Small Schools, Large Districts: Small-School Reform and New York City's Students

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Background/Context: *High school reform is currently at the top of the education policy making agenda after years of stagnant achievement and persistent racial and income test score gaps. Although a number of reforms offer some promise of improving U.S. high schools, small schools have emerged as the favored reform model, especially in urban areas, garnering substantial financial investments from both the private and public sectors. In the decade following 1993, the number of high schools in New York City nearly doubled, as new "small" schools opened and large high schools were reorganized into smaller learning communities. The promise of small schools to improve academic engagement, school culture, and, ultimately, student performance has drawn many supporters. However, educators, policy makers, and researchers have raised concerns about the unintended consequences of these new small schools and the possibility that students "left behind" in large, established high schools are incurring negative impacts.*

Research Design: *Using 10 years (1993–2003) of data on New York City high schools, we examine the potential systemic effects of small schools that have been identified by critics and researchers. We describe whether small schools, as compared with larger schools, serve an easier-to-educate student body, receive more resources, use those resources differently, and have better outcomes. Further, we examine whether there have been changes in segregation and resource equity across the decade contemporaneous with small-school reform efforts.*

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Findings/Results: *We find that, although small schools do have higher per-pupil expenditures, lower pupil-teacher ratios, and a smaller share of special education students than larger schools, their students are disproportionately limited English proficient and poor, and their incoming students have lower test scores. Thus, the evidence is mixed with respect to claims that small schools serve an easier-to-educate student body. Systemwide, we find that segregation is relatively stable, and although there have been some changes in the distribution of resources, they are relatively modest.*

Conclusions/Recommendations: *If small schools do eventually promote higher achievement (considering their student mix and other factors that differentiate them from larger schools), many more will be needed to house the 91.5% of the students still attending large schools. Otherwise, strategies that work for the vast majority of students who do not attend small schools will need to be identified and implemented.*

INTRODUCTION

High school reform is currently at the center stage of education policy making, coming on the heels of nearly a decade of reform focused on elementary and middle schools. With stagnant National Assessment of Educational Progress (NAEP) scores at the high school level, persistent racial and income achievement gaps, and low graduation rates in urban areas, federal, state, and local policy makers are calling for changes in curriculum, standards, and accountability.[1] As an example, in the latter half of 2004, President Bush championed an extension of No Child Left Behind's testing and accountability standards into high schools (Cavanagh & Davis, 2004; Kornblut, 2005). Additionally, in February 2005, the National Governors Association joined with Achieve, Inc. to convene a national education summit on high schools, bringing together the governors of 45 states, corporate executives, and educational leaders to focus on problems related to the nation's high schools.[2]

Although a plethora of reforms have been suggested to improve U.S. high schools, in urban districts, the "small school" reform model is particularly popular. In large part, small-school reform is rooted in the success of New York City's small-schools initiative of the mid-1990s and reinvigorated in 2003 with a new systemic effort to create 200 new small high schools within the next several years.[3] At the same time that numerous small schools are being formed, some educators, policy makers, and researchers express concerns about the unintended consequences of these new schools and, particularly, the possible impacts on students "left behind" in large, established high schools. Although based on limited evidence, the criticisms touch on a wide range of issues that, as one critic stated, "deleteriously impact(s) tens of thousands of the system's stu-

dents" (Bloomfield, 2006). A key concern is that the creation of new small schools exacerbates overcrowding in large high schools, leading to increased violence and absenteeism and a reduction in the academic progress in those schools. In a similar vein, critics claim that small schools receive more funding and serve fewer students with specialized educational needs, such as English language learners and special education students, than larger schools. Despite preliminary reports indicating that the new small schools in New York are producing better outcomes (Herszenhorn, 2006) in terms of attendance, we know little about the impact of such reforms on school districts as a whole.

New York City's rich history of small-school reform dates back to the 1960s, but the reforms of the mid-1990s and those currently under way afford a unique opportunity to examine the impact of small schools on a school system as a whole. Within just a decade, high school education in New York City has undergone dramatic change. Although the number of high school students remained relatively constant between 1993 and 2003, the number of high schools soared from 122 to 238, with a concomitant drop in the enrollment of the average high school from 2,179 to 1,220. As critics and researchers have noted, this change in numbers and sizes of schools may have affected segregation of students, distribution of resources, and outcomes for all the district's students. This study addresses these topics with a longitudinal descriptive analysis of the differences in the students, resources, and academic outcomes among schools of varying sizes, as well as potential systemic effects that may have accompanied the introduction and expansion of small schools in New York City, such as changes in segregation or equity in resources.

The remainder of the article is organized as follows. The second section presents background on the most recent New York City high school reform efforts. The third section provides a review of the literature on benefits, costs, and systemic effects of small schools. The fourth section describes our data and methods, followed in the fifth section by a discussion of results. The final section summarizes and concludes.

BACKGROUND

New York City is the largest public school district in the United States. With more than one million students, it is almost 50% bigger than the Los Angeles Unified School District and twice the size of the Chicago Public Schools district. As shown in Table 1, however, all these large districts share lagging graduation rates and large high schools. In 2002, whereas the average American high school enrolled 783 students, students in Chicago, LA, and New York attended much larger schools; the

average high school in Chicago enrolled more than 1,100 students, in Los Angeles nearly 1,600, and in New York over 1,200 students. Thus, it should be noted that in all these cities, significantly reducing the average high school size will require significant investments, whether the goal is to reach the national average (783) or to reach even more ambitious goals of 300 or 500.

Table 1. New York City in Context, 2001–2002

	U.S.	New York State	Chicago	Los Angeles	New York City
Number of high schools[1]	17,545	787	90	136	232
Enrollment, high schools[2]	13,735,868	854,790	100,243	215,463	286,552
Total enrollment[2,3]	47,533,802	2,872,132	437,418	735,058	1,049,831
Average high school size	783	1,087	1,114	1,584	1,235
Total district expenditures per pupil[4]	9,319	13,822	9,121	9,096	13,815
High school graduation rate[5]	69.6	71.6	44.7	NA	49.7

Notes:

[1] Number of high schools (defined as those with low Grade 7 and high grade up to 12) in the U.S. and by state, school year 2001–2002, Table 3, "NCES Overview of Public Elementary and Secondary Schools and Districts: School Year 2001–02" (http://nces.ed.gov/pubs2003/2003411.pdf). Includes special education, vocational, and alternative education schools. Number of high schools (defined as those with low Grade 7 and high grade up to 12) for Chicago, Los Angeles, and New York City from National Center for Education Statistics, Common Core of Data (CCD) for 2002–2003.

[2] New York State and U.S. total elementary and secondary enrollment, fall 2001, Table 37, "Digest of Education Statistics, 2003" (http://nces.ed.gov/programs/digest/d03/tables/dt037.asp). Total high school enrollment for Chicago, Los Angeles, and New York is for 2002–2003, from NCES, CCD. High schools defined as those with low Grade 7 and high grade up to 12.

[3] Total fall 2001 elementary and secondary enrollment from CCD, NCES, 2001–2002.

[4] Not cost adjusted. Expenditure data reported in NCES, CCD, 2001–2002.

[5] 2000–2001 graduation rates for U.S. from Educational Testing Services "One-Third of a Nation: Rising Dropout Rates and Declining Opportunities." 2001–2002 individual district and state graduation rates from CCD, NCES. Los Angeles' graduation rate not available because of missing dropout data. Four-year completion rate calculated as per Table 5, "State Public High School Dropouts and Completers from the Common Core of Data" (http://nces.ed.gov/pubs2004/dropout00-01/table_5.asp#12).

New York City is an especially appropriate location to study the systemic impact of small schools because of the long history and vibrancy of its small-schools movement. Moreover, despite the district's unusual size, the intense competition for alternative uses of education resources and the many competing ideas on how to reform education reflect the circumstances faced by other large urban school districts. The scale of New York City's efforts, however, outpaces those of other urban districts that have a

similarly rich history of creating smaller learning communities, such as Oakland (New Autonomous Schools initiative) and Chicago (Small Schools Workshop). The extraordinary popularity of small-school reform, in varying stages of development across the nation's urban districts, however, necessitates reflection on the implications of such reforms that this study of New York City offers.[4]

Three distinct waves of small-school creation are evident in New York City over the past four decades. The first wave began in the late 1960s with the creation of alternative and experimental small schools, serving students who did not succeed in traditional high school settings. The schools were alternative not only with respect to size but also in terms of organization, curriculum, and instruction. The second wave of small schools in the mid-1990s emerged as a more broadly conceptualized reform and included second-chance and college preparatory schools. During this second wave, 40 small schools were created in New York City (Stiefel, Berne, Iatarola, & Fruchter, 2000). The third (current) wave is far more expansive than the previous two and is intended as a systemwide reform, transforming secondary public education across the city by closing or transforming large high schools that no longer serve the needs of students, and creating small schools instead. Under the New Century High Schools initiative, funded by the Carnegie Corporation of New York, Gates Foundation, and Open Society Institute and managed by New Visions for Public Schools, 78 small high schools have already been created through 2003–2004, with 15 more planned.

Supporters of small schools highlight the potential that such reform offers students. The research on small schools, however, in terms of the effects of size on outcomes, broadly conceptualized, and on costs, suggests a less certain perspective on the potential advantages of small schools.

LITERATURE

Research on the effects of school size on outcomes and costs yields unsatisfying evidence on the impact and efficacy of small schools as a reform tool. Much of the research is characterized by weak research designs—insufficiently addressing the potential bias from the self-selection of students and teachers into schools of varying sizes, for example, or with limited generalizability (Page, Layzer, Schimmenti, Bernstein, & Horst, 2002). Even more important, however, is that virtually all the research focuses on the relative merits of small schools compared with large schools or on the relationship between outcomes and size, rather than on the effects of these reforms on the district or system as a whole. Put

simply, the systemic effects of small schools have not been previously addressed; we do not know if students who remain in larger schools are better or worse off as the number of small schools increases. That said, several critiques and concerns have been articulated about the impact of small-school reforms on the host district. In this section, we review research on the effects of school size on student outcomes, including intervening factors, and costs, as well as for whom small schools work, to gain some insight into what systemwide effects might be expected, particularly with respect to student performance, segregation, and resource equity. We then turn to review some of the major critiques about the small schools expressed, albeit with little supporting research.

PRIOR RESEARCH ON SMALL SCHOOLS

The large comprehensive high schools that we are familiar with today were developed at the turn of the century, partly as a response to criticisms of small, most often rural, schools offering an insufficiently broad or demanding curriculum for students (Conant, 1959; Hammack, 2004). In contrast, small schools are thought to promote higher academic achievement and better student outcomes, perhaps through the more personal school climate. Small schools, for example, may boost students' sense of belonging because teachers know students better, which may in turn reduce violence (Barker & Gump, 1964). Or, small schools may have higher academic expectations because teachers are better able to address individual intellectual, social, and emotional needs. Students may be more likely to participate in extracurricular activities. On the other hand, larger schools may be able to offer greater breadth and depth in curriculum than small schools, implying a set of academic benefits. In the end, which effect dominates is essentially an empirical matter.

