

47. Note that we include the racial variables as statistical controls for different student body characteristics across districts and schools. That black and Hispanic students score lower on these tests is a function of the data reported by the Board of Education. We do not in any way suggest that school officials or parents do or should have lower expectations for minority student performance. But if we do not include racial variables in these equations, we will not be comparing properly different student bodies and may mistakenly attribute or not attribute changes to choice or other policy variables.

48. This is the Board of Education's "Ranking of Schools by Reading Achievement: Overall Comparison of Reading Achievement in Similar Schools," prepared by the board's Division of Assessment and Accountability.

49. See, for example, Ronald Ferguson, "How Professionals in Community-based Programs Perceive and Respond to the Needs of Black Male Youth," in *Nurturing Young Black Males*, ed. Ronald Miney (Washington, D.C.: Urban Institute Press, 1991).

50. See, for example, Mark Schneider, Paul Teske, Melissa Marschall, and Christine Roch, "Shopping for Schools: In the Land of the Blind, the One-Eyed Parent May Be Enough," *American Journal of Political Science* 92 (1998).

51. Fliegel, *Miracle in East Harlem*, pp. 120-26.

52. These schools are PS 7, 50, 52, 72, 96, 101, 102, 108, 121, and 155.

53. Of these four negative trends, two are from PS 155, where reading scores in grades three and six declined; however, over the same time period, math scores in the school improved. Scores for grade three reading in PS 57 declined, but performance in two other tests remained steady and the school improved on one test. The final decline occurred in PS 96, where performance on grade five math dropped, but the three other comparisons showed improvement over time.

54. Michael Goldstein, "The Trials of Anthony Alvarado," *New York Magazine*, October 13, 1997, p. 82.

55. Clara Hemphill, *The Parents' Guide to New York City's Best Public Elementary Schools* (New York: Soho Press, 1997), p. 39.

56. Goldstein, "The Trials of Anthony Alvarado."

14 When Low-Income Students Move from Public to Private Schools

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Over the past few years, the school choice movement has taken off. Congress and many state legislatures have considered school voucher proposals that enable families, particularly low-income families, to choose among a wide range of schools, public and private, religious and secular. In 1990 the Wisconsin legislature enacted a pilot program that gave public students access to secular private schools in Milwaukee; then in 1996 the legislature expanded this program to include religious schools. After surviving a constitutional challenge, the program went into effect in the fall of 1998. A similar program in Cleveland, enacted by the Ohio legislature, began its fourth year of operation in the fall of 1999, but at the time of this writing its future was uncertain due to a court challenge. Also in 1999, a potentially large state-wide voucher program was initiated in Florida.

Interest groups, political leaders, and policy analysts on all sides of the ideological spectrum have debated the merits of school-choice programs. The conversation is charged, and the country remains far from any kind of consensus. Supporters of school choice assert that low-income, inner-city children learn more in private schools; critics retort that any perceived learning gains in private schools are due to the more advantaged student body typically found in private schools. Proponents insist that families develop closer communications with schools they themselves choose; critics reply that when choices are available, mismatches often occur and private schools expel problem students, adding to the educational instability of children from low-income, inner-city families. Champions of choice suggest that a more orderly educational climate in private schools enhances learning opportunities, while opponents submit that private schools select out the "best and the brightest," leaving behind the most disadvantaged.

Voucher advocates argue that choice fosters racial and ethnic integration,¹ critics, meanwhile, insist that private schools balkanize the population into racially and ethnically homogenous educational sectors.²

Few of these disputes have been resolved, in part because high-quality information about school-choice programs is in short supply. Although many published studies compare public and private schools, they consistently have been criticized for comparing dissimilar populations. Even when statistical adjustments are made for background characteristics, it remains unclear whether findings describe actual differences between public and private schools or simply differences in the kinds of students and families attending them.³

Though the problem of selection bias has plagued education research for years, it is not insurmountable. The best solution is to randomly assign individuals to treatment and control groups, thus creating two populations that are by and large identical to one another. This procedure is standard in medical research, and recently it has found its way into education studies, such as the Tennessee Star experiment that found that smaller classes positively affect the achievement of those in kindergarten and first grade.⁴ Until now, however, this type of research design has not been carefully used to study the validity of competing claims about school choice.

In this chapter we report outcomes from a randomized experiment conducted in New York City that was made possible by the School Choice Scholarships Foundation (SCSF), a privately funded school choice program. The program represents the first opportunity to evaluate a school-choice pilot program that has the following characteristics:

1. A lottery that allocates scholarships randomly to applicants and that has been administered by an independent evaluation team that can guarantee its integrity.
2. Baseline data on student test performance and family background characteristics are collected from students and their families prior to the lottery.
3. Data on a broad range of characteristics are collected from a high proportion of the test group and the control group one year later.

Because it has these qualities, the SCSF is an ideal laboratory for studying the effects of school choice on such things as parental satisfaction, parental involvement, school mobility, racial integration, and student achievement.

The School Choice Scholarships Foundation Program

In February 1997 SCSF announced that it would provide 1,300 scholarships to low-income families currently attending public schools. These scholarships were worth up to \$1,400 annually, and could be used for up to three

years to help pay the costs of attending a private school, either religious or secular. SCSF received initial applications from over twenty thousand students between February and late April 1997.

In order to become eligible for a scholarship, children had to be entering grades one through five, live in New York City, attend a public school at the time of application, and come from families with incomes low enough to qualify for the federal government's free school lunch program. Students and an adult member of each family had to attend verification sessions at which SCSF administrators documented family income and children's public-school attendance. Because of the large number of initial applications, it was not feasible to invite everyone to these verification sessions. Therefore, to give all families an equal chance of participating, a preliminary lottery determined whose income and public school attendance SCSF would verify. Only these families were then included in the final lottery that determined the allocation of scholarships among applicants.

The final lottery, held in mid-May 1997, was administered by Mathematica Policy Research (MPR); SCSF announced the winners. SCSF decided in advance to allocate 85 percent of the scholarships to applicants from public schools whose average test scores were less than the citywide median. Consequently, applicants from these schools, who represented about 70 percent of all applicants, were assigned a higher probability of winning a scholarship. The results presented in this chapter have been adjusted, by weighting cases differentially, so that they can be generalized to all eligible applicants.

Subsequent to the lottery, SCSF helped families find placements in private schools. By mid-September 1997, SCSF reported that 1,168 scholarship recipients, or 75 percent of all those offered a scholarship, had successfully gained admission to some 225 private schools.

Evaluation Procedures

In order to evaluate the voucher program, SCSF collected baseline data on student test scores, family demographics, and parents' opinions on matters relating to their child's education; one of the conditions for participating in the program was agreement to provide confidential baseline and follow-up information.

Collection of Baseline Data

During the initial verification sessions, students entering grades two through five took the Iowa Test in Basic Skills (ITBS) in reading and mathematics. Each student's performance was given a national percentile ranking that varies between one and one hundred. The national average is fifty. While children completed the hour-long test, adults answered question-

naires in a separate room. Although grandmothers and other relatives and guardians also accompanied children to verification sessions, in over 90 percent of the cases a parent completed the questionnaire. Because scholarships were allocated by a lottery, there were few differences between scholarship recipients and nonrecipients, though baseline test scores of nonrecipients were somewhat higher.

First-Year Follow-up

To evaluate the effects of the scholarship on students and their families, MPR selected at random students from 1,000 families who had been offered a scholarship and from 960 families who had attended a verification session but had not been offered a scholarship. Procedures used to select the control group are described elsewhere.⁵ In April, May, and June of 1998, these families were invited to attend sessions during which students again took the ITBS in mathematics and reading. Parents completed follow-up surveys that asked a wide range of questions about the educational experiences of their oldest child within the age range eligible for a scholarship. Students in grades three, four, and five also completed short questionnaires.

