were grouped into two categories: 'not college-bound' when 50 percent or less of the students did not go to a 4-year college immediately after graduation (coded as 1) and 'college-bound' otherwise (coded as 0).

Twelfth Grade School Type

G12CTRL1

This composite variable measures the student's school classification reported by the school. The categories are 'Public,' 'Catholic,' 'Private/other religious,' 'private/non-religious' and 'private/not ascertained' Schools were grouped into two categories: "public" (coded as 1) and otherwise (coded as 0).

Location of the School: Urban, Rural

G12URBN3

South

G12REGON

Location of the school is a rough indicator of the educational context of the student's school environment. For instance, schools located in rural areas as well as those in urban areas are usually associated with lower student academic achievement, lack of adequate funding, students from low socioeconomic backgrounds and disproportionate attendance by disadvantaged

minorities. Schools located in Urban and Rural areas were contrasted with Suburban schools which, as a group, are more likely to be attended by more advantaged groups of students.

Schools located in Southern census region are also traditionally considered to serve the more disadvantaged population of the U.S. students and to disproportionately consist of more disadvantaged minorities. Schools were grouped into two categories of 'South' (coded as 1) and otherwise (coded as 0). This category includes the other three census regions of West, Northeast and Midwest.

III: Academically-related characteristics

Taking Academically rigorous courses

F2RTRPRG

This variable measures the type of high school program the respondent has been attending. Schools are classified into two groups: 'rigorous academic' (coded as 1) and all others, i.e., 'academic,' vocational,' 'vocational and rigorous academic,' 'academic/vocational,' and 'none of the above' as the reference category (coded as 0).

Language

F2S107

This variable is a rough measure of student's proficiency in English language as a native speaker of English. NELS:88 contains many questions not only asking about the student's language proficiency but also asking about the student's mother's and father's immigration status and English proficiency which in turn may affect the student's academic performance. This question asks: 'Is English respondent's native language'. Students who answered 'no' were grouped as a 'non-native speaker' (coded as 1) and students who answered 'yes' were coded 0.

Older than peers/classmates

F2BIRTHY

Since the second follow-up of the NELS:88 was administered in spring of 1992, majority of the students were close to 18 years of age and therefore the mean (average) birth year is 1974. If a student's birth year was recorded 1972 or earlier, the student was considered older than his/her classmates. A student could be about 20 years of age or more and still in 12th grade because of factors such as repeating a grade or grades, numerous moves by the family leading to a student

falling behind, family crises such as divorce, death of one of the members of the family, psychological and mental problems experienced by the student or members of the family.

Core Course Academic Performance (GPA)

COREGPA

COREGPA index=
{F2RHENG2 (Average grade in English)+
F2RHMAG2 (average grade in Mathematics)+
F2RHSCG2 (average grade in science)+
F2RHSOG2 (average grade in social studies)+
F2RHCOG2 (average grade in computer science)+
F2RHFOG2 (average grade in foreign languages)}/6

This variable is an index of the student's core course grades by calculating the GPA of subject area units earned in English, mathematics, foreign languages, science, social studies and computer science/programming/data processing. Two types of course credit measurements are used in class credit calculations; one is the value reported by the student's school and two is the Carnegie unit which has been standardized across all schools.

IV: Dependent Variable: Admission Tests

SAT/ACT scores

F2RSATV
F2RSATM
F2RACTC
Index of SAT V+M= (F2RSATV + F2RSATM)
ACT composite scores= F2RACTC

The SAT and ACT takers among the representative sample of high school seniors are analyzed in this study. An index of combined SAT scores is created by simply calculating the sum of SAT-Verbal and SAT-Math scores. ACT scores were also converted to SAT scores to capture a representative sample of all college-bound high-school seniors who took admission tests (see Table B-1 for SAT-ACT concordance table). If a student had taken both tests, the highest score was used in the calculation. Almost 15 percent of students took both tests although this varied by different racial/ethnic groups (see Table B-2). Twenty two percent of Asian students, 18% of Hispanic, 11% of African American, 15% of White and only 6% of American Indian students took both SAT and ACT. A greater percentage of students in all ethnic/racial groups took SAT than ACT.