Several reviews of the school size literature find positive effects of small schools on student achievement and factors that mediate achievement (Cotton, 1996, 2001; Fowler, 1992; Page et al., 2002; Raywid, 1996, 1999; Ready, Lee, & Welner, 2004). The research record is, however, somewhat mixed. For example, Haller, Monk, Spotted Bear, Griffith, and Moss (1990) found that larger schools do offer more comprehensive curricula, but Monk and Haller (1993) found that the relationship between size and course offerings is not as strong in urban areas and in schools with a teachers' union. Barker and Gump (1964) reported that the number of extracurricular activities is greater in large schools compared with smaller ones, but the breadth of activities does not differ. Additionally, Lindsay (1982) found that students in small schools are more likely to participate in school activities, are more satisfied with school, have lower

dropout rates, and have higher attendance rates. Haller (1992) observed that poor student behavior is associated with larger school sizes, whereas Watt (2003) found some evidence of higher levels of adolescent depression and violence in smaller schools. Pittman and Haughwout (1987) found that school size influences school climate, which has an effect on dropout rates. More recently, Lee and Burkam (2003), using the High School Effectiveness Supplement to the National Educational Longitudinal Study (NELS), found that students in schools with fewer than 1,500 students are more likely stay in school than students in larger schools.[5]

There is a large and growing literature on the relationship between cost and school size as new data and improved methods offer new insights. There seems to be a broad consensus on the theoretical relationships, if not the empirics: Some economies of scale are likely to be gained from larger schools, but at some size, decreasing returns or diseconomies of scale will emerge because of limits in managerial ability, for example, and per-pupil costs will rise. (For a similar discussion with respect to the size of school districts, see Andrews, Duncombe, & Yinger, 2002.)

Empirical work on the relationship between costs and size yields different estimates of the minimum cost size. In an early paper, Cohn (1968) found a U-shaped high school cost curve, with the minimum cost at 1,500 students. Riew (1986) found declining expenditures in middle schools with enrollments as large as 1,024, but at the elementary school level, the lowest expenditures were in schools of 200–400 students. In earlier work, Riew (1966) concluded that the existence of economies of scale is unclear beyond 900 high school students. More generally, previous studies offer conflicting evidence on the relationship between size and average costs (Bee & Dolton, 1985; Callan & Santerre, 1990; Chabotar, 1989; Kumar, 1983; Watt, 1980), but none finds increasing costs in high schools under 900 students (Andrews et al., 2002). More recently, Stiefel, Berne, Iatarola, and Fruchter (2000) found that costs of small high schools (fewer than 600 students) are about the same as large high schools when considered on a per-graduate basis. Kuziemko (2006) roughly estimates that a 50% decrease in school size leads to a 20% increase in costs but that the return on the additional costs yields a net benefit of $3,298.

Several researchers find that large schools have particularly negative effects on low-income and racial and ethnic minority students.[6] Thus, small schools may better serve disadvantaged students, increasing their absolute achievement levels (Bickel, Howley, Williams, & Glascock, 2001; Howley, Strange, & Bickel, 2000) and reducing achievement gaps between the advantaged and disadvantaged students (McMillen, 2004). Fowler and Walberg (1991) and Fowler (1992) concluded that schools of

roughly 1,500 students or fewer show superior outputs for minority and poor youth. Similarly, Lee and Smith (1995) suggested that school size matters most to the equal distribution of achievement gains across socioeconomic groups.[7]

SMALL SCHOOLS ON A LARGE SCALE: THE SYSTEMIC EFFECTS OF SMALL-SCHOOL REFORMS

Despite the large literature examining the relationships between school size and school outcomes and costs, our study is the first to consider the systemic effects of small-school reform, particularly, the impact on the school district and the students enrolled in large schools elsewhere in the district. To do so, we draw on several nonempirical critiques of small schools that have emerged as the number of small schools has increased.

Of particular concern is the potential impact of the new small schools on the existing large schools. Herszenhorn (2005) and Bloomfield (2005, 2006), for example, reported that the largest schools in New York City have become overcrowded as the number of small schools increases, raising concerns about insufficient space for key activities and the possibility of increased violence (Bloomfield, 2005, Robelen, 2006). These effects may be compounded by shifts in the racial and ethnic makeup of the larger school as it absorbs students from other large schools closed as part of the small-school reform (Banchero, 2006).

Another concern is about school resources. According to Herszenhorn (2005), administrators in large high schools worry that their schools are receiving fewer resources and less support because of the expansion of small-school efforts. In Seattle, the superintendent has proposed closing small schools as the district faces a budget shortfall (Bhatt, 2005). In Los Angeles, it has been suggested that small schools are a drain on the district's resources and create fiscal disparities as resources and "good" teachers are diverted to small schools (Merl, 2005). Ravitch (2005) questioned whether small schools will be able to "provide highly qualified teachers," particularly in the areas of math and science.

Further, small-school reform may create unintended consequences for equity and segregation. That is, increases in the segregation of students and teachers may also emerge because the increase in the number of schools offers increased opportunities for sorting along demographic, socioeconomic, or academic lines (Paulson, 2002). If increased segregation does occur, then disparities in resources across schools may translate into inequities along racial and ethnic lines as well.

Notice that, although there is little specific evidence on the impact of small-school reform, other literatures and experiences are instructive. In

particular, Bradford and Oates's (1974) examination of fragmentation in local governments suggests that increasing the number of local governments in an area may lead to sorting by demand for public services. Put simply, the more local governments there are in an area, the more opportunity there is for people to sort. As fragmentation increases, there is more opportunity for sorting by income and its close correlate, race. Cutler and Glaeser (1997) found empirical support for this. Moreover, critics of the small-schools movement suggest that a higher number of schools offers more opportunity to segregate along racial or income lines and for inequity in school resources.

Recent evidence is troubling. Orfield and Lee's (2004) study of school segregation found a resegregation of schools during the 1990s in states that had been highly desegregated at the end of the 1980s. Further, they found that in 2001, New York was one of the most segregated states for Black and Hispanic students according to two different measures: the exposure to White students and the percent minority in majority White schools. Clotfelter (2001, 2004) also found that school racial segregation is increasing, although within-district segregation is declining, leaving most segregation attributable to between-district sorting.

At the same time, recent research reveals significant within-district disparities in resources across schools, with each school's allocation reflecting a combination of politics, cost differentials, and myriad decisions made by school leaders, teachers, and parents. Although there is mixed evidence on whether resources—and which ones—affect student achievement, from an equity-of-inputs standpoint alone, the people with whom a student attends school might affect the resources received by a district within a state (Stiefel et al., 2005) or by a school within a district (Iatarola & Stiefel, 2001). Thus, the concern about the impact of small-school reform on segregation and resource disparities is well grounded in the literature and worthy of investigation, to which we now turn.

HYPOTHESES

To summarize, prior research and policy debate suggest several hypotheses with respect to small schools. These hypotheses fall into two groups: small schools in comparison with large schools, and small schools' systemwide effects.

As compared with larger schools, small schools:

- Serve an easier-to-educate student body ("cream-skimming")
    - lower share of special education students
    - lower share of poor students

    - lower share of limited English proficient (LEP) students
    - higher test scores at intake
- Serve a student population that differs demographically from the students attending large schools
    - differential shares of students with respect to race/ethnicity
    - differential shares of students in terms of gender
- Receive more resources
    - more spending per pupil overall
    - qmore instructional spending per pupil
    - fewer pupils per teacher, suggesting smaller class sizes
    - better teachers (e.g., experience)
- Have better student outcomes
    - higher graduation rates
    - higher SAT test taking and scores
    - greater percentage of students passing English and math Regents exams

As part of a system, small schools:

- Increase segregation by poverty, English proficiency, recent immigrant status, and race
    - Isolation is greater
    - Exposure is lower
- Increase resource inequity

We examine the evidence for each of these hypotheses in turn, first by comparing small schools with larger schools, and second by considering the systemwide effects of the introduction of small-school reforms.

METHODS AND DATA

In this study, we provide a descriptive analysis of New York City's public high schools, exploring differences across sizes and examining the changes in the schools over a decade (1993–2003). We then analyze the implications of changes for segregation and resource equity. We address three methodological challenges: categorizing schools by size, distinguishing small schools from medium-sized and large schools; measuring segregation; and measuring inequity.

Defining small. The first step is to distinguish a set of small schools from the others. Although "small" schools are the centerpiece of secondary school reform in New York City and have drawn national attention, there are differing notions of what is meant by "small." Although the federal

government's Small Schools Initiative defines a limit of 300 students, the current Gates-funded initiative in New York City defines a substantially larger limit of 500 students. In contrast, Stiefel et al. (2000) followed the then-current New York City designation of 600 students or fewer in their study of the cost of small schools. Finally, Lee and Smith (1997), in their study of school size, found schools in the range of 600–900 to be most effective for minority students. In keeping with these alternative definitions, we distinguish five groups of schools: 0–300 (National Center for Education Statistics [NCES] cutoff); 301–500 (Gates Foundation and NYCDOE cutoff); 501–1,200 (medium); 1,201–2,000 (large); and 2,001 plus (very large).[8]

Measuring segregation. We use two measures of segregation to examine whether changes in segregation are contemporaneous with or subsequent to the second and the beginning of the third waves of reform: the isolation index and the exposure index. Although segregation indexes such as the Dissimilarity Index (D) are often used to measure unevenness in the distribution of racial groups across schools, these indexes are sensitive to the number and size of schools (Cortese, Falk, & Cohen, 1976). The isolation and exposure indexes are not similarly sensitive and give useful insight into intergroup contact.

The isolation index focuses on the extent to which students attend school with other students from their own group. It is calculated for subgroup *g* as follows:

$$I = \sum_{i}^{N} (g_i / G) \times (g_i / t_i)$$

where *i* indexes high schools, *g* is the respective subgroup of interest in the school (*G*, in the district) and *t* is the total student enrollment in the school.[9] The index ranges from nearly 0 to 1, with 1 representing total isolation of the group. The index captures the proportion of the students in the school attended by the group's average student. For example, an isolation index of 0.2 for recent immigrant students means that the average recent immigrant student attends a school in which 20% of the students are recent immigrants. An isolation index of 1 means that all the student's schoolmates are members of the same group—if, say, all recent immigrants attended a newcomer school with other recent immigrants.