Among recipients and nonrecipients, 83 percent of those selected for participation agreed to attend the testing and questionnaire sessions held in April and May 1998. This high response rate was achieved in part because SCSF conditioned the renewal of scholarships on participation in the evaluation; nonrecipients selected to become members of the control group were financially compensated and told that they could automatically enter a new lottery if they participated in these follow-up sessions.⁶

Validity of the Randomized Experiment

When randomized experiments are conducted, it is important to consider their internal and external validity. The internal validity of an experiment depends on whether or not the test and control groups are in fact similar in all respects, save for the experimental condition. Its external validity depends on the extent to which one can generalize from the experimental group to a larger population. We consider each in turn.

Internal Validity

As mentioned previously, three conditions allowed the evaluation team to execute an experiment that had a high degree of internal validity. First, since the evaluation team itself performed the lottery assigning students to test and control groups, one can be confident that the comparison groups were similar, on average, except that the members of one group were

offered a scholarship. Second, response rates were high, reducing the chances that results would be dependent upon the characteristics of those applicants who proved willing to remain in the evaluation after one year.⁷ Third, 75 percent of those receiving the scholarship made use of the scholarship. As compared to those who did not use their scholarships, users had similar incomes but were more likely to be college educated and were advantaged in a number of other respects; on the other hand, they were also more likely to be African American.⁸ Because of these differences, comparisons between scholarship users and the appropriate control group were estimated by means of a statistical technique commonly used in medical evaluations to adjust for differential patient use of the medical procedure under investigation.⁹

External Validity: Small Groups and Large Groups

Although a randomized experiment can achieve a high degree of internal validity by securing high response rates and adjusting for noncompliance (in this case, scholarship recipients who stayed in the public schools and nonrecipients who attended private schools), questions of external validity remain. In medical research, it may be unclear whether one will obtain the same results when one expands treatment beyond a small group. The difficulties of generalization are no less significant in the field of education. Vouchers and scholarships may have positive effects when used on a small scale, but the consequences may be quite different when writ large. Because the SCSF program only reached a small percentage of eligible New York City students, for example, it probably had little impact on the composition of public and private student bodies: larger programs may have a more substantial effect on the two educational sectors and thereby generate a different set of findings. The only way to find out is to expand the scale of the experiment to include ever larger populations.

External Validity: Differences between Applicant and Eligible Population

Questions about the external validity of a school choice experiment arise, however, even before any student has been awarded a scholarship. As with any intervention, only a certain percentage of the eligible population will be interested in and have the means of taking advantage of it. If the applicant population is very unusual, it becomes difficult to generalize from this group to one that a larger voucher program might reach.

It is quite possible that many families who met SCFS's requirements, and who were interested in sending their child to a private school, never heard of the program in the first place. And of those who were informed and who considered applying, many others may have decided not to par-

ticipate in the lengthy eligibility verification sessions. Given these barriers to entry, it is possible that the application process attracted a population substantially different from a cross-section of all those eligible.

To estimate the distinctiveness of the voucher applicants, Rachel Deyette at Harvard's Kennedy School of Government obtained demographic information on the general New York City population that would have been eligible had scholarships been offered in 1990, the last year in which a U.S. census was taken.¹⁰ Her estimate is based on data collected at a time when New York's economic and social conditions differed from those prevailing when applicants were surveyed. For one thing, in 1990 the economy was in a recession, whereas in 1997, the year SCSF first accepted applications, it was in the midst of a boom. In addition, education levels of the adult population rose during the interceding seven years. Nonetheless, Deyette's data provide a useful, albeit rough, estimate of the extent to which the SCSF applicants differ from those eligible within the larger New York population.

Deyette found no significant difference between these two groups' incomes, having adjusted for inflation between 1990 and 1997. Father employment rates were similar. Also, the residential mobility of the applicant population was about the same as that of the eligible population. And applicant mothers were only slightly more likely to be foreign-born than were the eligible population. Applicants were also more likely to be dependent on various forms of government assistance, less likely to be non-Hispanic white and more likely to be African American. If this suggests that the applicant population was particularly disadvantaged, other findings point in the opposite direction. Mothers and fathers were considerably more likely to have some college education, English was more likely to be the language spoken in the household, and mothers were more likely to be employed either full or part-time.

While SCSF applicants were somewhat different from the eligible population within New York City, these differences do not indicate that the applicant pool was a particularly advantaged group. Indeed, along most dimensions scholarship applicants appeared less advantaged than the large population from which they were drawn. While not definitive, these findings ought to allay some of voucher critics' concern that only "white and higher-SES families will . . . be in a position to take greater advantage of the educational market."¹¹

Parental Reports on Public and Private Schools

In this section of the paper we discuss the effects of the choice program on student experiences in school, as perceived by their parents. Significant differences were observed in the school facilities available to students, the de-

gree of ethnic integration, parental satisfaction, discipline problems in school, and school-parental communications.

School Facilities

Most observers believe that the facilities in central-city public schools are generally larger and more sophisticated than are those in central-city private schools. With a few exceptions, reports from applicant parents in New York City are consistent with this conventional wisdom. First of all, public schools are larger. As estimated by parents, the effect of taking a scholarship was to reduce the size of the school a child attended by 141 students, or about 30 percent. Private school parents also reported that their children were in smaller classes. With a scholarship, the size of a child's class dropped, on average, by 2.7 students, or about 10 percent.

But while public schools may be larger, they also have more varied and extensive programs and facilities to serve their students. (See figure 14.1.) Public schools were more likely to have a library, a cafeteria, a nurse's office, child counselors, and special programs for non-English speakers and students with learning problems. The biggest difference was for programs for non-English speaking students. Forty-eight percent of the scholarship parents reported such a program in their schools, as compared to three-quarters of the control group. Most other differences, however, were substantially smaller; for example, 80 percent of the scholarship families reported their school had a nurse's office, as compared to 94 percent of the parents in the control group. In a couple of instances, private school parents reported more extensive facilities and programs. For example, private school parents were somewhat more likely to say their schools had a computer laboratory and a music program. In other cases, such as arts programs, after-school programs, and programs for advanced learners, no differences between the two groups could be detected.

Ethnic Composition of School

Using a scholarship in New York City slightly reduced the racial isolation of minority students (figure 14.2). When asked, "What percentage of the students in this child's classroom are minority?" 18 percent of the scholarship users replied that less than half of the students in the classroom were of minority background. Only 11 percent of the parents in the control group gave this response. At the other end of the spectrum, 37 percent of the control-group parents said their child's classroom was all-minority, as compared to just 28 percent of the parents of scholarship users.

Parental Satisfaction

Most studies of voucher programs for low-income minority families have found that families receiving the scholarships are much more satisfied with

their child's schooling than are families who remain in public schools.¹² The results from New York confirm these earlier findings. When asked to assess the school's overall performance, private school parents give significantly higher grades than do public school parents. Half of the scholarship users gave their school an "A," as compared to one-eighth of the control group.

