The Effect of Attending a Small Class in the Early Grades on College Attendance Plans (Executive Summary)

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Background

Project STAR was an experiment in which 11,600 students and their teachers in grades k-3 were randomly assigned to a small class (13-17 students), regular-size class (22-25 students), or regular-size class with a teacher aide within 79 Tennessee public schools. The experiment began with kindergarten students in the 1985-86 school year. After four years, all students were returned to regular-size classes. Project STAR students who moved along on pace graduated from high school in the Spring of 1998. To determine the impact of having attended a smaller class in elementary school on students' long-term educational outcomes, we asked ACT, Inc. and the College Board/Educational Testing Service to link information on high school seniors in the class of 1998 who took the ACT or SAT exam to records that we provided on the 11,600 students from Project STAR, regardless of where the Project STAR students resided in 1998. The resulting database contains information on whether Project STAR students in the class of 1998 wrote either the ACT or SAT exam, their test score, and information from the background questionnaire students fill out when they take the ACT or SAT exam. This is the first database that permits a long-term examination of the behavior and post-high school aspirations of Project STAR participants. This Executive Summary describes our initial findings for a sample of more than 9,000 Project STAR students who were high school seniors in 1998.

Specific Findings

- The main results are illustrated in Figure 1. This figure reports the percent of students who took either the ACT or the SAT exam by the type of class they were assigned to attend their initial year in Project STAR. The figures are reported for all students combined, for white and black students separately, and for students who received free or reduced-price lunch in at least one year in grades k-3. For the entire sample, Figure 1 indicates that 43.7% of students who were assigned to a small class took either the ACT or SAT exam, whereas 40.0% of those assigned to a regular-size class took one of the exams, and 39.9% of those assigned to a regular-size class with an aide took one of the exams. The 3.7 percentage point higher test-taking rate for the students assigned to small classes relative to those assigned to regular-size classes was statistically significant at the .05 level; that is, this difference is unlikely to have occurred by chance.

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- • Figure 1 also indicates that attending a small class was particularly effective in raising the proportion of black students who wrote one of the college entrance exams. Only 31.7% of black students in regular-size classes wrote the ACT or SAT exam, whereas 40.2% of black students in small classes wrote the college entrance exam. To gain some perspective on the magnitude of this effect, note that black-white gap in taking a college entrance exam was 13.3 percentage points for students in regular-size classes, and 6.1 percentage points for students in small classes. Thus, attending a small class reduced the black-white gap in the college-entrance-test-taking rate by 54 percent.

- Nationwide, 65.8% of white and 55.3% of black young high school graduates enrolled in college within 12 months of graduating from high school in 1996 (Statistical Abstract of the United States, 1998, Table 301). The 10.5 percentage point black-white gap in college enrollment for the nation as a whole is close in magnitude to the racial gap in college-entrance-exam taking rates in regular-size classes in Tennessee.

- Earlier research on Project STAR has found that minority students and students on free lunch exhibited the greatest gains in test scores as a consequence of attending a small class. The findings in Figure 1 complement a result that has been found consistently throughout Project STAR: minority students benefited most from attending a small class, and small classes were able to considerably narrow, although not eliminate, the gap in educational performance between black and white students.

- Table 1 provides further evidence on the effect of class size on the percent of students who took the college entrance exam. The first three columns of Table 1 contain the data used to construct Figure 1. To ensure that our results are not due to extraneous factors, we estimated a series of logistic regressions in which we controlled for the students' race, sex, free or reduced-price lunch status, and the specific elementary school he or she attended. Our findings were unchanged when we controlled for these variables, so we emphasize the simpler raw tabulations. Nonetheless, the fourth column of the table reports a statistical test of the null hypothesis that initial class-type assignment is unrelated to the likelihood the student writes either the ACT or SAT exam. With the exception of white students, these tests indicate that it is very unlikely that the observed differences in test-taking rates across the three types of classes would have occurred by chance.

- Tennessee is a state in which a majority of college-bound students take the ACT exam. Tables 2 and 3 provide separate tabulations of the test-taking rates for the ACT and for the SAT: some 40% of STAR students wrote the ACT exam while fewer than 6% wrote the SAT exam. The disaggregated results in Tables 2 and 3 indicate that, compared to students assigned to regular-size classes, students assigned to small classes were more likely to take the ACT exam, and were more likely to take the SAT exam.

- Class size may not have to shrink to 15 students for smaller classes to raise the likelihood that students take the ACT or SAT exams. We find that students who were initially assigned to a class with 21-25 students their first year in Project STAR were more likely to take the ACT or SAT exam than students who were assigned to classes with 26-30 students. And students who were assigned classes with 16-20 students were more likely to take the ACT or SAT exam than students who were assigned to classes with 21-25 students.