The exposure index offers a slightly different perspective, comparing two groups of students and their typical setting. The index is calculated as follows:

$$E = \sum_i \left(\frac{w_i}{W}\right)\left(\frac{b_i}{t_i}\right)$$

where i indexes schools and, for example, w is the number of White students in school i divided by the number of White students in the district (W). The ratio is multiplied by a second ratio of Black students (b) in school i to all students (t) in school i. The index ranges from 0 to the maximum value that equals the percent of Black students in the district, in this example. The index can be interpreted as the average percent of Black students in the school of the typical (average) White student. For example, an exposure index of 0.22 for White and Black students means that 22% of the students in the school of the "typical" White student are Black. If the percent of Black students in the district is greater than the index, then segregation is indicated. As an example, if 35% of the students in a district are Black, an exposure index of Whites to Blacks of 22% suggests that the distribution of Black students (and White students) is uneven across schools—there is some segregation. An exposure index of 0 indicates total segregation of the two groups.

Measuring inequity. We measure the dispersion of resources across students using the coefficient of variation to examine whether changes in resource distribution are concurrent with small-school reforms.[10] The coefficient of variation for any resource is defined as the standard deviation divided by the mean, and it indicates the size of the interval around the mean that captures the resources received by roughly two thirds of the students.[11] Although there are many dispersion measures available, the coefficient of variation is particularly attractive because of its relative ease of interpretation, common usage, and benchmark values set by other researchers. For example, Odden and Picus (2003) identified a coefficient of variation of 10% as defining an equitable distribution of resources across school districts in a state. That said, how high is "too high" remains, to some extent, a subjective question.[12]

DATA AND SAMPLE

We draw on three sources of publicly available school-level data from 1993 to 2003 on New York City's public high schools, published by the New York City Department of Education: *Annual School Reports* (ASR), *4-Year Longitudinal Reports* (Cohort), and *School-Based Budget/Expenditure*

Reports (SBER). The ASRs include information on school, student, and teacher characteristics and student outcomes, the percentage of enrolled students who are black, Hispanic, Asian and White; female; limited English proficient (LEP); recent immigrant; and in special education.[13] The SBER data provide richly detailed information on school-level spending.[14] The Cohort reports include information on the status of entering ninth graders four years after they enter high school, providing graduation, dropout and "still enrolled" rates.[15]

We measure resources using both spending data and (limited) information on teachers, including the percentage of teachers who are licensed, who are experienced (5 or more years of teaching experience), who hold master's degrees, and who are new to the school (teaching in the school less than 2 years), as well as the average number of days absent.[16] Average teacher salary and pupil-teacher ratios provide different perspectives on teacher resources.[17] We consider spending in two categories, distinguishing instructional and noninstructional expenditures. Instructional resources include expenditures for classroom instruction (for example, teachers, educational paraprofessionals, and summer and evening programs) and instructional support (not shown). Noninstructional expenditures at the school level include leadership, supervision and administration, ancillary (e.g., food services and transportation), and building (e.g., leases, custodial services, building maintenance, and energy costs). Noninstructional expenditures at the superintendent and system levels are distinguished as well.[18]

Our key outcome measure is the graduation rate, calculated by cohort. Although there are a number of ways to calculate graduation rates,[19] there is some consensus that one of the most informative measures is based on the cohort in which the student entered high school. For over a decade, New York City has reported graduation and dropout rates on a cohort basis, tracking students from the time they enter ninth grade to their status 3 years (or more) later (4-year rate) and calculating graduation and dropout rates for the cohort.[20]

Although graduation rates may be the most important outcome for high schools, we also examine the percent of students taking the SAT and their SAT scores, and the percent of students passing the New York State Regents exams in English and mathematics, the first of the Regents-level exams to be required of all students as part of the state's new graduation requirements that began in 1999–2000.

Our sample consists of public high schools in New York City, excluding six with enrollments fewer than 30 students and eight with a preponderance of missing data.[21]

RESULTS

In this section, we provide an overview of changes in school and student characteristics from 1993 to 2003 to give a context for, and illuminate, the magnitude of New York City's small-school reforms over the past decade. We then examine the implications of the formation of small schools as systemic reform by exploring the differences in student characteristics, school outputs, and resources across schools of different sizes to examine whether small schools, as compared with larger schools, serve an easier-to-educate student body, receive more resources and use those resources differently, and have higher outcomes. Further, we examine the extent to which there have been changes in segregation and resource equity across the decade that mirror small-school reform efforts.

PERSPECTIVES ON A DECADE: NEW YORK CITY HIGH SCHOOLS, 1993-2003

From 1993 to 2003, the number of high schools nearly doubled, from 122 to 238. As shown in Table 2, this continuing growth is marked by two spurts, with an increase of 53 schools from 1994 to 1995, and 27 schools from 2002 to 2003, reflecting the second and third (current) waves of small-school reform in New York City. At the same time, the number of high school students peaked in 1998, ending the decade 9% larger. Increasing the number of schools with only modest changes in enrollment meant that school size declined considerably. The average high school enrollment decreased from 2,179 to 1,220 or by 44.0% over the decade. Importantly, this decline largely reflects the addition of small-sized schools rather than a decrease in the size of existing schools. Thus, median school size decreased from 2,302 in 1993 to 645 in 2003, and the rate of decline in the size of schools at two ends of the spectrum (10th and 90th percentiles) differed markedly. Schools at the 10th percentile declined by 68%, and schools at the 90th percentile declined by only 9%. Although many smaller schools were created, the largest schools remained quite large.

Consider the distribution of students across schools of different sizes. As shown in Figure 1a, 1993 saw most students enrolled in large schools: Just over 1% attended one of the 14 very small or small schools (< 500), with 94% of the students enrolled in 92 large and very large schools (1,200+). As shown in Figure 1b, by 1998, the second wave of small schools had begun to have an impact. Approximately 7% of students were enrolled in small or very small schools (representing 38% of all high schools, not shown), whereas 83% of students were enrolled in large or

Table 2. Overview of New York City High Schools, 1993–2003

School year, annual percent change	Schools	Students	School Size			
	Total	Total	Mean	10th Percentile	Median	90th Percentile
1993	122	265,885	2,179	450	2,302	3,562
1994	123	270,616	2,200	385	2,234	3,754
'93–'94 % Change	0.82%	1.78%	0.95%	-14.44%	-2.95%	5.39%
1995	176	277,758	1,578	129	1,235	3,510
'94–'95 % Change	43.09%	2.64%	-28.27%	-66.49%	-44.74%	-6.50%
1996	180	282,935	1,572	211	1,051	3,571
'95–'96 % Change	2.27%	1.86%	-0.40%	63.57%	-14.86%	1.72%
1997	197	293,589	1,537	196	1,040	3,683
'96–'97 % Change	9.44%	3.77%	-2.21%	-7.11%	-1.05%	3.15%
1998	198	296,296	1,519	235	937	3,551
'97–'98 % Change	0.51%	0.92%	-1.15%	19.90%	-9.90%	-3.58%
1999	191	284,065	1,487	252	994	3,493
'98–'99 % Change	-3.54%	-4.13%	-2.12%	7.23%	6.08%	-1.63%
2000	213	284,169	1,353	201	747	3,388
'99–'00 % Change	11.52%	0.04%	-9.01%	-20.44%	-24.90%	-3.02%
2001	209	283,691	1,357	236	734	3,325=
'00–'01 % Change	-1.88%	-0.17%	0.31%	17.71%	-1.67%	-1.85%
2002	211	279,934	1,346	274	786	3,218
'01–'02 % Change	0.96%	-1.32%	-0.85%	16.10%	7.08%	-3.22%
2003	238	290,337	1,220	142	645	3,229
'02–'03 % Change	12.80%	3.72%	-9.36%	-48.18%	-18.00%	0.34%
% Change, 10 years	95.08%	9.20%	-44.03%	-68.44%	-72.00%	-9.35%

Note: All high schools with at least 30 students are included in the analysis. Eighteen schools are excluded, 8 with enrollment under 30, and 10 for which a preponderance of data are missing.

very large schools (75% of all high schools). With the third wave of small reforms taking root in 2003, as shown in Figure 1c, the percentage of students in very small and small schools increased by one percentage point, to 8% of the high school student population, with 77% of students enrolled in large and very large schools. At the same time, the share of students enrolled in medium-sized schools grew threefold over the decade. Thus, two basic conclusions emerge: First, the system changed significantly over the decade, and second, despite the substantial expansion in the number of small schools, almost two thirds of the high school students in the city still attended one of the very largest schools

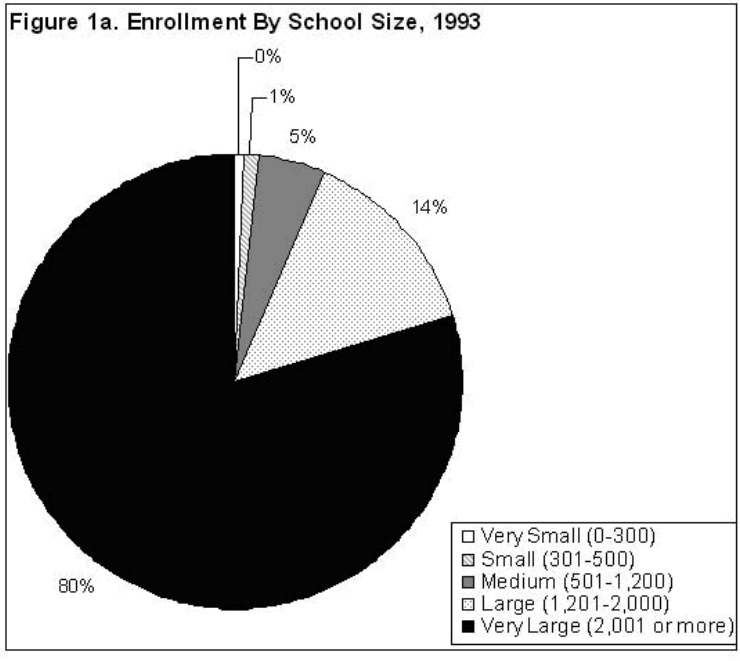


Figure 1a. Enrollment By School Size, 1993
0%
1%
5%
14%
80%
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