We also examined particular dimensions of parental satisfaction (figure 14.3). On every aspect of a school about which parents were questioned, scholarship parents were substantially more satisfied than parents in the control group. The percentage of "very satisfied" parents within the private school sector was significantly higher for all of the following: location of the school, school safety, parental involvement, class size, school facility, student respect for teachers, teacher communication with parents, freedom to observe religious traditions, parental support for the school, discipline, clarity of school goals, staff teamwork, teaching and academic quality.¹³

The scholarship program had the smallest impact on parents' satisfaction with school location. One-half of the scholarship parents were very satisfied with the school's location, but over a third of the control group was also very satisfied. In every other domain, however, differences between the two groups were considerably larger. For example, more than half of the scholarship parents were very satisfied with the academic quality of the school, while just one-sixth of the control group were. Similarly, 58 percent of the scholarship parents expressed the highest satisfaction with "what's taught in school," as compared to 18 percent of the control group.

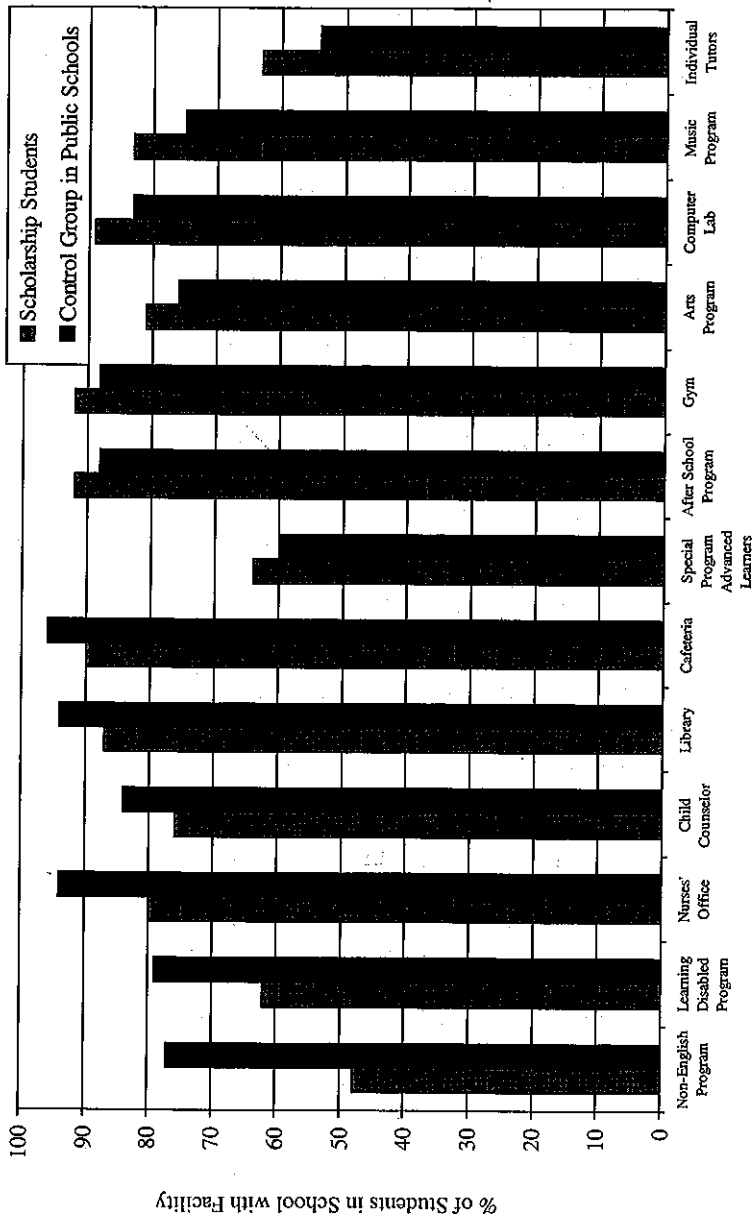


Figure 14.1. Facilities for Students in Public Schools

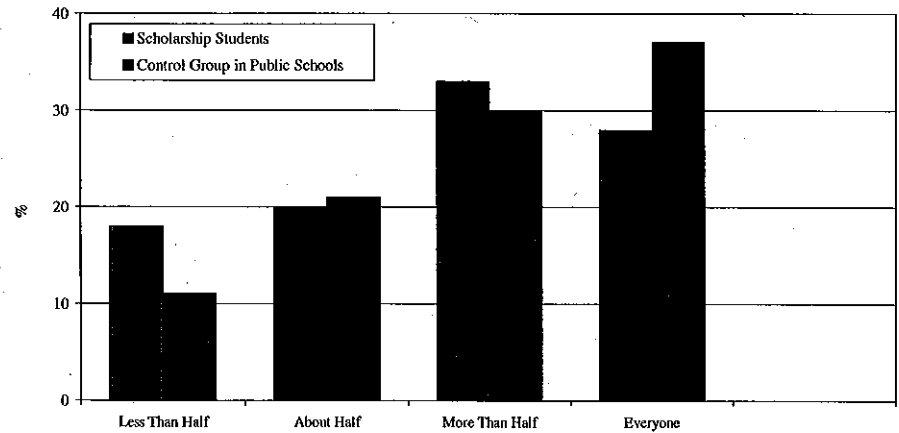


Figure 14.2. Racial Composition of Classroom (Percentage of students in child's class who are minority)

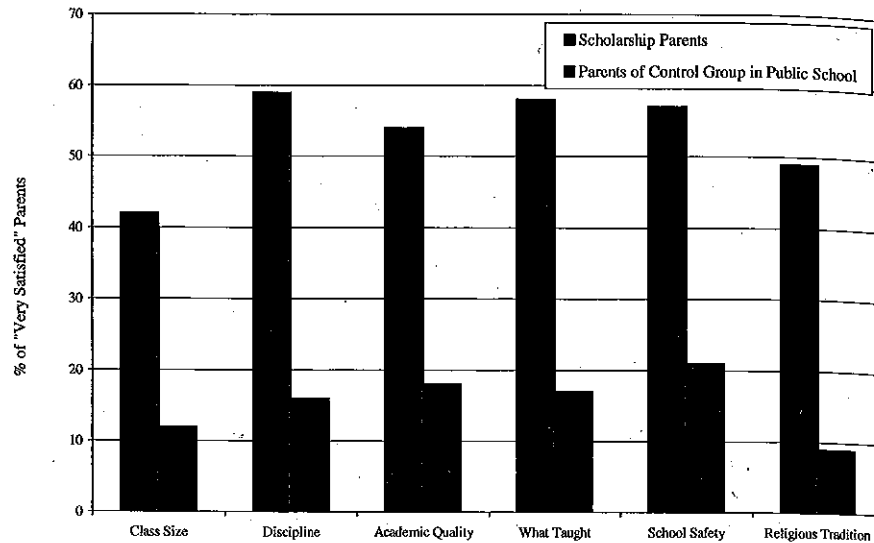


Figure 14.3. Parent Satisfaction with Child's School

The consistency of these findings reveals strong enthusiasm for the private schools participating in the voucher program, as compared with the level of satisfaction with public schools. Less emphasis, however, should be placed on the reports parents provide for specific items. Other evaluations of school voucher programs suggest that scholarship parents become increasingly discerning about the quality of their children's schools the more time that passes. Overarching excitement often gives way to a more considered assessment of the merits of public and private education. In Cleveland, for example, parents after two years in the program remained equally satisfied with the academic program, safety and school discipline at their school, but their satisfaction with school facilities, and parental involvement declined significantly.¹⁴

Discipline Problems in School

If parental reports are accurate, the scholarship program had a major impact on the quality and safety of students' lives at school. Take a look at figure 14.4. Scholarship parents were more likely to report that the following were *not* a serious problem at their school: students destroying property, being late for school, missing classes, fighting, cheating, and causing racial conflict. For example, 39 percent of the parents with students in private schools thought fighting was a serious problem at their school, versus nearly two-thirds of the control group. Thirty-eight percent of scholarship users perceived tardiness as a problem, as compared to 57 percent of par-

ents within the control group. Nearly 30 percent of scholarship users and 49 percent of the control group said destruction of property was a serious problem.