Table B-1: SAT-ACT Concordance Table

ACT COMPOSITE SCORE	SAT V+M SCORE
36	1560
35	1510
34	1450
33	1400
32	1350
31	1300
30	1260
29	1210
28	1170
27	1130
26	1090
25	1050
24	1010
23	970
22	920
21	880
20	840
19	790
18	740
17	700
16	650
15	600
14	560
13	520
12	480
11	440
10	420
1-9	400

Source: Marco, Gary L and A.A. Abdel-fattah. College & University Summer 1991. Pp. 188-194.

Table B-2: Distribution of students who took SAT, ACT or both by race/ethnicity

	Asian	Hispanic	Black	White	American Indian	Total
SAT only	63%	49%	54%	45%	52%	47%
ACT only	15%	34%	35%	39%	42%	37%
took both	22%	18%	11%	15%	6%	15%

Academic Ranking of the Student

(Class rank for last year attended) F2RRANK
(Class size for last year attended) F2RCSIZE
Index of converted Rank= (1-(f2rrank/f2rcsize))*100

This variable is measured by dividing the class rank of the student for the previous year by the size of the student's class for the previous year. This is not a measure of the student's complete high school rank but an approximate measure of his class standing in his/her high school. The value was then standardized by inverting and multiplying by 100. The value of the converted rank is therefore from 0 to 100, 100 being the top class rank and 0 being the lowest rank.

Descriptive statistics of the class rank components:

	Minimum	Maximum	Mean
F2RRANK	1	807	121.86
F2RCSIZE	1	1438	258.80
Converted RANK	0	99.87	52.92

** The highest rank is 1 and the lowest is 807. This valued was inverted and standardized. Therefore the highest school rank in previous school year became a 100 (or to be exact 99.87) and the lowest was 0. The range is therefore from 0-100, 100 being the highest rank.

APPENDIX C
Descriptive Statistics & Correlation Coefficients

Table C-1 : Descriptive Statistics of Variables in the Model

variables	Minimum	Maximum	Mean	Standard Deviation	N
SAT/ACT	400	1530	890.26	210.80	8687
Asian	0	1	.05	.22	8687
Hispanic	0	1	.07	.25	8687
Black	0	1	.09	.29	8687
Native-Am	0	1	.01	.10	8687
female	0	1	.52	.51	8687
family SES	-2.56	2.54	.29	.73	8682
mom_emp	0	1	.92	.28	8684
school SES	0	1	.24	.43	8439
% Coll_bound	0	1	.56	.50	7967
public	0	1	.86	.36	8687
urban	0	1	.27	.45	8687
rural	0	1	.29	.46	8687
south	0	1	.32	.47	8687
rigorous	0	1	.29	.46	8687
non-native speaker	0	1	.07	.26	8464
older than Peers	0	1	.01	.11	8687
core course GPA	0	4	2.50	.79	8657

*** Note that the standard deviation is an approximate value. For exact value of standard deviation, calculations has to be done in SUDAAN.