- We do not know how many students who took the ACT or SAT exam have actually enrolled in college, or how many years of higher education they will ultimately complete. But based on an analysis of the High School Class of 1972 Database, we found that high school seniors who took the ACT or SAT exam completed an average of 1.63 more years of schooling than students who did not take one of the college entrance exams, after controlling for the race and gender of the students.

- Lastly, we examined the test scores students achieved on the ACT and SAT exams. For students who took the SAT but not the ACT exam, we converted their SAT score to an ACT equivalent score using a concordance developed by researchers at the College Board. For any student who wrote the ACT exam we used their ACT score, even if he or she also took the SAT exam. The average ACT test scores were virtually identical for students who were assigned to small and regular-size classes. For the full sample of 3,832 test takers, the average student in small and regular-size classes both earned a 19.3 composite ACT score. Moreover, assignment to a small class did not appear to alter the average test score for any of the subgroups that we examined (i.e., black, white and free or reduced-price lunch students). Past studies have found that average test scores tend to decline when more students take the college entrance exam, because the marginal test takers are weaker students than the average student. In the STAR experiment, however, students assigned to small classes were more likely to take the ACT or SAT exam, but the average score of those in small classes did not decline.

Conclusion

Attendance in a small class in grades k-3 appears to have raised the likelihood that students take either the ACT or SAT college-entrance exam. Since most colleges in the U.S. require students to take either the ACT or SAT exam to be admitted, these findings suggest that lowering class size in the elementary school grades raises the prospect that students will attend college. The beneficial effect of smaller classes on college aspirations appears to be particularly strong for minority students, and students on free or reduced-price lunch. Indeed, attendance in small classes appears to have cut the black-white gap in the probability of taking a college-entrance exam by more than half.

Appendix: Description of the Sample

With the assistance of HERO's, Inc., we provided the ACT and ETS organizations computer files which contained several variables from the STAR database, including demographic data, class assignment, and elementary school test scores. The ACT and SAT data were merged to these records on Project STAR students on the basis of the students' names, dates of birth and Social Security numbers. If a STAR record was missing information on one of these three identifiers, the remaining identifiers were used to complete the merger. The data were merged together by searching over ACT and SAT records for the entire U.S., so any student who had moved away from Tennessee should still be included in the sample. About 9 percent of the STAR students who were identified by the search algorithm took the ACT or SAT exam outside of Tennessee. Once the data were merged together, the students' names, dates of birth, and Social Security numbers were concealed to preserve confidentiality.

Several checks indicated that the data were linked properly. For example, the correlation between the students' ACT score percentile rank and their 8th grade Tennessee Comprehensive Assessment Program (TCAP) Test percentile rank was .80, which is even higher than the correlation between the students 3rd grade Stanford Achievement Test Score percentile and their 7th grade TCAP percentile (.74). Additionally, the sex of the students based on their STAR records matched their sex in the ACT records in 98.7% of cases. These checks suggest that STAR students were correctly linked to their ACT and SAT records.

The ACT and SAT databases are organized by graduating high school classes. Only members of the High School Class of 1998 were included in the ACT and SAT records that formed the basis of the search. As a consequence, STAR students who repeated a grade or for some other reason were not high school seniors in 1998 could not be matched to their ACT and SAT records, even if they had taken one of the exams. Because of this feature of the data, we restrict our sample to the subset of 9,397 students who were on grade level based on information that we have on students who wrote the TCAP exam through the eighth grade. As a further check, however, we re-calculated Figure 1 for the entire sample of 11,600 students in our database (which includes students who fell behind and were not high school seniors in 1998), and find qualitatively similar results as in Figure 1. Thus, our results are robust to the inclusion of students who have fallen behind grade level.

Project

STAR - Figure 1

Students Assigned to Small Classes were More Likely to Take the ACT or SAT College Entrance Exams