Although student reports are not as sharply differentiated, they are nonetheless consistent with parental assessments. Scholarship students were more likely to report that "students got along with teachers" and "students are proud to go to this school." Scholarship students were also less likely to feel "put down" by teachers and to have friends who use bad language, though these differences are not statistically significant.

School Communications and Parental Involvement

Parents of scholarship users report much higher levels of communications from their children's schools. Figure 14.5 indicates that a higher percentage reported:

- being informed about student grades halfway through the grading period;
- being notified when their child is sent to the office the first time for disruptive behavior;
- parents speaking to classes about their jobs;
- parents participating in instruction;
- parent open-house or back-to-school night being held at the school;
- receiving notes about their child from the teacher;
- receiving a newsletter about what is going on in school;
- being informed by school administrators when the child is absent.

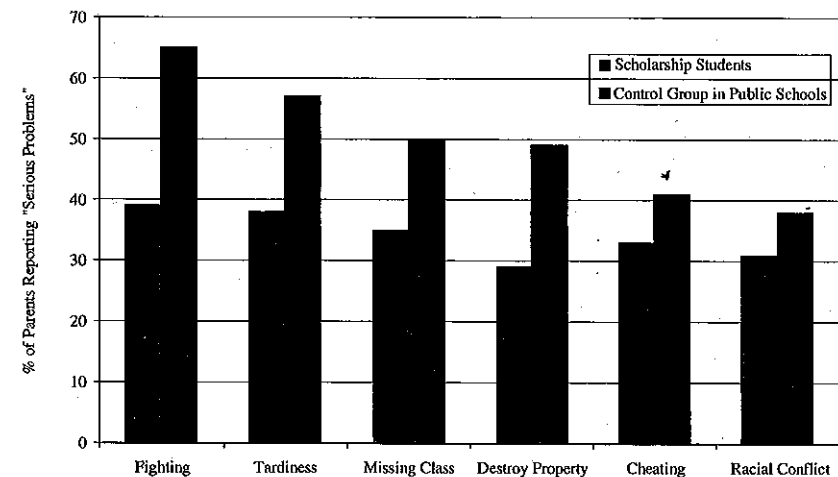


Figure 14.4. Discipline Problems

The largest differences involved parents receiving newsletters and notes from teachers and parents participating in instruction and speaking about their jobs. Over 90 percent of the scholarship users reported receiving notes from teachers as compared to just over three-fourths of the parents in the control group.

Critics of school choice often argue that perceived differences between voucher recipients and public school students have little to do with the schools themselves, but rather are a function of parental involvement. By virtue of applying for a voucher, parents distinguish themselves as more involved with their child's education. And from this basis, all subsequent differences in achievement and satisfaction derive. There is some reason to believe that the parents of voucher recipients differ somewhat from parents of public school students generally. Indeed, findings described earlier speak to this very issue. But it would be misleading to then conclude that parental involvement is a fixed characteristic. Again, because treatment and control groups were virtually identical at baseline, differences detected in New York can meaningfully be attributed to programmatic effects. The evidence presented here suggests that private schools may do a better job at communicating with parents about their children's progress and convincing them to participate in the classrooms.

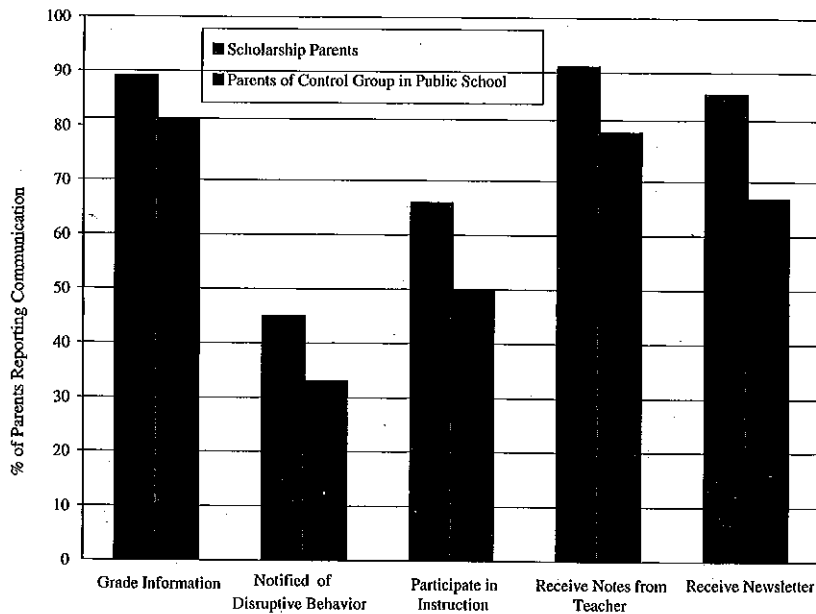


Figure 14.5. Communication with School

Continuing in the Program

All else being equal, students do better the less their education is disrupted. Does school choice destabilize a child's educational experience? In his evaluation of the Milwaukee school choice program, John Witte voiced concern about the high rate of attrition within private schools.¹⁵ And a number of choice critics have raised questions about the readiness of private schools to expel students who do not "fit in."¹⁶ But it is not entirely clear that a public school education is any more stable than a private one. Indeed, a number of studies of school choice have found that students from low-income families are more likely to remain in the same school, both within the school year and from one year to the next.¹⁷

Remaining in Same School during School Year

Most educators think that it is especially important that students remain within the same school for the entire school year. If school choice disrupted the education of many children within one school year, it would raise questions about the viability of voucher programs. In general, however, the findings from the SCSF pilot program indicate that this is not a serious concern: scholarship students were no more likely to move from one school to another than were the students in the control group.

Ninety-five percent of all students in the study were said to have remained in the same school the entire year, much higher than is typical of inner-city minority children in general.¹⁸ No differences in school mobility rates are apparent between the scholarship parents and the control group. Similarly, suspension rates were much the same for both groups. Six percent of the parents in the control group and 4 percent of the scholarship users reported their child had been suspended.¹⁹

The few families who did change schools were asked why they changed. Among both groups, the reasons given were fairly evenly distributed across the variety of alternatives provided in the questionnaire. The most frequently mentioned reasons were that the school was too expensive or that the family had moved away from the school.²⁰ School expulsion or suspension was a trivial factor, affecting less than 1 percent of each group. In short, school mobility was very low and virtually identical for both scholarship users and members of the control group.

Plans for Next Year

Scholarship recipients said they were more likely to attend the same school next year than were members of the control group. Things look much the same when examining mobility rates across school years. Once again, differences between public and private schools are minimal. As one might expect, a larger percentage of families in both groups plan on switching

schools over the summer than during the school-year itself. Eighty-four percent of the families using a scholarship said they expected their child to be back at the same school, as compared to 69 percent of the control group. Approximately 5 percent of scholarship parents said they planned to change schools because they did not find the quality of their school acceptable, and another 5 percent said they were preparing to move away from the school. The next most frequently mentioned reasons, given by less than 2 percent of scholarship parents, were expense and an inconvenient location. Less than one percent of all scholarship users said their school had asked them "not to return."