Table C-2 Correlation Coefficient Matrix of Personal, Family, School, and Academic Characteristics with SAT & ACT Scores
SAT, ACT CONVERTED SCORES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1- SAT-ACT	1																	
2-ASIAN	0.04	1																
3- LATINO	-0.14	-0.06	1															
4- AFRICAN AMERICAN	-0.22	-0.07	-0.08	1														
5- NATIVE-AMERICAN	-0.14	-0.02	-0.03	-0.03	1													
6- GENDER	-0.06	-0.001	0.02	0.01	0.04	1												
7- FAMILY SES	0.4	0.04	-0.23	-0.16	-0.02	-0.1	1											
8- MOM-EMPLOYED	0.1	-0.02	-0.06	-0.03	-0.02	0.01	0.13	1										
9- SCHOOL SES	-0.18	0.01	0.18	0.12	0.04	0.03	-0.27	-0.03	1									
10- LOW % COLLEGE-BOUND	-0.18	-0.06	0.03	-0.01	0.06	0.03	-0.26	0.007	0.24	1								
11-PUBLIC	-0.11	-0.02	0.02	0.01	-0.05	0.07	-0.21	-0.01	0.21	0.36	1							
12- URBAN	0.01	0.09	0.12	0.15	-0.01	0.02	0.04	-0.02	0.05	-0.16	-0.33	1						
13- RURAL	-0.1	-0.1	-0.03	-0.06	0.08	0.03	-0.18	0.02	0.22	0.26	0.21	-0.39	1					
14- SOUTH	-0.13	-0.07	0.03	0.2	0.01	-0.01	0.01	0.02	0.08	0.01	0.01	0.1	0.04	1				
15- TOOK RIGOROUS ACADEMIC COURSES	0.2	0.02	-0.01	0.02	-0.06	0.04	0.06	0.02	-0.02	-0.04	-0.02	0.04	-0.03	0.05	1			
16-ENGLISH NOT NATIVE LANGUAGE	-0.09	0.33	0.45	-0.07	0.01	0.03	-0.19	-0.09	0.15	0.03	0.02	0.09	-0.06	-0.05	0.003	1		
17- OLDER THAN CLASSMATES	-0.13	0.02	0.03	0.12	0.06	-0.04	-0.08	0.006	0.02	-0.02	0.04	0.02	0.001	0.06	-0.01	0.05	1	
18- CORE COURSE PERFORMANCE (GAP)	0.56	0.07	-0.04	-0.16	-0.03	0.18	0.14	0.04	-0.01	-0.04	0.01	-0.01	0.07	-0.1	0.19	0.01	-0.1	1

Personal & Family Characteristics: (Rows 2-8)
School Context: (Rows 9-14)
Academically Related Characteristics: (Rows 15-18)

Correlation coefficients are calculated based on NELS:88 representative sample of SAT and/or ACT takers who were seniors in high school in 1992.
u:\ehb\corr_co.xls

APPENDIX D

Technical Notes on Weighting, Sampling Error and Missing Data Adjustment

NELS:88 sample design involves multi-stage sampling, stratification, clustering, and unequal probability selection. The sample resulted from a multi-stage sampling is no longer a simple random sample and the resulting statistics are more varied than they would have been had they been based on data from a simple random sample. Thus, the estimates in the study have to be weighted appropriately to account for the unequal probability of selection of a given case since for instance certain types of students and schools were over-sampled. Special technique should be used to calculate the standard errors of the estimates since the standard error calculated from the standard softwares such as SAS (Statistical Analysis System) and SPSS (Statistical Package for Social Sciences) is no longer valid. Missing data is another commonly encountered problem in survey data analysis. The estimates based on the non-missing data can be seriously biased. Special treatment is necessary for this type of survey data analysis. We did the following precautions:

Weighting: Because of unequal probability selection, the sample distribution of the underlying variables is usually different from the population distribution. The resulting sample is not a simple random sample of the population. To correct this bias, various weights are created and included by NCES (National Center for Education Statistics) to the NELS:88 data file. The weight utilized for our study is the student transcript file weight (F2TRSCWT). This weight is designed to project NELS:88 sample to the population of 12th graders in 1992. It is also designed to overcome the missing cases and biases that exist in student's school transcript file.

Standard Errors: The calculation of exact errors for estimates of complex survey data can be difficult and expensive. Statistical analysis packages such as SAS and SPSS do not take complex survey design into account in standard errors calculation. Special techniques such as Taylor Series Approximations, Jackknife Repeated Replication, Balanced Repeated Replication and Bootstrap have been developed to calculate the standard error correctly. SUDAAN (Survey Data Analysis) is a stand alone program consists of a series of procedures used to analyze data from complex sample surveys and other studies involving clustered data using Taylor Series method. In our study, we use SUDAAN to estimate the standard error, to fit the model and to perform hypothesis testing.