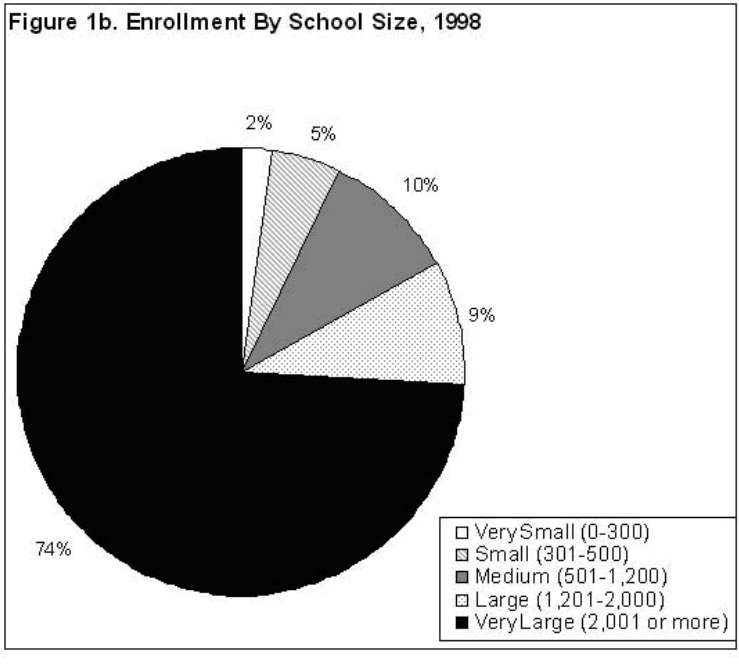
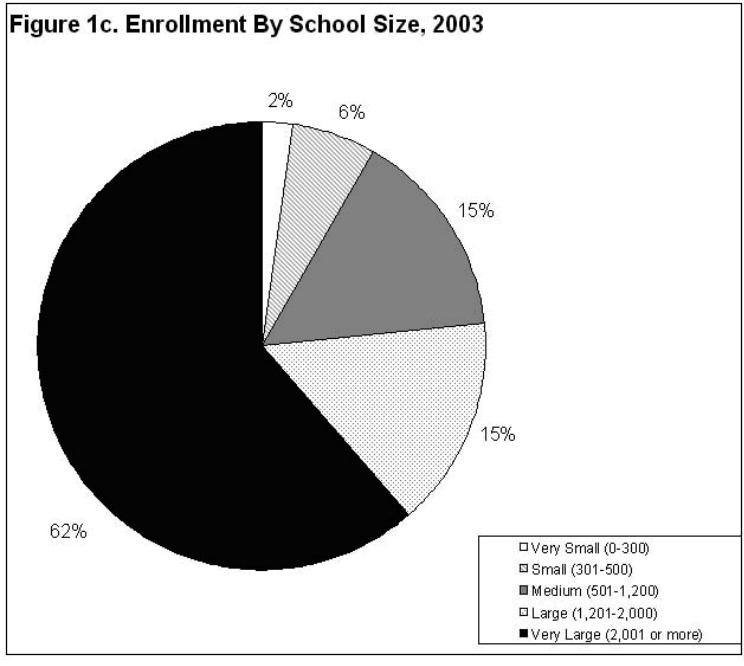


Figure 1b. Enrollment By School Size, 1998
2%
5%
10%
9%
74%
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

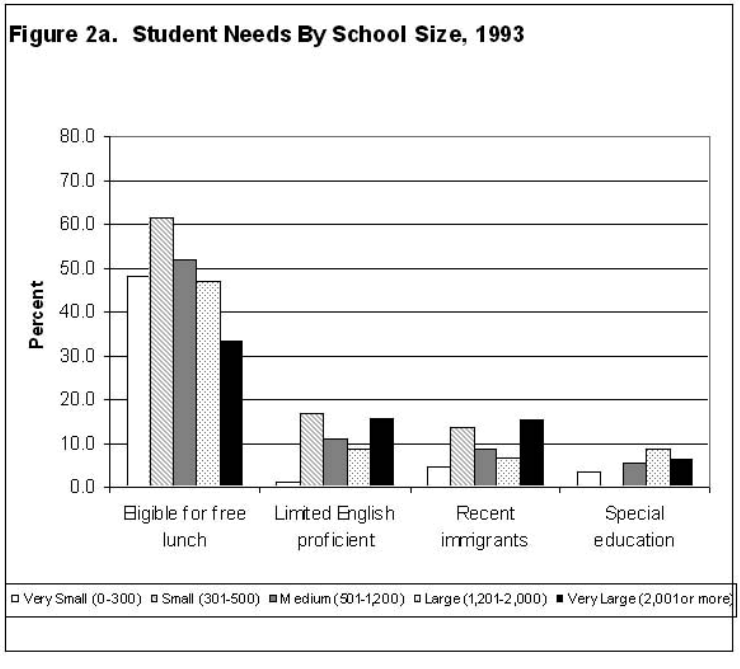


(comprising 24% of all high schools), and roughly three quarters attended a school considered large by most standards.

HOW DO SMALL SCHOOLS DIFFER FROM LARGE SCHOOLS?

Comparing Students. Do small schools capture the "easiest" students to educate, leaving poor, special education, LEP, and lowest performing students to the larger schools? As shown in Figures 2a–2c, in 1993, with the exception of the very smallest schools ($n = 6$), the percentage of students eligible for free lunch (henceforth "poor") was higher in smaller schools than in large schools, with the largest schools having the lowest percentage of such students.[22] On the other hand, small and very large schools were quite similarly composed of LEP and recent immigrant students, and very small and small schools had lower percentages of special education students than their larger counterparts. In 1998, the small schools served lower percentages of LEP and recent immigrant students and continued to serve lower percentages of special education students as compared with the large and very large schools, but by 2003, small schools

once again served roughly similar percentages of LEP and recent immigrant students, although still lower percentages of special education students than larger schools. As shown in Figures 3a and 3b, in 1998 and 2003, small schools enrolled lower percentages of students who entered ninth grade having passed eighth-grade reading and math exams than did medium, large, and very large schools, respectively. Notably, in 2003, all schools saw a large decrease in the percentage of students entering ninth grade and passing the eighth-grade exams. In summary, as compared with their larger counterparts, smaller schools enroll lower percentages of special education students but similar percentages of LEP and recent immigrant students, and higher percentages of poor students. In addition, small schools enroll lower percentages of students entering ninth grade having passed reading and math exams as compared with larger schools. Thus, the evidence suggests that there may be some selectivity of students who are easier to educate in small schools—for example, lower percentages of special education students—but that selectivity does not cut across all types of students.



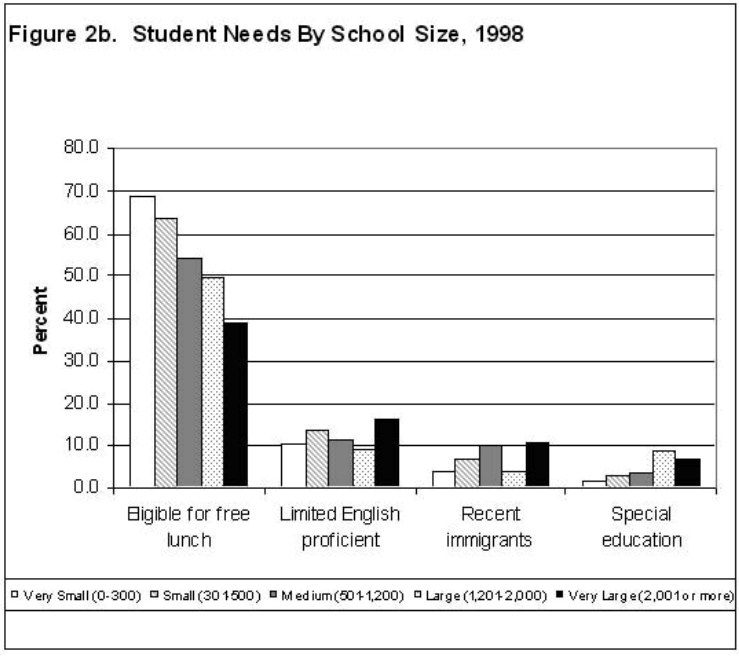


Figure 2b. Student Needs By School Size, 1998
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
Eligible for free lunch
Limited English proficient
Recent immigrants
Special education
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

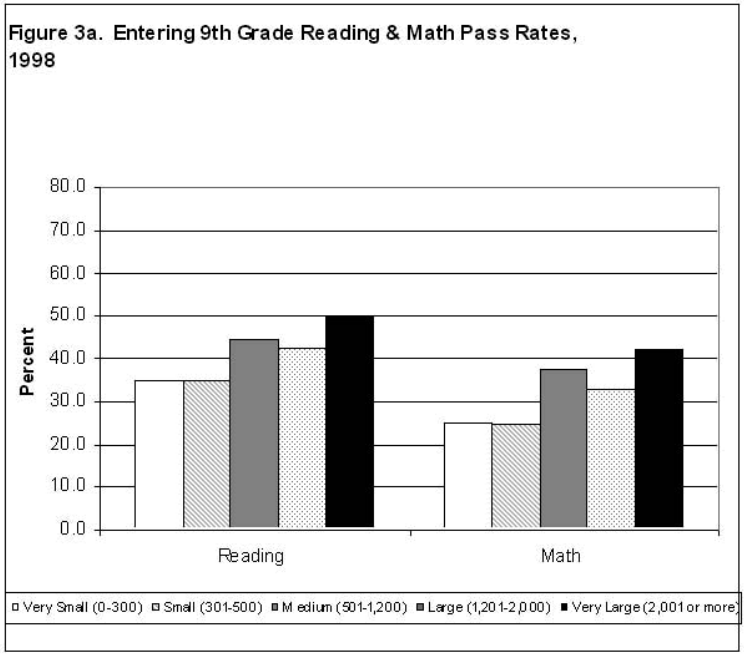


Figure 3a. Entering 9th Grade Reading & Math Pass Rates, 1998
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
Reading
Math
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

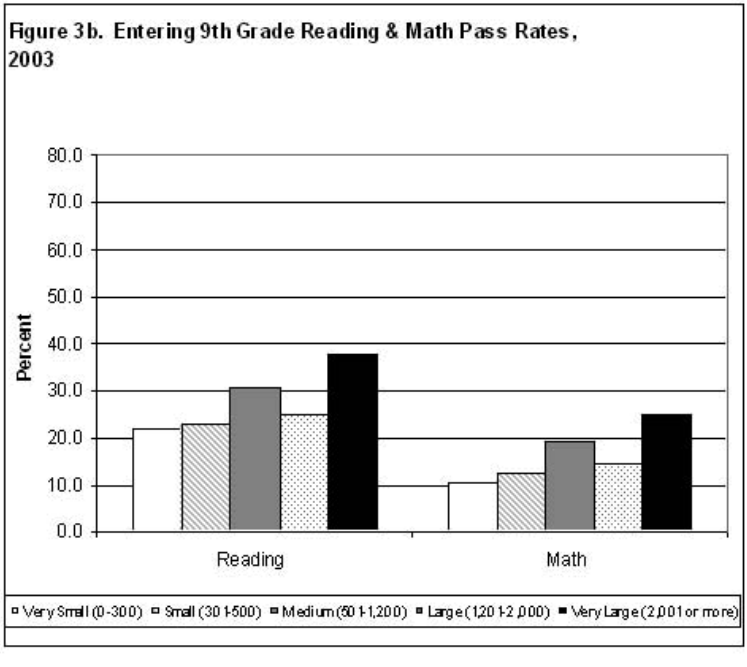
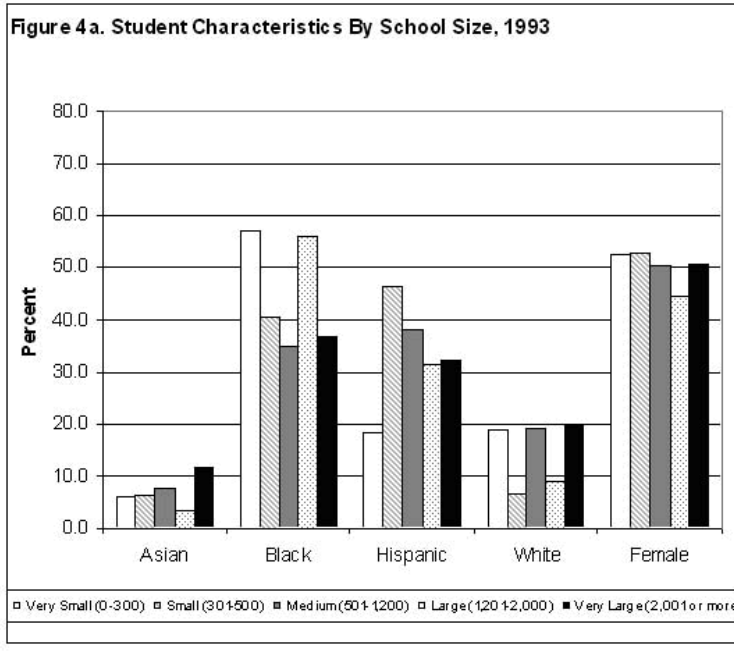