Nearly a third of the families in the control group were planning to change schools after the program's first year. However, 12 percent of those changing schools said it was because their child was graduating—presumably from elementary to middle school, a division found in New York public schools but not in most New York private schools. If these families are put to one side, there remains 19 percent of the control group that planned to change schools, about the same rate as among scholarship parents. Seven percent of the control group said the quality of their school was not acceptable. Less than 1 percent of all control group members said they were changing schools because their child had been asked not to return.

Test Performance

Most school choice experiments conducted thus far have not conformed to a classic randomized experiment. Privately funded programs in Indianapolis, San Antonio, and Milwaukee admitted students on a first-come, first-served basis. In the state-funded program in Cleveland, scholarship winners were initially selected by means of a lottery, but eventually all applicants were offered a scholarship, thereby precluding the conduct of a randomized experiment. The public Milwaukee program did award vouchers by a lottery, but data collection was incomplete.²¹ Given the limitations on prior research, this evaluation provides a much improved opportunity to estimate the impact of attending a private school on scholarship recipients' test scores.

Figure 14.6 reports test score differences after one year between private school students and students in the control group. Results are provided on reading and mathematics for students in grades two, three, four, and five, and, finally, in order to increase the number of observations, for the combined group of fourth and fifth graders. Because baseline test scores were not collected from applicants then in kindergarten, no first grade results are reported.

Results varied somewhat from one grade to the next. After one year, sec-

ond grade scholarship recipients scored, on average, five percentile points higher in math than students in the control group; the difference was seven percentile points for those in fourth grade and five points for those in fifth. The impacts of school choice are much the same for reading. Second grade reading scores increased by four points; fourth grade scores increased just one point; fifth grade scores jumped by six points. The effects among third graders are -2.0 points in math and -3.0 in reading; these results are not statistically significant. We do not know why gains are not observed in grade three.

Because they are based on a larger number of observations and thus are more robust, the results for fourth and fifth grade students combined are worthy of special attention. For these students, the impact of a scholarship student's attendance in a private school is five percentile points in math and three points in reading.

Equal Opportunity

Some critics of school choice concede that test scores may improve, but they suggest that gains will be concentrated among the most advan-

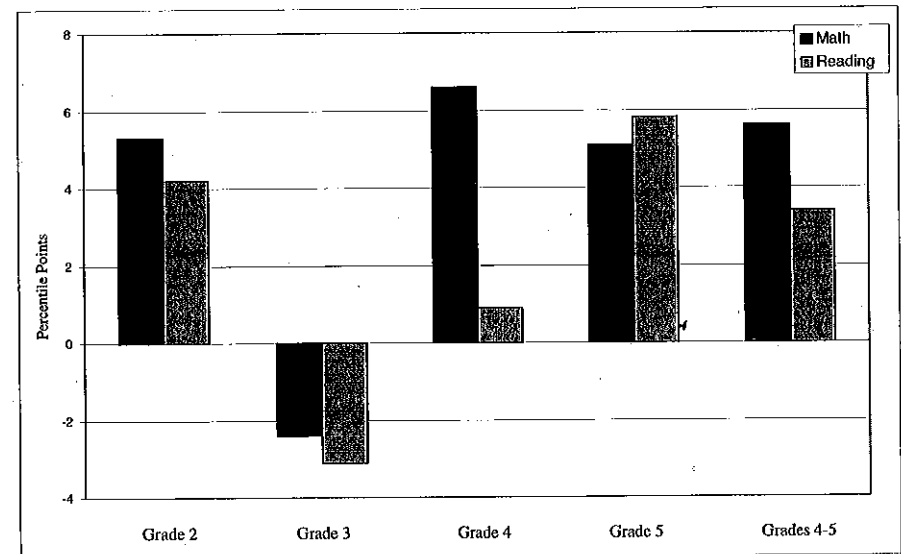


Figure 14.6. Test Score Gains from Attending a Private School (Percentile points by which private school students outperform control group in public schools)

taged, thereby increasing differences between higher-scoring and lower-scoring students.²² Better students may win access to higher-quality schools, the argument goes, while lower-scoring students are relegated to less effective schools. The net result may constitute aggregate gains, but these come at the cost of greater variations in student performance.

Some defenders of school choice, by contrast, have argued that the opposite will occur.²³ They point to the fact that public schools need only report summary test score statistics, and it is on this basis that they are judged; to maximize these aggregate scores, public schools focus on the more talented students, then place the less talented in special education classes and exclude them from high-stakes tests. Private schools, by contrast, need to keep all of their paying customers happy, or else they will leave. Students in private schools, thus, ought to receive roughly the same amount of attention, regardless of their ability level.

To test these competing hypotheses, we calculated the coefficient of variation, a measure of test score dispersion for student test scores at baseline and again at the end of the first year. By identifying the direction and amount of change in the coefficient of variation between test scores at baseline and at the end of the first year, it is possible to determine the extent to which test score gains are becoming more or less dispersed. A negative sign suggests that achievement differences among students are diminishing, a positive sign, obviously, suggests that differences are increasing. As can be seen in table 14.1, the coefficients declined—that is, scores were becoming more similar over time, in both public and private schools. In other words, neither public nor private schools are contributing directly toward greater inequality in ability levels. In five of the six observations, the drop is not statistically significant for the students who remain in public schools (the control group). The size of the decline varied between 0.00 and -0.05 in these cases, except for the reading scores of students in second and third grade, where the drop was a statistically significant -0.19. Among choice students, however, the decline in the coefficient was statistically significant in every case for math; the coefficients of variation then ranged between -0.14 and -0.39. The coefficients also declined in reading, but the differences were not statistically significant.

These findings suggest that school choice does not increase disparities among student performances, as critics have suggested; on the contrary, it appears to reduce them. Reformers sometimes disagree as to which is more important: raising test scores or reducing test score differences among students. If the results from New York can be generalized, school choice seems to do both.

TABLE 14.1 Distribution of Test Scores, New York

	Grades 2-5	Grades 2-3	Grades 4-5
Math			
Offered scholarship			
Baseline	1.18	1.12	1.21
Year 1	0.91	0.98	0.82
Change	-0.27** [781]	-0.14* [421]	-0.39*** [360]
Control group			
Baseline	1.05	1.10	0.98
Year 1	0.98	1.04	0.92
Change	-0.05 [670]	-0.05 [346]	-0.04 [329]
Reading			
Offered scholarship			
Baseline	0.99	1.04	0.89
Year 1	0.86	0.93	0.79
Change	-0.13* [781]	-0.11* [421]	-0.10 [360]
Control group			
Baseline	0.85	1.04	0.87
Year 1	0.85	0.85	0.85
Change	-0.00 [675]	-0.19* [346]	-0.02 [329]

Note: Figures represent coefficients of variation (standard deviation divided by the mean) using weighted data. Unweighted number of observations reported in brackets. Only those observations which have test scores at *both* baseline and after one year are included.

*Signifies difference between baseline and year 1 is statistically significant at the .1 level, 2-tail f-test conducted.

**Significant at the .05 level.

***Significant at the .01 level.

Interpretation

When reporting the effects of school choice on student achievement, *Education Week* labeled them "modest"; the *New York Times* found them "slight."²⁴ Whether or not the gains after one year amount to much depends in part on what happens in the years ahead. Nonetheless, there is reason to believe that these choice effects are already sufficiently large to be worthy of careful consideration.

Scholars typically calculate effect sizes in standard deviations. Although the concept can be confusing, one can grasp its essential quality by keeping in mind that one standard deviation approximates the current difference between the average test scores of blacks and whites nationwide. The

effects of school choice on students in fourth and fifth grade are roughly one-fifth of a standard deviation. If similar effects occur in subsequent years, and to the extent that voucher programs are targeted toward inner-city populations with a high concentration of minorities, this may provide an important step toward achieving equal educational gains across ethnic groups, which would clearly represent a major accomplishment.