Post-stratification Adjustment: Like many other surveys, NELS:88 suffers from item non-response. Item non-response occurs when some respondents answer some survey questions but not all of them. Item non-response becomes of a major concern when numerous variables are involved and are analyzed as a group as is the case in regression models. In a regression analysis, only the cases with no missing values for all the

variables involved can be used in the model fitting. Therefore when multiple variables are used, the sample size for the analysis can drop dramatically. One consequence of this is that the sample distribution is distorted when the missing mechanism is related to the study variables. In other words, the distribution of the sample being used to fit the model is quite different from the distribution of the original sample. Dropping the missing data and using only the nonmissing data without any treatment is actually assuming that the missing is at random or the missing cases are not related to the variables in the study.

For example, in our analysis it became evident to us that because of the non-random missing cases, the sample we used to fit the model, had a different race distribution from the race distribution of the full sample of high school seniors. The technique we used to correct this problem is called "post-stratification" method. Putting it simply, first, we used variables such as race, gender, and region to divide the original sample into classes (or cells) and then we calculated the population total (Ai) for each class. These classes are called adjustment classes. Second, we divided the sample used in the regression analysis into classes using the same variables (race, gender, region) and calculated the class population totals (Bi). The adjustment factor for ith class is fi=Ai/Bi. This adjustment factor is then applied to the sampling weight. The modified weight therefore guarantees the race distribution of the weighted sample matching the race distribution of the full sample and allows us to adjust for the overall missing at random assumption. Instead we assume that missing at random occurs only within the adjustment classes.

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Background on Educational Testing Service (ETS)

I. Background

ETS, a non-profit institution, develops and administers achievement, occupational and admission tests, including the Scholastic Assessment Test (SAT) for the College Board; the Graduate Record Examination (GRE); the Graduate Management Admission Test (GMAT, among others. Each year ETS administers more than nine million tests used in education, government and business in the United States and 180 countries worldwide.

As the primary provider of the nation's scholastic testing and assessment tools and resources and because of its stature and standing in the education community, ETS has a rightful place in the public debate regarding the future directions of American education.

Almost since the founding of the Republic, quality universal education has been assumed to be a fundamental and important right for every citizen. Through universal education, generations of immigrants were provided a path into the mainstream of American society. Through universal education, the distinction between economic classes has steadily diminished and advancement in society has been possible based on merit, not social or financial status.

There is now a vigorous public debate regarding the quality of instruction within the universal education system, especially at the primary and secondary levels. There is also broad discussion about the "end products" of our educational system -- the qualifications and abilities of the young men and women being graduated from the nation's high schools and colleges and entering the workforce.

There are numerous challenges being posed to our system of universal education. Members of Congress want to provide families with "vouchers" to use in enrolling children in "schools of choice," in either the private or public sector. Teacher training, licensing, advancement and tenure are subjects of intense debate. Affirmative action enrollment practices are under attack in several states and the question of continued access to colleges for members of minority groups is being examined. National scholastic achievement standards are being considered by

the Federal government for imposition on the states; many states have already adopted standardized tests to measure progress at various grade levels in elementary and secondary levels.

Education touches on the lives of literally every American and these are topics of vital interest to virtually all citizens. There are, as to be expected in a public policy debate of this breadth and depth, many individuals, organizations and institutions actively shaping the debate about the future of American education. Advocates of all persuasions are individually and collectively exploring the philosophical, pedagogical and political paths [to be taken] to improve and enhance our system of universal education.

The stakes in the outcome of the debate are enormous -- for individuals, families, corporations, the business community, colleges and universities, the public school system, and society-at-large.

The most important consideration in the debate is that access to the nation's educational system must be fair based on scholastic achievement and individual merit.

ETS believes that test scores [on standardized achievement tests] do and will continue to play a central, critical role in the debate about the American system of education.