Figure 3b. Entering 9th Grade Reading & Math Pass Rates, 2003
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
Reading
Math
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

Are there differences in the racial composition of schools by size? As shown in Figures 4a–4c, the differences are real. In 1993, the percentage of Black students was highest in small and in large high schools, the percentage of Hispanic students was higher in small high schools than in large high schools, the percentage of Asian students was higher in large high schools than in small high schools, and the percentage of Whites was equally high in very small, medium, and very large high schools. By 1998, Black students constituted a lower percentage of students in small and very small schools as compared with all but the very largest high schools; Hispanic students constituted a higher percentage in small and very small schools than in any other size; and Asian and White students represented the higher percentages of students in the very largest high schools compared with all other sizes. Patterns became even clearer by 2003, when Black students constituted higher percentages in large high schools than any other size; Hispanic students represented higher percentages in small and very small high schools than in any other size; and Asian and White students constituted considerably higher percentages in very large compared with very small or small high schools. Although the process by which these disparities emerge is unknown, these racial disparities are clear and may be gaining, bolstering concerns about segregation, to which we return.



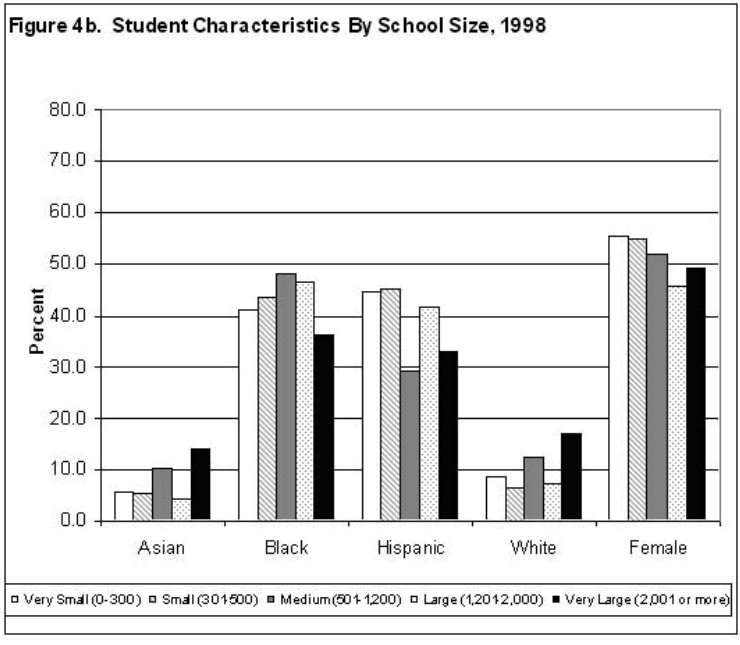


Figure 4b. Student Characteristics By School Size, 1998
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
Asian
Black
Hispanic
White
Female
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

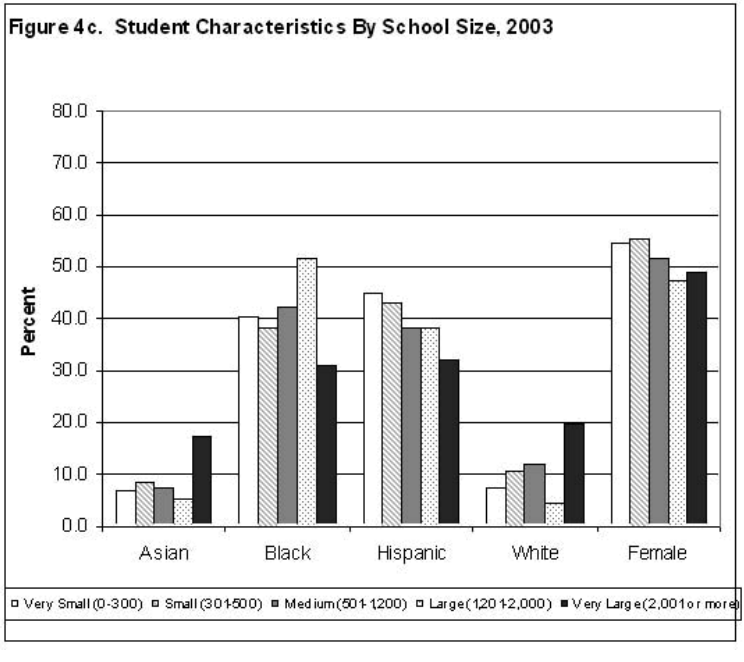


Figure 4c. Student Characteristics By School Size, 2003
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
Asian
Black
Hispanic
White
Female
Very Small (0-300)
Small (301-500)
Medium (501-1,200)
Large (1,201-2,000)
Very Large (2,001 or more)

Female students were also disproportionately enrolled across school sizes; small and very small schools served higher percentages of female students than did any other size, with this pattern becoming more pronounced over time.

In sum, small schools disproportionately enroll female and Hispanic students, large high schools serve larger percentages of Black students than do any other size, and very large schools (which include the specialized high schools) have higher enrollments of White and Asian students than any other size.

Comparing Resources. There is much concern that small schools receive more resources than do large schools. Whether these differences are warranted, however, is more complicated than measuring the disparities. As an example, newer schools may well receive additional funds to offset startup costs leading to higher per-pupil expenditures. Per-pupil spending differences may legitimately reflect lower costs in larger schools because of economies of scale generated by, for example, spreading administrative costs over a greater number of students. Alternatively, smaller schools may incur costs, such as those associated with leasing space, that larger schools may not. Finally, schools serve different proportions of students who are more or less costly to educate and may receive resources to compensate for these differences. Unfortunately, disentangling these effects is complicated. With that caveat about the underlying theoretical and practical factors that may legitimately drive spending differences, we examine differences in resources, including teachers, by school size, in order.

As seen in Table 3, per-pupil spending in 1998 was higher in small and very small schools as compared with their larger counterparts, with the lowest per-pupil spending in the very largest.[23] In addition, there were real differences in the mix of spending. Medium to very large schools spent more of their funding on instruction, particularly on teachers and summer school, than did very small and small schools.[24] Moreover, as the school size increases, more is spent on instructional support (e.g., counseling and referral and evaluation of special education students), which may reflect differences in the distribution of students with special educational needs across schools of varying sizes. The differences among smaller and larger schools held over time, and similar patterns in the different types of spending were also evident in 2003.

Four other notable differences between smaller and larger schools emerge. First, larger schools had much lower per-pupil expenditures on leadership than did smaller schools, which is consistent with the spreading of these costs over a greater number of students. Second, leasing costs were significant for smaller schools but not for larger schools. For

example, in the very smallest schools, expenditures on leases amounted to $787 per pupil, over 32 times as large as the per-pupil expenditure in the very largest schools. Third, average teacher salary was lower in smaller schools, reflecting differences in certification, experience, and advanced educational degrees. Fourth, and perhaps most worrisome, the pupil-teacher ratio is higher in larger schools. In fact, the difference between very small and very large schools is quite large. For example, in 1998, very large schools had four more students per teacher (18.8) than very small schools (14.7). With the exception of very small schools, the pupil-teacher ratios held steady over time. In very small schools, however, the ratio decreased further, exacerbating the gap between the smallest and largest schools.[25]

Table 3. Mean High School Characteristics by Size, 1998, 2003

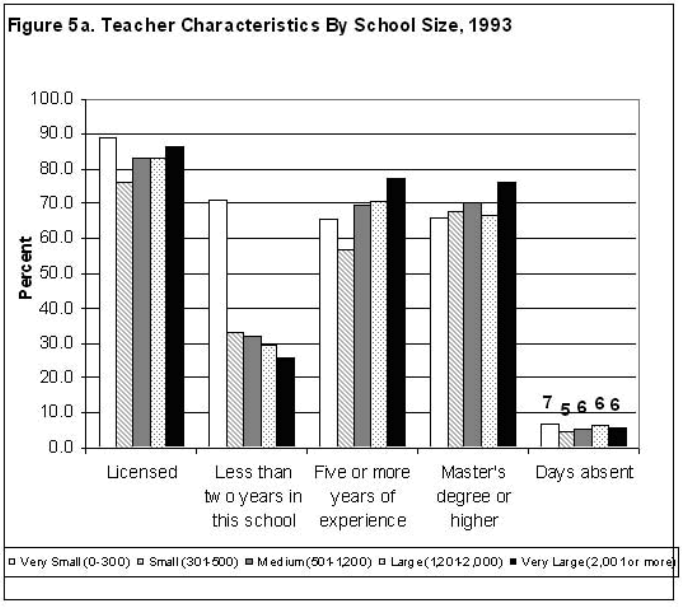
1998	Very Small (0–300)	Small (301–500)	Medium (501–1,200)	Large (1,201–2,000)	Very Large (2,001 or more)
Spending, All Students (Per Pupil and % of Total)[1]					
Total	10,575	9,873	9,135	9,355	8,180
	100.00%	100.00%	100.00%	100.00%	100.00%
Instructional School Expenditures	5,755	5,416	5,458	5,583	5,103
	54.42%	54.86%	59.75%	59.68%	62.38%
Classroom Instruction	5,143	4,692	4,570	4,661	4,325
	48.63%	47.52%	50.03%	49.83%	52.87%
Teachers	4,506	4,095	4,006	4,052	3,829
	42.61%	41.48%	43.85%	43.31%	46.80%
Educational Paras	108	163	172	159	104
	1.02%	1.65%	1.88%	1.69%	1.27%
Summer and Evening Programs	29	40	36	123	94
	0.28%	0.40%	0.39%	1.31%	1.15%
Other Classroom Instruction	499	395	357	328	298
	4.72%	4.00%	3.90%	3.51%	3.65%
Instructional Support	612	724	888	922	778
	5.79%	7.33%	9.72%	9.85%	9.51%
Noninstructional School Expenditures	3,884	3,523	2,728	2,794	2,116
	36.73%	35.69%	29.87%	29.87%	25.87%
Leadership, Supervision, & Administration	1,458	1,327	1,316	1,217	965
	13.78%	13.44%	14.41%	13.01%	11.80%
Ancillary	556	527	515	564	483
	5.25%	5.34%	5.64%	6.03%	5.90%
Building Services	1,871	1,670	897	1,013	668
	17.69%	16.91%	9.82%	10.83%	8.17%
Leases	787	527	323	129	24
	7.45%	5.34%	3.54%	1.38%	0.29%
Systemwide, Administrative	935	934	949	978	962
	8.85%	9.46%	10.39%	10.46%	11.75%
Average teacher salary[1]	43,808	43,041	46,835	49,093	51,806
Pupil-teacher ratio	14.7	15.2	16.7	17.0	18.8