IMPACT OF TEST SCORES ON EARNINGS. Nor are test scores a trivial matter, the hobgoblin of academic researchers. Studies show that students who score higher on standardized tests are more likely to remain in school, more likely to achieve a college degree, more likely to remain married and avoid welfare dependency, and more likely to enjoy a higher family income. According to the best available estimates, a gain of one standard deviation in test scores later in life will translate into a 20 percent increase in that person's future earnings.²⁵ By this measure, if students in the choice program in New York City simply hold the gains they have already achieved, their family incomes, on average, ought to rise 4 percent—or \$1,200 a year, if one assumes they would ordinarily have a modest annual income of \$30,000. If these estimates are reasonably accurate, the philanthropists in New York will realize an ample return on their dollar once these students enter the labor force.

COMPARISON TO TENNESSEE STUDY OF CLASS SIZE. Another way of thinking about the size of the effects of the SCSF program is to compare them to those of another intervention. Very few other educational innovations of interest have been subjected to a randomized experiment, but one, which examined the effects of class size reductions, has been subject to rigorous evaluation. It is worth comparing the results from the school choice experiment with the results from a class size reduction, because both innovations can be introduced rather straightforwardly by legislative action. (Other reforms, such as requiring students to do more homework, are obviously much more difficult to mandate by legislative fiat.)

The class size field trial was conducted in Tennessee, where students were randomly assigned to classes of different sizes. No incremental effects on student learning were observed for students after the first grade. Among first graders, effect sizes varied between .15 and .30 standard deviations (table 14.2). In his comment on these effects, Fred Mosteller, one of the experiment's evaluators, observed, "Although effect sizes of the magnitude of 0.1, 0.2, or 0.3 may not seem to be impressive gains for a single individual, for a population they can be quite substantial."²⁶

The effect sizes observed in our evaluation of the New York scholarship program in grades four and five do not differ materially from those observed in Tennessee in grade one. As can be seen in table 14.2, the effects among fourth and fifth graders of attending a private school were, on av-

erage, .23 standard deviation in math and .15 standard deviation in reading, not much different from the .2 to .3 effects observed in the first grade of the Tennessee study—the only grade for which incremental class size effects were detected. Following Mosteller's guidelines, these effect sizes, observed after just one year in the program, clearly warrant public attention.

COMPARATIVE COST-BENEFIT ANALYSIS. An investment in school choice programs is especially attractive once costs are taken into account. From a cost-benefit perspective, increasing school choice would seem to be preferable to decreasing class size. To get effects of about .2 standard deviations, class sizes were reduced from approximately twenty-five to approximately fifteen. If this were introduced as a school reform more generally, it would increase the size of the teaching staff and classroom space by 40 percent. Per pupil costs could be expected to rise by approximately 20 percent (assuming classroom costs constitute about half the cost of public schooling). By comparison, the per pupil cost of school choice is minimal; the taxpayer may in fact enjoy savings, if competition among schools leads to more efficient distribution of educational resources.²⁷

Moreover, the incremental benefits of reducing class sizes disappear after the first grade. If larger differences between the test scores of scholarship students and those in the control group appear in subsequent years in New York City, the benefits of school choice will clearly outstrip those obtained by large reductions in class size.

TABLE 14.2 A Comparison of School Choice and Class Size Reduction Effects on Student Test Scores

	<i>Effects of Being Offered Treatment</i>		<i>Effects of Receiving Treatment</i>	
	<i>Math</i>	<i>Reading</i>	<i>Math</i>	<i>Reading</i>
New York Scholarship Program				
Grade 4	0.21	0.10	0.27	0.12
Grade 5	0.16	0.23	0.18	0.27
Grades 4 & 5 combined	0.18	0.14	0.23	0.18
Tennessee School Size Study ^a				
Grade 1 ^b			0.32	0.30
Grade 1 ^c			0.15	0.25

Note: Effect sizes measured in standard deviations.

^aNo significant incremental effects detected, positive or negative, beyond the first year.

^bStanford Achievement Test.

^cTennessee Basic Skills First Test.

EXPLANATIONS FOR EFFECTS. When our findings were initially announced, Sandra Feldman, president of the American Federation of Teachers, offered the interesting hypothesis that we had documented what teachers' unions had been arguing all along, that smaller classes and schools increase students' test scores. "I see it as a validation of the need for small class sizes, and for smaller schools that are orderly and disciplined," she proclaimed.²⁸ The implication is clear. Test score gains have little to do with public and private schooling per se, for given the resources they require to reduce school and class sizes, public schools too could improve the test scores of inner-city children.

To test this hypothesis, we conducted a multivariate analysis in order to ascertain whether any of the following characteristics alone could account for the higher test score gains achieved by scholarship students:²⁹ class size, school size, discipline problems, school-parent communications, and/or the number of school programs and resources.

Data on these potential explanatory factors were available from the 1998 parent questionnaires. As we have seen, parents reported that private schools were superior in most respects, except that they had fewer programs and resources. To see whether these factors explain why school choice succeeds, we regressed test scores on all of these mediating variables, together with the key indicator variable that distinguishes the students who received a scholarship offer. The results are reported in tables 14.3 and 14.4.

When interpreting the results reported in these tables, it is important to recognize that the mediating variables—school discipline, school-parent communication, and class size—should not be included in an equation that is simply trying to detect whether school choice makes a difference for student achievement. Since the offer of a scholarship may cause an increase or decrease in these factors, it makes no sense to control for them when testing the effects of choice. On the other hand, it is interesting to see whether any one of them is the key factor connecting school choice to student learning. These two tables explore their potential as mediating mechanisms.

The lay person may read these two tables simply by star gazing. The more stars after a number, the more confident one can be that the relationships observed in the sample also exist in the population from which the sample is drawn, namely all potential applicants to an SCSF-type scholarship program. If a number does not have a star following it, one cannot be very confident that the observed result might not have appeared by chance alone.

When one examines the results for students in grades four and five, certain mediating factors have statistically significant effects on either reading or math scores. For example, class size affects math test scores. However, the direction of the effect is the opposite of what Sandra Feldman

TABLE 14.3 Explaining Test Score Achievement, Grades 4 and 5 (Math)

	<i>OLS Model</i>	<i>2SLS Model</i>
Estimated effect of scholarship offer ^a	4.19*	
Estimated effect of attending private school		5.59***
Scholarship offer	4.13*	
Attend private school		6.19*
School characteristics		
School size	0.82	1.23
Class size	1.59**	1.56**
Parent communications	5.43	4.20
Problems at school	-4.62	-4.55
Resources	5.60	6.59
Baseline test scores		
Math	0.53***	0.53
Reading	0.32***	0.32
Constant	1.81	4.30
(N)	(397)	(397)
Adjusted R ²	.52	.51

^aThis is the effect of offering a scholarship calculated using a fixed effects model with the only controls being baseline test scores and lotteries. For complete results, see Peterson, Myers, and Howell 1998.

Weighted, fixed effects models conducted, controlling for the 30 different lotteries held for applicants to the scholarship program. Unweighted number of observations reported.

*Significant at .10 level, two-tailed test.

**Significant at .05 level.

***Significant at .01 level.

hypothesized—all other things being equal, students learned more math in *larger* classes. Class size is measured by increments of five. The results show that, all other factors being equal, when classes had five more students, math scores increased by 1.6 percentile points, a modest effect that should not be overinterpreted, especially since class size had no effect on reading scores.