In keeping with its leadership role in American education, and to help facilitate the debate and develop constructive, long-term solutions, ETS has embraced five public leadership themes -- these have been termed the ***ETS Global Issues Initiatives***. The initiatives are:

1. Assessment and Diversity
2. Higher Education and the New Economy
3. What American Students Are Learning
4. Linking Education and Careers
5. Promoting an Effective Teaching Force

ETS began this process with extensive research and meetings with other thought leaders in American

education, and in public life. The ETS public leadership initiatives are designed to cut across all of ETS's strategic directions and encourage collaboration with other organizations interested in influencing key issues.

Each theme will have its own set of activities. For example, there are four elements to ETS leadership efforts on assessment and diversity:

- Consulting and Convening;
- Research;
- Tool Development;
- Communications.

Moving Forward:

The five initiatives address specific ETS concerns that are also broad public concern. By speaking out on these issues, ETS can add its voice, reputation and important perspective to the public debate on education, and also utilize the five global issue initiatives as an effective "matrix response" mechanism to address education issues of interest to higher education, business and the public. In this way, ETS becomes fully engaged in the debate.

The three spheres of influence of greatest importance to ETS -- ***the education community (users); the business community; and the general welfare, or commonweal*** -- have individual, collective and overlapping levels of interest in the issues that can be addressed within the ETS global issues initiatives. Most likely, the higher education community will pay closest attention to ETS communications on most issues, but the other two spheres of influence can be reached and effective communication can begin [initiated by ETS] with equal vigor.

There are two basic methods of exerting ETS' influence in the public debate on education: (1) individual ETS activities can be undertaken as part of a themed, proactive, carefully targeted external communication program; and, (2) joining with other institutions or third parties, ETS can jointly conduct programs or speak out on issues (which will provide ETS with greater leverage).

Frequently Asked Questions About ETS

Is ETS a government agency or part of Princeton University?

It's neither. ETS is a private, nonprofit organization devoted to educational measurement and research, primarily through testing. We develop and administer millions of achievement and admissions tests each year in the U.S. and 180 other countries. Our headquarters are located in Lawrenceville, New Jersey (with a Princeton, New Jersey, mailing address), but we also have field offices in Atlanta, Georgia; Evanston, Illinois; Hato Rey, Puerto Rico; Oakland, California; Phoenix, Arizona; and Washington, D.C.

Is ETS an unregulated monopoly?

No on both counts. We hold ourselves to the highest professional standards of the measurement community, and we are governed by a 16-member Board of Trustees. The Board members represent various levels and areas of interest in education and business. Among other things, they select ETS's president, oversee the leadership provided by the ETS officers, set policy, and determine future directions for the entire organization. And, although we are the world's largest testing organization, there are competitors for most of the testing programs and related products and services we develop.

Aren't ETS and the College Board really the same thing?

No, but we understand the confusion. ETS develops and administers the SATs and the Advanced Placement Program, but the College Board sponsors these testing programs and decides how they will be constructed, administered, and used. While the College Board is our largest client, we also do similar work for dozens of organizations and associations.

How can ETS be nonprofit if it makes money every year?

Our nonprofit status is a reflection of our purpose: ETS was established to serve education, and therefore performs a public service. However, ETS is also a private, self-supporting organization. That means we must make enough revenue each year to cover our expenses, plus enough extra to support the work we want to do in the years ahead.

We are continuously exploring new forms of measurement, new teaching tools, and new applications of technology in assessment. ETS routinely supports the research, surveys, field-tests, and analysis these developmental projects require.

What good are standardized college and graduate admissions tests?

Various kinds of important information are used to evaluate a student's readiness for

college work. High school grades have great value, but they are subject to variability from place to place. Standardized admissions tests offer colleges and universities a fair and impartial way to compare students from different school situations. Literally thousands of studies have found that the combination of grades plus test scores is a more effective predictor of the student's readiness than either one alone.

Are standardized tests fair to women and minority students?

We go to great lengths to see that the tests we develop are fair to everyone. Every question on every test that we produce goes through a careful review process to ensure that it does not favor--or penalize--any particular group of students.
It is also important to remember that if groups of students (such as males and females or White and Black students) have different average scores on the same test, it does not necessarily mean that the test is biased. If the groups actually have different knowledge and skills due to different educational backgrounds and opportunities, the scores will reflect those differences.