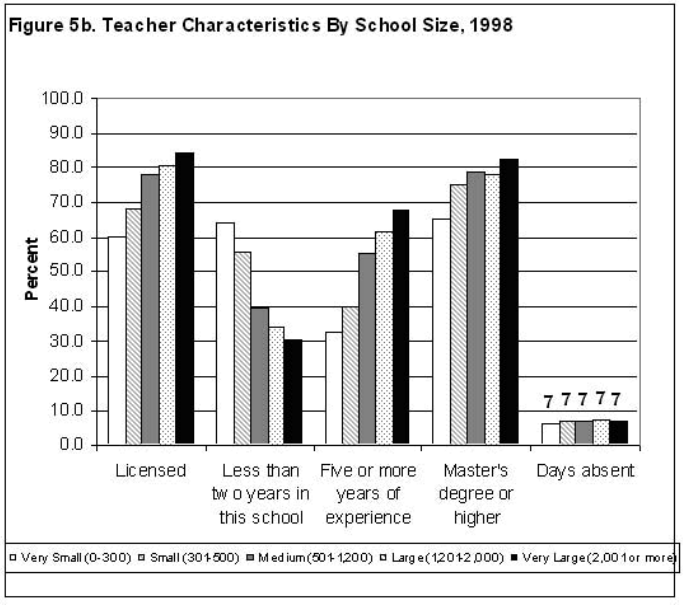
2003	Very Small (0–300)	Small (301–500)	Medium (501–1,200)	Large (1,201–2,000)	Very Large (2,001 or more)
Spending, All Students (Per Pupil and % of Total)[1]					
Total	14,811	11,601	11,229	11,177	9,398
	100.00%	100.00%	100.00%	100.00%	100.00%
Instructional School Expenditures	8,556	6,896	6,906	7,168	6,149
	57.77%	59.45%	75.60%	76.62%	75.16%
Classroom Instruction	7,458	5,825	5,756	5,880	5,124
	50.35%	50.21%	63.01%	62.85%	62.64%
Teachers	5,786	4,658	4,650	4,733	4,262
	39.06%	40.16%	50.91%	50.59%	52.10%
Educational Paras	192	227	169	205	113
	1.30%	1.96%	1.85%	2.19%	1.38%
Summer and Evening Programs	84	122	119	141	137
	0.57%	1.05%	1.31%	1.51%	1.68%
Other Classroom Instruction	1,395	817	817	801	612
	9.42%	7.04%	7.27%	7.17%	6.51%
Instructional Support	1,098	1,072	1,150	1,288	1,024
	7.42%	9.24%	10.24%	11.53%	10.90%
Noninstructional School Expenditures	5,319	3,703	3,321	2,941	2,237
	35.92%	31.92%	36.35%	31.44%	27.34%
Leadership, Supervision, & Administration	2,736	1,612	1,524	1,495	1,049
	18.47%	13.89%	16.68%	15.98%	12.82%
Ancillary	687	564	606	539	540
	4.64%	4.86%	6.64%	5.76%	6.60%
Building Services	1,863	1,496	1,163	880	627
	12.58%	12.90%	12.73%	9.41%	7.67%
Leases	696	509	250	58	0
	4.70%	4.39%	2.74%	0.62%	0.00%
District Support	33	31	28	28	21
	0.23%	0.21%	0.19%	0.19%	0.14%
Systemwide, Administrative	935	1,001	1,002	1,068	1,012
	6.32%	8.63%	8.93%	9.55%	10.77%
Average teacher salary[1]	47,362	48,623	51,061	55,025	56,816
Pupil-teacher ratio	12.7	15.3	16.0	16.7	18.7

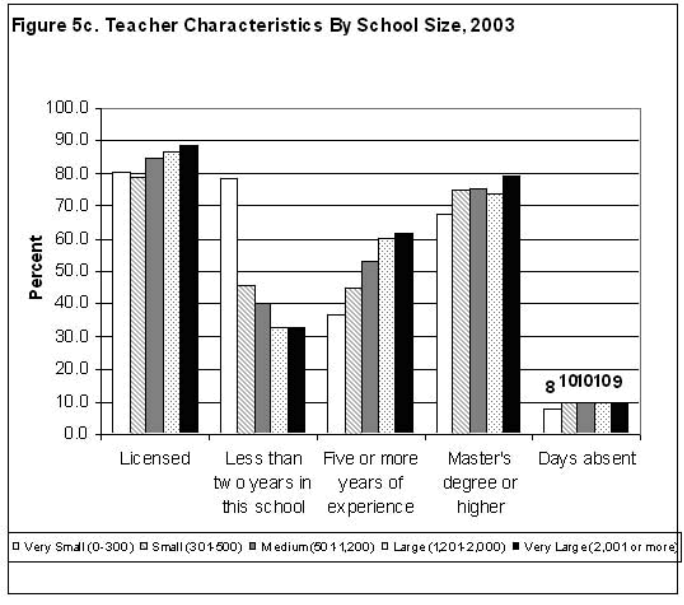
Notes:
All high schools with at least 30 students are included in the analysis. Eighteen schools are excluded, 8 with enrollment under 30, and 10 for which a preponderance of data are missing.
[1] All dollar figures are in constant 2003 dollars using CPI-U, Bureau of Labor Statistics.
[2] District Support is a spending category appearing in primarily years after 1998 and thus is not shown in earlier tables.

Because teachers are often viewed as the key educational resource and account for more than 40% of school-level per-pupil expenditures, in Figures 5a–5c, we take a closer look at the characteristics of teachers by school size. Initially in 1993, although there were differences across schools of varying sizes, smaller schools did not have a markedly different teaching force than larger schools, with the exception of having more teachers who taught less than 2 years in that school, which is likely to be the case if schools were newer. By 1998, however, clear differences emerged, with the variations appearing to be directly related to school size. For example, the percentages of licensed and experienced teachers, as well as those with master's degrees, were lowest in very small schools

and progressively higher in larger schools. In 2003, although the apparent linear relationship between school size and teacher characteristics remained, the gap between the very smallest and very largest schools narrowed.







Comparing Outcomes. One of the motivating factors for the current wave of small-school reform is the potential for improving student outcomes. Although we do not assess the effectiveness of small schools, which is beyond the scope of this study, we examine how student outcomes differ by school size in Table 4. Graduation rates increased, across the board, from 1998 to 2003.[26] In 1998, on all measures of student outcomes, including SAT scores and Regents exams, very small and small schools did worse than medium to very large schools. Very small and small schools, however, had much higher percentages of their 11th- and 12th-grade students taking the SAT. Clearly, student outcomes may be related to how prepared students are for high school. As indicated by the reading and mathematics passing rates of students entering ninth grade for the respective cohort (1998, 2003), there are clear differences across high schools whereby smaller schools have lower percentages of students entering high school having passed eighth-grade reading and mathematics exams.[27] In 2003, the patterns by school size are similar to those found in 1998. All schools improved, not only in terms of graduation rates but also in terms of the percentage of students taking the SAT, SAT verbal and math scores, and Regents English and math pass rates. Notably, medium and very large schools had the highest graduation rates, SAT scores, and Regents English pass rate, whereas the very smallest schools

had the highest Regents math pass rate. Across all schools, lower percentages of students are entering high school having passed eighth-grade reading and math exams, with the differences by school size similar to those found in 1998. Although these comparisons offer a descriptive analysis of the relationship between school size and outcomes, we cannot state that size is a causal factor because there may be other factors, such as the self-selection of students into schools by size, that are unaccounted for in this analysis.

Table 4. Mean High School Performance by Size, 1998, 2003

1998	Very Small (0–300)	Small (301–500	Medium (501–1,200)	Very Large (1,201–2,000)	Large (2,001 or more)
% Graduate (4-year cohort)	42.0	48.0	52.5	55.8	58.0
% 11th & 12th graders taking SAT	39.5	36.4	28.2	25.2	30.6
SAT, Verbal	368.8	385.1	422.6	406.3	422.7
SAT, Math	350.0	386.5	429.5	415.8	447.2
English Regents	31.9	34.5	34.1	32.9	42.8
Math Regents	29.1	35.2	46.8	36.8	48.4
2003					
% Graduate (4-year cohort)	47.8	54.3	64.9	54.9	61.1
% 11th & 12th graders taking SAT	42.0	35.1	35.9	33.6	37.9
SAT, Verbal	401.9	405.4	417.2	401.3	421.0
SAT, Math	423.0	422.3	437.2	421.0	440.4
English Regents	44.4	46.3	58.4	48.1	58.4
Math Regents	64.3	46.6	48.1	34.6	46.7

Notes: All high schools with at least 30 students are included in the analysis. Eighteen schools are excluded, 8 with enrollment under 30, and 10 for which a preponderance of data are missing.

To summarize, we find support for the concern that small schools serve disproportionately few special education students, but not necessarily with respect to LEP, immigrant, or poor students. In addition, Hispanic students are well represented in smaller schools, girls are overrepresented, and Asian and White students are underrepresented. Smaller schools spend more and use their resources differently than do larger schools. The differences appear to be most evident in terms of per-pupil expenditures for leadership and leasing costs that may be related to economies of scale and different capital needs. Although outcomes improved for the most part across all schools, larger schools still have better outcomes than smaller schools. Perhaps most important, by 2003, after the second wave and the start of the third wave of small-school

reform, a large majority of students are still enrolled in very large or large schools. This suggests that New York City is replicating within the district an "urban school district phenomenon" whereby a small number of schools are educating a majority of the students. Thus, the success of the small-school reforms in improving outcomes for the students of New York City will depend in no small part on the impacts that these changes have on the large schools themselves.