The other factors included in the estimate of the older students' test scores—school resources, discipline problems at school, and school-parent communications—are indices constructed from the items listed in figures 14.1, 14.4, and 14.6. In each case the index has been standardized so as to vary between zero and one.

Discipline problems at school and school resources had the largest and most consistent effect on reading test scores. Lower rates of discipline problems are associated with significantly higher test scores. More mater-

ial resources and programs also had a positive effect on reading scores. But other than class size, no factor significantly affected math scores. Based on these results, it appears that private schools create an improved learning environment is by creating a framework that generates fewer discipline problems. On the other hand, the public schools have the advantage of greater material resources and programs.

Most importantly, though, none of these mediating factors through which school choice may have been affecting test scores, nor all of them together, materially reduced the size of the effects of receiving a scholarship offer. As can be seen in tables 14.3 and 14.4, the sizes of the effects of a scholarship offer do not change significantly when these other mediating school characteristics are included in the analysis.

Perhaps the program's impact comes from the sheer fact of choice, the opportunity to better match older students with an appropriate school. Al-

TABLE 14.4 Explaining Test Score Achievement, Grades 4 and 5 (Reading)

	<i>OLS Model</i>	<i>2SLS Model</i>
Estimated effect of scholarship offer ^a	2.51*	
Estimated effect of attending private school		3.35***
Scholarship offer	2.95*	
Attend private school		4.43
School characteristics		
School size	-0.18	0.13
Class size	0.05	0.02**
Parent communications	5.58	4.70
Problems at school	-8.72***	-8.66***
Resources	12.06***	12.77***
Baseline test scores		
Math	0.20***	0.20***
Reading	0.68***	0.68***
Constant	-11.34	-4.14
(N)	(397)	(397)
Adjusted R ²	.60	.59

^aThis is the effect of offering a scholarship calculated using a fixed effects model with the only controls being baseline test scores and lotteries. For complete results, see Peterson, Myers, and Howell 1998.

Weighted, fixed effects models conducted, controlling for the 30 different lotteries held for applicants to the scholarship program. Unweighted number of observations reported.

*Significant at .10 level, two-tailed test.

**Significant at .05 level.

***Significant at .01 level.

ternatively, scholarship students may be learning more simply because they are surrounded by new peers with higher aptitudes. And perhaps there is some interaction of many factors that affects scores in ways not easily captured by a linear statistical model. What is immediately apparent is that the advantages of attending a private school are not readily reduced to any one or single set of factors. In the future we plan to further investigate the sources of test-score gains associated with a private education.

Conclusions: Implications for Education Reform

As we have pointed out, the advantages of attending a private school in New York City are not clearly evident until a student enters fourth or fifth grade. This finding is consistent with other indications that problems in American public education begin during the middle years of schooling. According to the National Assessment of Educational Progress (NAEP), students in fourth grade are performing at higher levels than their counterparts a generation ago. Gains over the past two decades have been particularly large for students from minority groups. But NAEP data also show that, after fourth grade, initial gains disappear. In fact, students nationwide learned less between fourth and eighth grade in the 1990s than they did in the seventies. The slippage seems even greater in high school.

Similarly, international comparisons reveal that U.S. fourth grade students keep up in science and math with most of their peers abroad (though not with the Japanese and Koreans). By eighth grade, however, U.S. students trail those in all other leading industrial nations, so much so that by twelfth grade they fall to around the bottom of all participating countries.³⁰ If the problems in American education develop in the middle years of schooling, perhaps it is at this point that the advantages that come with school choice are particularly evident.

Of course, this evaluation observes results after just one year. Our evaluation is scheduled to continue for two more years, and only time will tell whether the initial gains are maintained. And it remains to be seen whether school choice, if generalized to a larger population, will yield comparable gains. But the initial gains detected here make a strong case for the continued support of existing voucher programs and the initiation of larger ones, allowing us to deepen our understanding of the potential impact of school choice.

NOTES

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1. Recent works making a case for school choice include John E. Brandl, *Money and Good Intentions Are Not Enough, or Why a Liberal Democrat Thinks States Need Both Competition and Community* (Washington, D.C.: Brookings Institution, 1998); Andrew J. Coulson, *Market Education: The Unknown History* (New Brunswick, N.J.: Transaction Press, forthcoming); Clifford W. Cobb, *Responsive Schools, Renewed Communities* (San Francisco, Calif.: Institute for Contemporary Studies, 1992); and Alan Bonsteel and Carlos A. Bonilla, *A Choice for Our Children: Curing the Crisis in America's Schools* (San Francisco, Calif.: Institute for Contemporary Studies, 1997). A collection of essays that report mainly positive school choice effects is to be found in Paul E. Peterson and Bryan C. Hassel, eds., *Learning from School Choice* (Washington, D.C.: Brookings Institution, 1998).

2. Recent works criticizing school vouchers include Carol Ascher, Norm Fruchter, and Robert Berne, *Hard Lessons: Public Schools and Privatization* (New York: Twentieth Century Fund Press, 1996); Carnegie Foundation for the Advancement of Teaching, *School Choice: A Special Report* (Princeton, N.J.: Carnegie Foundation for the Advancement of Teaching, 1992); Amy Gutmann, *Democratic Education* (Princeton, N.J.: Princeton University Press, 1987); Henry M. Levin, "Educational Vouchers: Effectiveness, Choice, and Costs," *Journal of Policy Analysis and Management* 17, no. 3 (1998); Bruce Fuller and Richard F. Elmore, with Gary Orfield, eds., *Who Chooses? Who Loses? Culture, Institutions, and the Unequal Effects of School Choice* (New York: Teachers College Press, 1996); E. Rasell and R. Rothstein, eds., *School Choice: Examining the Evidence* (Washington, D.C.: Economic Policy Institute, 1993); Peter W. Cookson, *School Choice: The Struggle for the Soul of American Education* (New Haven, Conn.: Yale University Press, 1994).

3. Major studies finding positive educational benefits from attending private schools include James S. Coleman, Thomas Hoffer, and Sally Kilgore, *High School Achievement* (New York: Basic Books, 1982); John E. Chubb and Terry M. Moe, *Politics, Markets, and America's Schools* (Washington, D.C.: Brookings Institution, 1990); Derek Neal, "The Effects of Catholic Secondary Schooling on Educational Achievement" (University of Chicago, Harris School of Public Policy and National Bureau for Economic Research, 1996). Critiques of these studies have been prepared by Arthur S. Goldberger and Glen G. Cain, in "The Causal Analysis of Cognitive Outcomes in the Coleman, Hoffer, and Kilgore Report," *Sociology of Education* 55 (1982);

Douglas J. Wilms, "Catholic School Effects on Academic Achievement: New Evidence from the High School and Beyond Follow-up Study," *Sociology of Education* 58 (1985).

4. Frederick Mosteller, "The Tennessee Study of Class Size in the Early School Grades," *The Future of Children* 5 (1995).

5. Jennifer Hill, Donald B. Rubin, and Neal Thomas, "The Design of the New York School Choice Scholarship Program Evaluation," paper presented before the American Political Science Association annual meeting in Boston, Mass., August 31, 1998.

6. Paul E. Peterson, David Myers, William G. Howell, and Daniel Mayer, "An Evaluation of the New York City School Choice Scholarships Program: The First Year," Occasional Paper 98-12, Program on Education Policy and Governance, Taubman Center for State and Local Government, Kennedy School of Government, Harvard University, 1998. This report is available at the website: data.fas.harvard.edu/pepg/.