How does ETS come up with the test questions?

The knowledge areas and skills that a test will cover are defined by the educators or other professionals who use the test scores. For example, history teachers help us define the content for a history achievement test. In most cases these same professionals also help us write the actual test questions.

How does ETS set the pass/fail point for a test?

We don't. Passing scores are usually established by the colleges and universities or state agencies that use the test scores.

Don't some really good students do poorly on standardized tests?

We know that there are a small number of students whose standardized test scores are inconsistent with their school grades. Such disparities are one of the reasons why we believe that no single factor should be used as the sole criterion for any important educational decision. No single test can give a complete picture of an individual, and we urge score users to view a test score as simply one of the many pieces of information available about a student.

What does ETS think about the coaching schools that promise to raise students' scores on the SAT and other admissions tests?

ETS does not recommend expensive and elaborate coaching courses. Although the courses vary according to objectives, duration, and method, we believe that most of the claims made by commercial coaching companies are greatly overblown.

However, we do recommend that students prepare for any important test. The best way to do that is to familiarize yourself with the format of the test and to review the content areas the test will cover, and you can do this on your own. ETS and the testing program sponsors provide these details, as well as practice tests (printed materials and a growing number of software versions) at very low cost for all of the testing programs we create. We encourage all of our test candidates to review this material to help refresh their memories of particular content, decrease their anxiety,

and increase their confidence on test day. Note, however, that last minute cramming will never replace years of study and effort.

If you need more information about testing programs and general content matter contained on the Website, send an e-mail to our customer service group at etsinfo@ets.org.

Educational Testing Service

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Last Updated: 97/10/22 Release Level: 1.4

What's the DIF? Helping to Ensure Test Question Fairness

Here's a sample analogy from the SAT. It seems straight-forward enough.

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STRAWBERRY:RED
(A) peach:ripe   (B) leather:brown (C) grass:green
(D) orange:round (E) lemon:yellow
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A "strawberry" is a fruit that is typically "red"; therefore, (E) -- a lemon is a fruit that is typically yellow -- is the correct answer. But is this item unfair toward members of a particular group? Did one particular group of test takers have difficulty with it -- not because they knew less but because they had different assumptions or cultural experiences? To help find the answers to these questions, ETS relies on a procedure called Differential Item Functioning (DIF), coupled with professional judgment.

The DIF procedure, developed by ETS researchers in 1986 using methodology adapted from medical research, is applied to ETS tests with sufficient samples of examinees. The procedure assumes that if test takers have approximately the same knowledge (as measured by total test scores), then they should perform in similar (though not identical) ways on individual test questions regardless of their sex, race or ethnicity.

"Matching students according to their test scores and then examining how they did on individual test questions helps us to determine whether the test questions themselves may be creating problems for a particular group," says Sydell Carlton of ETS Test Development. "Questions on which groups of test takers with similar scores performed very differently are identified for further study.

"Questions identified by the DIF procedure are not necessarily unfair." Carlton cautions. "Instead, the procedure spots questions that need to be judged for fairness by groups of professionals."

Score Comparison

In DIF analyses, groups of Black, Hispanic, Asian-American, and Native American test takers are compared with matched groups of White test takers; groups of female test takers are compared with matched groups of men. White and male test takers are known as the focal groups.

The DIF statistic is expressed as differences on the delta scale, an ETS index that ranks the difficulty of test questions. A negative value means that the test question is more difficult for the focal group (females or minority group), while positive value indicates that it is more difficult for the reference group (males or Whites). The higher the number, the greater the difference between matched groups.

Questions with elevated values of DIF are "flagged" by the computer scoring the examination. Questions harder for focal groups, along with questions harder for reference groups, are identified and, depending on when DIF analyses are performed, are either dropped or reviewed by a group for possible unfairness.