SMALL SCHOOLS AS SYSTEMIC REFORM: IMPLICATIONS FOR SEGREGATION AND RESOURCE EQUITY

Examining segregation and resource equity measures over the decade in the context of the changes in school and student characteristics provides some perspective on how the changes in the school system, particularly small-school reforms, were related to changes in segregation and resource equity.

Figures 6–8 report isolation and exposure indices that are descriptive of the settings in which students attend school with respect to how segregated particular groups of students are from their peers. A mixed picture of segregation emerges from 1993 to 2003, with some groups of students increasingly isolated (poor, Asian), some decreasingly isolated (White, Black) and little change for others, such as LEP, recent immigrant, and Hispanic students. In 1993, the average poor student attended a school in which 46% of the students were also eligible for free lunch (see Figure 5). By 2003, however, the average poor student attended a school where 66% of the students were poor, indicating substantial increases in segregation with respect to poverty. At the beginning of the decade, the average Asian student attended a school where 21% of the students were Asian, and by the end of the decade, the rate increased to 28% (Figure 6). White and Black students, conversely, were situated in less isolated settings by the end of the decade as compared with the start of the decade. The isolation indices for White and Black students, however, exceeded their overall representation in the school system, suggesting that some segregation still exists. Although it is true that White students, on average, are less isolated, their exposure (Figure 7) to other students has changed over the decade such that the other students to whom they are exposed are increasingly Asian, steadily Hispanic, and decreasingly Black. For example, the average White student in 1993 attended school with 22% Hispanic, 22% Black, and 15% Asian students. By 2003, the other students in the school of the average White student were 23% Hispanic, 20% Black, and 20% Asian.

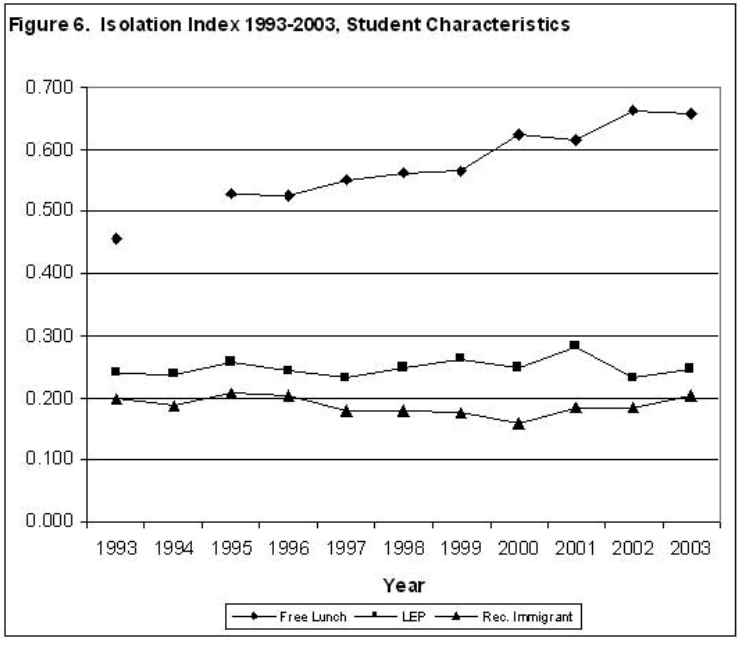


Figure 6. Isolation Index 1993-2003, Student Characteristics
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003
Year
Free Lunch
LEP
Rec. Immigrant

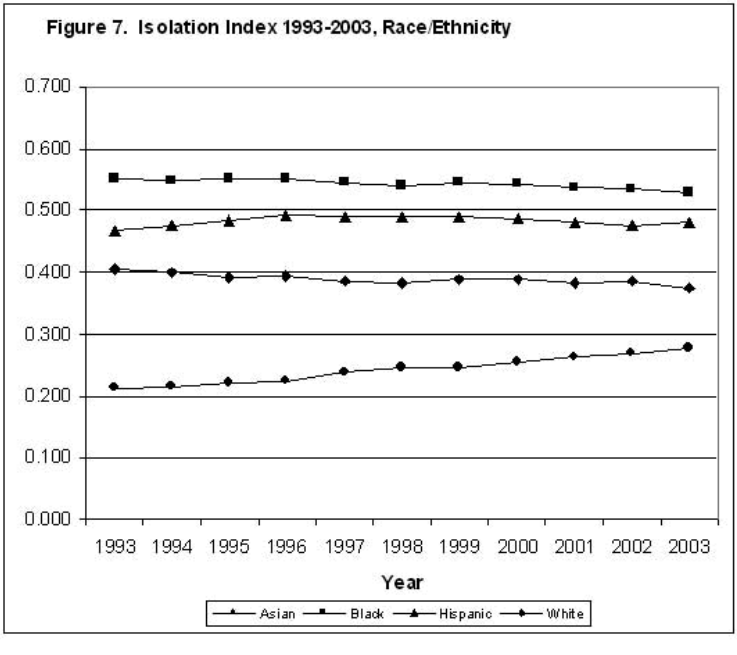


Figure 7. Isolation Index 1993-2003, Race/Ethnicity
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003
Year
Asian
Black
Hispanic
White

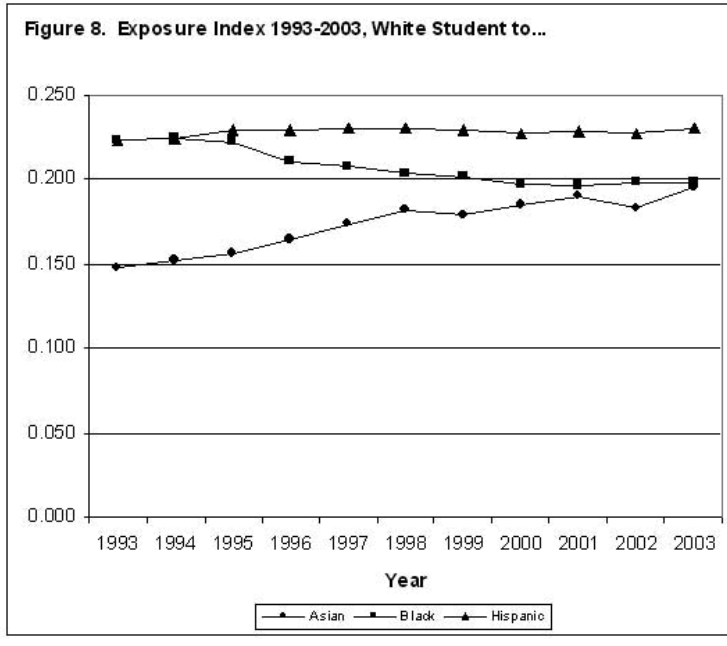
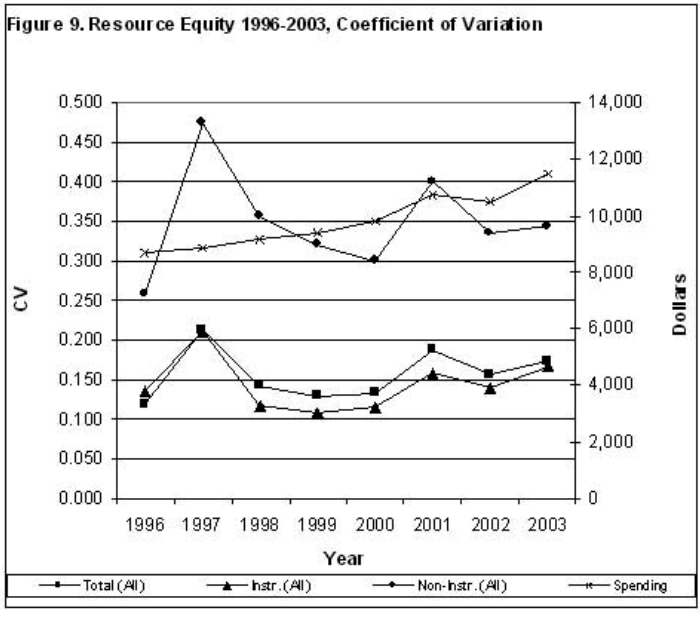


Figure 9 presents the dispersion of resources (total spending on all students, instructional spending, and noninstructional spending) as measured by the coefficient of variation.[28] In 1996, the earliest year for which spending data are available, the distribution of total spending was relatively equitable with a coefficient of variation of 0.119, which is slightly greater than the 0.10 standard of an equitable distribution.[29] Although the pattern of dispersion across the years is similar, the dispersion of noninstructional spending is much greater than that of total spending and instructional spending. Although there was variability from year to year, the levels of dispersion for all three spending measures in 2003 were higher than in 1996. From 1996 to 2001, spending per pupil increased in a linear fashion, and the variability in the dispersion of spending appears to be unrelated to the changes in spending. In 2002, with spending relatively unchanged from the previous year, the dispersion in spending decreased, but as spending increased in 2003, so too did the dispersion.

To summarize the findings of Figures 5–9, segregation worsened for poor students, recent immigrants, and Asians, who were increasingly isolated from other groups of students; improved for White and Black students, who were less isolated from other groups of students; and held



steady for LEP and Hispanic students. The dispersion of resources grew over time, and noninstructional spending continued to be more disparate than total spending and instructional spending.

SUMMARY AND CONCLUSIONS

From 1993 to 2003, the number of high schools in New York City nearly doubled. Small and very small schools were created, some large and very large schools were phased out, and the average size of all high schools was reduced by 44%. Nevertheless, the dramatic changes in average school size and the increase in the number of small schools did not produce similarly dramatic changes in the educational setting for the great majority of students in the system. By the end of the decade, only 8.5% of the student population was enrolled in a very small or small school, approximately 14.8% in a medium-size school, and a large majority (76.8%) in a large or very large school. In addition, although small schools offer higher per-pupil expenditures and lower pupil-teacher ratios compared with larger schools, the small schools as a group do not seem to be cream-skimming the best students, as measured by reading and math scores on entry, and they do not pay higher average teacher salaries.

In the meantime, although it is not clear whether students in small schools are more favorably situated than other students attending larger schools, it is apparent that substantial segregation of students and disparities in the distribution of resources remain a condition of education across all New York City high schools. The city continues its commitment to increasing the numbers of small schools, but thus far, only marginal increases in performance have occurred across the student body, and the small schools have lower achievement rates than the larger schools. If small schools do eventually promote higher achievement (considering their student mix and other factors that differentiate them from larger schools), many more will be needed to house the 91.5% of the students not now attending them. Otherwise, strategies that work for the vast majority of students who do not attend small schools will need to be identified and implemented.

If the city created enough new small schools to house even a simple majority of high school students, added and unanticipated administrative costs would follow. For example, students and parents would have many more high schools to consider when making high school choices. This could result in a less transparent enrollment process than the already complicated system already in place. In addition, more individual schools would require more principals who would have to be hired, trained, and evaluated. Finally, the possibility of midyear school failures (due, perhaps, to financial or staff issues) would increase simply because there would be more schools, and then students would need to be moved to other buildings. All this would involve more resources for administration.