7. The response rate for those offered scholarships was 85 percent; for the control group, it was 80 percent. The response rate for those who used the scholarship was 89 percent; for those who did not, 66 percent. To adjust for nonresponse, we used adjusted sample weights (see Peterson, Myers, and Howell, "An Evaluation of the New York City School Choice Scholarships Program," appendix). Since the number of missing cases is relatively small and the characteristics of the missing cases do not differ markedly from observed cases, the assumptions necessary for utilization of this procedure are not particularly restrictive. We have adjusted the weights given to individual cases in order to account for differential response rates.

8. Paul E. Peterson, David Myers, Josh Haimson, and William G. Howell, "Initial Findings from the Evaluation of the New York School Choice Scholarships Program," Occasional Paper, Harvard Program on Education Policy and Governance, November 1997. This report is available at the website: data.fas.harvard.edu/pepg/.

9. The effects are estimated by means of a two-stage least squares regression in which the lottery outcome is used as the first-stage estimator. The procedure is discussed in Peterson et al., "Initial Findings from the Evaluation of the New York School Choice Scholarships Program."

10. Rachel Deyette, "Selection into Voucher Programs: How do Applicants Differ from the Eligible Population?," paper prepared for Program on Education Policy and Governance, Harvard University, 1998. Information is drawn from the Integrated Public Use Microdata Series data set of the U.S. Census, which has been created at the University of Minnesota.

11. Amy Stuart Wells, "African-American Students' View of School Choice," in *Who Chooses? Who Loses?*, ed. Fuller and Elmore, p. 47.

12. A summary of findings from earlier studies is available in Paul E. Peterson, "School Choice: A Report Card," in Peterson and Hassel, *Learning from School Choice*, p. 18. Mark Schneider, Paul Teske, Melissa Marschall, and Christine Roch, "Tiebout, School Choice, Allocative and Productive Efficiency," a paper prepared for annual meetings of the American Political Science Association, 1998, finds higher levels of parental satisfaction within New York City public schools when parents are given a choice of school.

13. Not all satisfaction measures are shown in figure 14.3. Some have wondered

whether the higher level of satisfaction with private schools is an artifact of a characteristic of our research design, namely, the comparison of scholarship recipients with families who had applied for a scholarship but did not receive one, a group that might be thought to be a group of "sour grapes." In Cleveland we tested the sour grape hypothesis but found no support for it: there were no significant differences in satisfaction levels between parents who applied for but did not receive vouchers and a cross-section of parents of students in public school. Paul E. Peterson, William G. Howell, and Jay P. Greene, "An Evaluation of the Cleveland Voucher Program After Two Years," Report Number 99-02. Program on Education Policy and Governance, Kennedy School of Government, Harvard University, 1999, table 3a.

14. Peterson, Howell, and Greene, 1999, table 3b.

15. John F. Witte, "First Year Report: Milwaukee Parental Choice Program," University of Wisconsin—Madison, Department of Political Science, and Robert M. La Follette Institute of Public Affairs, November 1991.

16. Dan Murphy, F. Howard Nelson, and Bella Rosenberg, *The Cleveland Voucher Program: Who Chooses? Who Gets Chosen? Who Pays?* (New York: American Federation of Teachers, 1997).

17. Jay P. Greene, William G. Howell, and Paul E. Peterson, "Lessons from the Cleveland Scholarship Program," in *Learning from School Choice*, ed. Peterson and Hassel, pp. 376–80.

18. John F. Witte, Andrea B. Bailey, and Christopher A. Thorn, "Second Year Report: Milwaukee Parental Choice Program," University of Wisconsin—Madison, Department of Political Science, and the Robert M. La Follette Institute of Public Affairs, December 1992, pp. 19–20.

19. These percentages may underestimate the actual rate of school mobility for both scholarship students and those in the control group. The families that did not attend questionnaire administration sessions probably were more likely to have moved, making it more difficult for evaluation staff to locate them. If so, the children in those families that could not be located would be more likely to have changed schools. In this regard, it is important to note that the response rate was less for the control group than for scholarship users.

20. Next in importance was the quality of the school, a response given by just four scholarship parents and seven members of the control group. Seven scholarship parents and four members of the control group said expense was a factor. Only three scholarship users and two members of the control group said their child had been expelled or suspended.

21. Results from these evaluations are reported in *Learning from School Choice*, ed. Peterson and Hassel.

22. "What mechanisms ensure that those students who need extra time and attention to do well receive this more costly instruction?" ask Carol Ascher, Norm Fruchter, and Robert Berne, *Hard Lessons: Public Schools and Privatization* (New York: Twentieth Century Fund, 1996), p. 9.

23. John Chubb and Terry Moe, "Effective Schools and Equal Opportunity," in *Public Values, Private Schools*, ed. Neil Devins (London: Falmer Press, 1989).

24. Lynette Holloway, "Pupils Using Vouchers Had Better Scores, Study Finds,"

New York Times, October 28, 1998; Jeff Archer, "N.Y.C. Voucher Students Post Modest Gains," *Education Week*, November 3, 1998.

25. Christopher Winship and Sanders Korenman, "Economic Success and the Evolution of Schooling and Mental Ability," in *Earning and Learning: How Schools Matter*, ed. Susan Mayer and Paul E. Peterson (Washington, D.C.: Brookings Institution, 1999); Christopher Jencks and Meredith Philips, "Aptitude or Achievement: Why do Test Scores Predict Educational Attainment and Earnings?" in *Earning and Learning*, ed. Mayer and Peterson.

26. Frederick Mosteller, "The Tennessee Study of Class Size in the Early School Grades," *The Future of Children* 5 (1995); Eric A. Hanushek, "Evidence on Class Size," in *Earning and Learning*, ed. Mayer and Peterson; Frederick Mosteller, "How Does Class Size Relate to Achievement in Schools?" in *Earning and Learning*, ed. Mayer and Peterson.

27. Caroline Minter Hoxby, "The Effects of School Choice on Curriculum and Atmosphere," in Susan B. Mayer and Paul E. Peterson, eds., *Earning and Learning: How Schools Matter* (Brookings, 1999), p. 281–316; Caroline B. Hoxby, "Does Competition Among Schools Benefit Students and Taxpayers?" *American Economic Review*, forthcoming.

28. Jeff Archer, "N.Y.C. Voucher Students Post Modest Gains," *Education Week*, November 9, 1998.

29. The effects of being offered a scholarship were somewhat less than the effects of actually using the scholarship to attend a private school. See Peterson et al., "An Evaluation of the New York City School Choice Scholarships Program," for a discussion of the ways in which we estimated the effects of being offered a scholarship and, separately, the effects of receiving a scholarship reported in the figures in this essay. In this section, we look at the effects of the other variables, controlling for the effects of being offered a scholarship.

30. Though the fourth graders trailed students in Japan, Korea, the Netherlands, and the Czech Republic, they did better than students in England, Norway, and New Zealand ("U.S. 4th Graders Score Well in Math and Science Study," *Education Week*, June 18, 1997, p. 22). The U.S. eighth graders clearly outscored only seven countries—Lithuania, Cyprus, Portugal, Iran, Kuwait, Colombia, and South Africa—none of them usually thought to be U.S. peers ("U.S. Students Rank about Average in 41-Nation Math, Science Study," *Education Week*, November 27, 1996, p. 32). United States National Research Center, "TIMMS High School Results Released," Michigan State University, College of Education, Report 8, April 1998; Paul E. Barton and Richard J. Coley, "Growth in School Achievement Gains from the Fourth to the Eighth Grade," Policy Information Center, Research Division, Educational Testing Service, Princeton, N.J., May 1998.