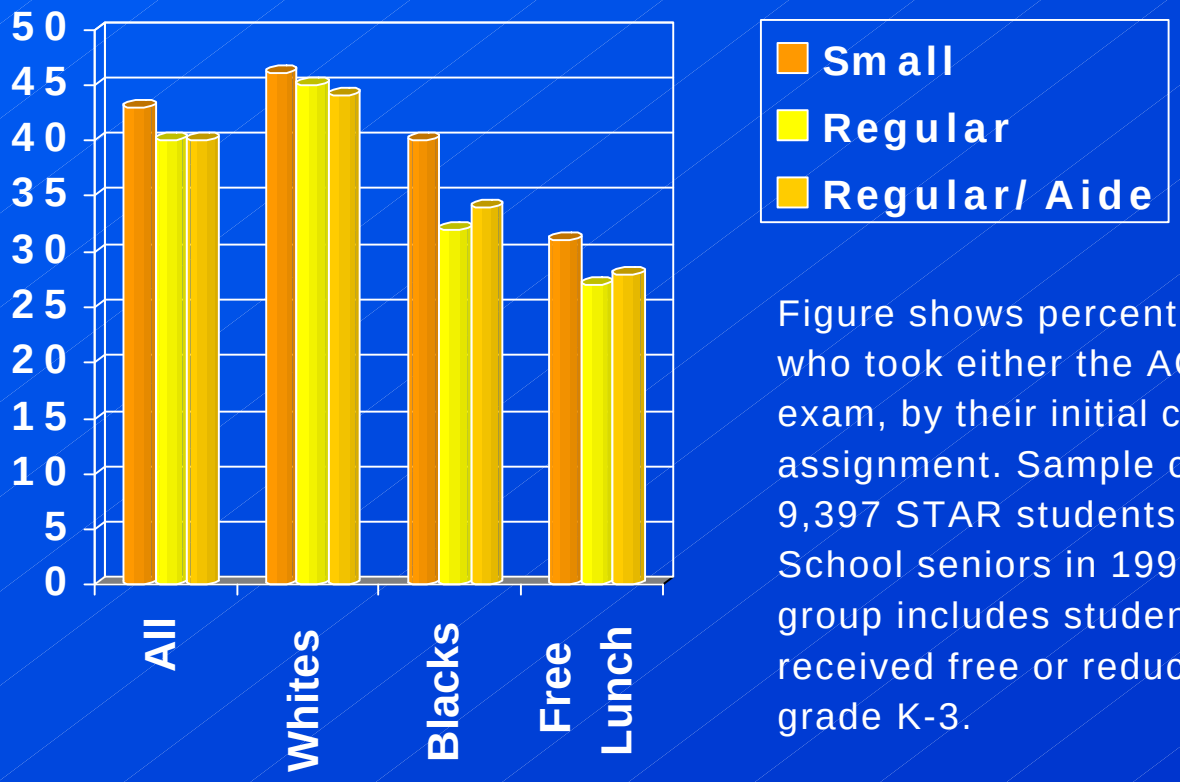

Figure shows percent of students who took either the ACT or the SAT exam, by their initial class-size assignment. Sample consists of 9,397 STAR students who were High School seniors in 1998. Free lunch group includes students who ever received free or reduced-price lunch grade K-3.

Project

STAR - Table 1

Percent Taking Either ACT or SAT Exam

	Small	Regular	Regular/ Aide	Multivariate Logit-Adjusted P-Value
All	43.7	40.0	39.9	.019
Whites	46.3	45.0	44.2	.285
Blacks	40.2	31.7	34.0	.006
Free Lunch	30.8	26.5	28.2	.025

Sample sizes are 9,397, 5,995, 3,180 and 5,264. Multivariate logit includes initial-class assignment, race, sex, free-lunch and initial school dummy variables. The sample consists of students who never repeated a grade, and free lunch measures whether a student ever received free or reduced-price lunch in grades K-3.

Table 1. Percent Taking Either ACT or SAT Exam

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Notes: Sample sizes are 9,397, 5,264, 3,180, and 5,995. Multivariate logit includes initial-class assignment, race, sex, free-lunch and initial school dummy variables. The sample consists of students who never repeated a grade, and free lunch measures whether a student ever received free or reduced-price lunch in grades K-3.

Table 2. Percent Taking ACT Exam

	Small	Regular	Regular/Aide	Multivariate Logit-Adjusted P-value
All Students	41.8	38.7	38.7	0.071
Free Lunch	30.0	25.8	27.1	0.024
Black	39.3	31.4	33.1	0.015
White	44.0	43.2	42.8	0.590

Notes: Sample sizes are 9,397, 5,264, 3,180, and 5,995. Multivariate logit analysis includes initial-class assignment, race, sex, free-lunch and initial school dummy variables. The samples consist of students who never repeated a grade, and free lunch measures whether a student ever received free or reduced-price lunch in grades K-3.

Table 3. Percent Taking SAT Exam

	Small	Regular	Regular/Aide	Multivariate Logit-Adjusted P-value
All Students	6.7	5.2	5.2	0.026
Free Lunch	2.7	2.1	2.6	0.707
Black	5.5	3.2	3.9	0.123
White	7.4	6.0	5.9	0.076

Notes: Sample sizes are 9,397, 5,264, 3,180, and 5,995. Multivariate logit includes initial-class assignment, race, sex, free-lunch and initial school dummy variables. The sample consists of students who never repeated a grade, and free lunch measures whether a student ever received free or reduced-price lunch in grades K-3.