Timing of the Analysis

In testing programs that pretest and that have large enough pretest samples of focal groups, DIF analyses are performed at the pretest stage. When final forms of a test are being assembled, all questions with elevated levels of DIF are dropped. For programs that do not pretest or do not obtain large enough group samples at the pretest stage, the DIF analyses are done at the Preliminary Item Analysis stage, that is, after the test has been given but before final scoring is done and therefore before scores are reported. In this latter case, decisions about high-DIF panel questions are made by a panel, which always includes members with at least one person external to ETS. The DIF panel decides whether the question is more related to what the test is trying to measure (if so, keep it) or more related, unfairly, to membership in a group (if so, drop it).

Reviewing the Analogy

For example, when the strawberry:red analogy appeared on the SAT, the Hispanic test takers had a DIF score of -1.87 when compared with White test takers. This means that White test takers outperformed Hispanic test takers by approximately 19 percent. Because its delta score exceeded the guideline, the question was flagged. Since the question appeared on the SAT, which pretests large populations, the question was flagged at this stage and dropped. Had it appeared in a different test at a different stage, a DIF panel would have made a decision to keep it or not. In the case of this particular question, an "experimental" panel was called to review several high-DIF questions, and the problem was easily explained by a Hispanic member who noted that some of the Hispanic test takers were probably familiar with green, not yellow, lemons. That led them to choose grass:green instead, which is the best answer if you do not associate "lemons" with "yellow." The DIF panel discovered that what appeared to be a simple analogy in fact discriminated against one group of test takers.

"The question would be dropped because in a general test of verbal ability, such as the SAT, specific knowledge of fruit is not required. The question was judged unfair in that context. However, in a test of botany, the question might have been kept. Fairness is always judged in the context of the purpose of the test," Carlton explains.

"The procedure identifies test questions that need to be examined by the DIF panel, whose members must decide which questions behave in a manner that gives one groups of test takers an unfair advantage over another. By using the DIF procedure, paired with the Test Sensitivity Review procedure, ETS helps ensure that its examinations provide a level playing field for all who take them."

Ongoing Research

ETS researchers continuously conduct DIF studies and analyses to help monitor the validity

and fairness of exisiting tests. Additionally, researchers are exploring methodological questions relating to DIF for new forms of assessment, such as computerized adaptive tests and performance tasks.

For more information, please contact research@ets.org.

ONE AMERICA IN THE 21ST CENTURY

The President's Initiative on Race

The New Executive Office Building
Washington, DC 20503
202/395-1010

AGENDA
Meeting with Educational Testing Service (ETS)
March 3, 1998

I. Introductions

II. ETS Research Projects and Upcoming ETS Activities

No way to replicate current diversity. (w/alternative approaches)

A. Research in Conjunction with Harvard Civil Rights Project

B. Research and Findings Regarding Testing and Admissions Models

1. The Strivers Model

C. Future ETS Meeting on Testing and Admissions

III. PIR-Related Efforts in Higher Education and Opportunities for Coordination

IV. Other

ETS March 3

Best replication w/ "strivers"
Those whose test scores do better than expected.

Factors are income, educ of parents, etc.

"Strivers" pool
w/race 5500 Blacks in top 120 schools (now is 7500) > admissions
w/out race 2500 Blacks in top 120 schools

Data used is data available to admissions offices.

Not easy to replicate results we get w/ affirmative action.

Strivers model.
replicates some people's

Things like family structure have diff. impacts on diff. groups of people.

Retention
looking @ at what SAT score does a given applicant have a > 50% chance of graduating.

We underrate the # of people who could succeed @ these institutions

they give extra pts. on score to strivers. What admissions offices do in their heads.

Striver model cuts out middle class minorities. This ~~cuts do~~ slows down the rate of progress b/c social power is inter-generational.

Family background (?)

Psychology and family structure that supports a kid through these institutions — social capital

Institutional benefit of having more middle class Black students @ the university.

W/out race in striver model ↓ 2/3 Blacks

Likelihood of graduating is much greater for strivers than those who did not strive.

→ They have a draft of this.

ETS Trustees want to know what more they can do on this issue.

Small conference in June.
Educ. & CK leaders
to talk about what kind of models could
be more effective to lead ~~to~~
diversity