Simply put, the existing evidence about the effectiveness and cost of schools of different sizes provides a weak foundation for policy making. More research about the successes and challenges of the existing efforts is warranted before New York–or other large cities—invests heavily in small-school reform as the method for improving the high school performance of all their students. Further, as the number of small schools increases, and the number of students attending these schools also increases, attention should be paid to tracking and addressing the systemic effects on segregation of students and equity of resource distribution.

Notes

1. In contrast to trends for 9- and 13-year-olds, recent NAEP math results show no gain in performance for 17-year-olds since 1999 (NAEP, 2004).
2. Achieve, Inc. is a nonprofit organization established after the 1996 summit and has been a sponsor of the past three summits, including the 2005 high school summit.
3. New York City's unprecedented systemwide effort has benefited from over $100 mil-

lion from the Bill and Melinda Gates Foundation. Over the past decade, the foundation has invested over $700 million nationwide for high school initiatives, including $590 million (80%) on reforms in which small schools are either the centerpiece or an essential component (e.g., the early-college reforms).

4. Los Angeles, San Diego, Philadelphia, and Boston are among the districts that are creating new small learning communities. The Gates Foundation is providing funding for a number of these urban district initiatives and statewide initiatives in Oregon and Ohio. (Also see "High School Reform Discussed," 2005, for Michigan's interest in small-school reform.

5. Notice, however, that although studies have found an inverse relationship between school size and student achievement, no consensus has emerged on the optimal school size. As an example, Lee and Smith (1997) found that the optimal school size with respect to student achievement in reading and mathematics is between 600 and 900 or 1,200 students. Foreman-Peck and Foreman-Peck (2006) placed the optimum size at 540, with schools over 600 having lower exam scores and attendance rates, controlling for prior exam scores. Kuziemko (2006) found positive effects on math scores and attendance rates when schools become smaller.

6. Two recent studies on the effects of district size found that small districts do not benefit students overall, as measured by high school completion rates (Heinesen, 2005) and test scores (Driscoll, Halcoussis, & Svorny, 2003). Seeking to explain the unequal distribution of size effects across all students, Friedkin and Necochea (1988) suggested ways in which district size might interact with student socioeconomic status and found that disadvantaged students are best served in small-school districts (measured by number of students)—although the positive effect is small—whereas students with higher socioeconomic status are best served in large districts. They hypothesized that greater numbers of high-socioeconomic-status (SES) students lead to more opportunities and fewer constraints on success, whereas the opposite is true for low-SES students.

7. The arguments are most often that small schools allow even disadvantaged students to get involved in activities that the school offers, which causes students to be more engaged and less likely to drop out of school (Entwisle, 1990), staff to be more responsive when dealing with a more limited pool of students, and administrators to have more flexibility in disciplining students, leading to less violence and antisocial behavior (Gottfredson & Gottfredson, 1985).

8. We define the size of a school based on its enrollment of students as of October of the respective school year.

9. Note that we include only high schools in this study. Thus, the "district" includes only high schools.

10. The equity measures are pupil weighted, reflecting dispersion across students rather than across schools as unweighted school-level calculations would. They are not adjusted for needs of different groups of students, such as poor or special education, however.

11. This assumes a normal distribution of the resource across students or schools.

12. Despite the Odden and Picus (2003) benchmark, most analysts agree that determining whether, or to what extent, resources are distributed inequitably or segregation is too high requires a subjective judgment of social preferences and values. In addition, adjusting resource equity measures to reflect needs or costs of students who are poor or LEP is key; without these, the measures are difficult to interpret. If the composition of the student body is relatively constant over time, the measures are more appropriate for over-time comparisons. Essentially, it is hard to know whether changes are due to changing distributions of student needs or to small-school reform

13. The *Annual School Reports* (ASRs) have been published annually from 1994–1995 until the present. Data from 1992–1993 and 1993–1994 are drawn from the *School Profiles* database that preceded the ASRs.

14. In 1997, New York City became the first urban school system to publicly report

spending at the school level. The data were first made available only in budget form for the 1995–1996 school year. In subsequent years, expenditure reports were also available. Given the near year-end date of the budget reports, the two versions—budget and expenditures–did not vary substantially. The New York City Department of Education (formerly the Board of Education) suspended publication of the budget form of the reports in the late 1990s.

15. In addition to the school-level cohort data, we draw on data from the systemwide summary that includes schools and programs excluded from our school-level sample. Thus, the figures are not directly comparable to the analysis using our school-level panel of data, and such instances are duly noted.

16. Clearly, our measures do not fully capture the quality of teachers or school resources. Our choices were dictated by the availability of data.

17. Average teacher salary includes salary expenditures on all teachers divided by the number of full-time equivalent teachers and does not include any benefits, payments for preparation periods, or substitute teacher spending. The pupil-teacher ratio gives a sense of the instructional adults per pupil, without any weighting for differences in their salary or education.

18. In 2002, the state legislature placed the New York City public school system under the direct control of the mayor and authorized the dissolution of the 32 community school districts that governed the city's elementary and middle schools by June 2003. The 32 community school districts were replaced by 10 regional superintendencies governing all levels of schooling (elementary, middle, and high school). Prior to these most recent reforms, there were distinct differences in the governance of elementary and middle schools, and high schools. Elementary and middle schools were governed by locally elected school boards and appointed superintendents. High schools were controlled by the central office of the former Board of Education and overseen by six superintendents who were in part geographically based (Brooklyn, Bronx, Manhattan, Queens, Brooklyn-Staten Island, and Alternative). Thus, in this study, superintendency spending reflects spending under the prior governance structure.

19. Researchers are beginning to call attention to how graduation rates are measured (Greene, 2001; Miao & Haney, 2004; Swanson, 2003), and the debate over the appropriate measure is intensifying because states are now required to report graduation rates to the federal government as part of NCLB (Hall, 2005). Many states and school systems report annual graduation and dropout rates, calculating the graduation rate as the number of graduates as a percent of 12th graders, and the dropout rates as the number of students dropping out as a percent of all students enrolled in a school in a given year. Using this method, the graduation rate is likely to be overstated because it does not account for students who dropped out before 12th grade or who were held back a grade.

20. On a school-level basis, the cohort consists of students entering ninth grade or transferring into a school in 10th–12th grades in subsequent years. Students who transfer out of a school are eliminated from that school's cohort and added to the cohort of the school to which the student transferred. Students who leave the New York City public school system to attend a private school or public school in another system are removed entirely from the cohort and counted as discharges. Students who graduate or drop out at any time over the 4-year period are included in the calculation of the respective rates, and students who remain in school after 4 years are reported in the "still-enrolled" rate. New York City continues to track students for an additional 3 years, reporting 7-year graduation and dropout rates. Although the 4-year cohort basis is clearly the most informative way to measure graduation and dropout rates, it is not immune to manipulation. Of course, any measure of high school completion is suspect, as evidenced by the controversy over the manipulation of graduation and dropout rates in Houston (Archer, 2003; Schemo, 2003). In 2002, New York City's Public Advocate and Advocates for Children released a report that provided anecdotal evidence that some of the city's high schools were misreporting students as discharges from the system rather than dropouts. Moreover, schools can manipulate their rates

by encouraging the transfer of students to other high schools or GED programs. We have no reason to think that these kinds of manipulations have been prevalent.

21. While the sample includes schools labeled by New York City as comprehensive, alternative (both academically oriented and "last chance"), and specialized (admission test), it does not include GED programs and other highly specialized programs. GED programs over the decade of this study accounted for a small percentage of graduates, but in the future, the program may grow, in which case different ways of counting such graduates will be required.

22. Note that free lunch eligibility rates tend to be lower for high school students than elementary or middle school students because of the stigma associated with such programs (Karey, 2002; U.S. Department of Agriculture, 1994). Thus, it is quite possible that a school's free lunch rate reflects not only students' need but also success in collecting forms and mitigating the stigma.

23. Spending data are not available for 1993 because the DOE only started publicly releasing school system data in 1997 for the 1996 school year.

24. Summer school expenditures are incurred by schools that host summer school programs for students who may or may not be enrolled in that particular school during the regular academic year.

25. Pupil-teacher ratios are an imperfect proxy for class size because some teachers may not be actually teaching, but serving as staff developers or in other roles. We do not have detailed information that would allow us to further refine this measure to better approximate class size. Yet, it is quite possible that there are differences in class size as suggested by the ratio.

26. The average graduation rate in the three groups of schools enrolling fewer than 1,200 students is based on a subset of the schools for which graduation rates were reported. Some of the newer schools have not yet had a graduating class. Moreover, the Department of Education did not publish graduation rates for schools with fewer than 20 students in the 4-year cohort. Note: Outcome data are not available for 1993.

27. The number of schools for which entering ninth-grade pass rates are reported is lower than the number of schools included in the analyses in general, and very small and small schools are more likely to be missing data than the larger size categories.

28. We also examined spending on general education students and the subset of general education students who receive resource room services. The results are very similar in magnitude and direction to the results for spending on all students and thus are not reported here. Moreover, the Gini Coefficient and McLoone Index, alternate measures of dispersion, were calculated as well with similar results and thus are not reported here.

29. All sources of funds (local and state operating funds and state and federal compensatory aid) are included in the spending measures. Moreover, spending on part- and full-time special education students is also included. Thus, it is not unexpected that the coefficients of variation exceed 0.10 (Odden & Picus's equitable standard; Odden & Picus, 2003) because the majority of state and federal compensatory aid is directed to schools with high levels of students eligible for free lunch or at risk of failing school. In addition, if special education students and related spending are unevenly distributed across schools, then the equity measures will show greater dispersion.

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APPENDIX

Table A. Description of Spending Variables

Variables	Description
Total	Reflects all expenditures related to the operation and administration of schools and subdistrict and central offices, as well as systemwide obligations, such as debt service, retiree health and welfare, special commissioner for investigations, and projected expenditures.
Instructional expenditures, school	Expenditures made by or on behalf of the school and directly related to instruction, including expenditures on classroom instruction and instructional support services.
Classroom instruction	Spending on school-based instruction in the classroom, for example, teachers and instructional supplies, and in support of classroom instruction, for example, professional development.
Teachers	Spending on teachers, including those who are not in the classroom, such as library teachers whose salary is reported on a teacher line. Includes salary and fringe benefits, as well as per diem or per-session payments made to teachers or substitutes.
Educational paraprofessionals	Classroom-based educational paraprofessionals and substitute paraprofessionals, including those who paid on a full-time, per diem, or per-session basis. Does not include paraprofessionals who provide services related to full-time special education students as mandated by their individualized educational plan.
Summer and evening school	Spending on instructional and recreational programs, including teachers, staff, equipment and supplies.
Other	Includes spending on other classroom staff (e.g., lab technicians), textbooks, librarians and library books, instructional supplies and equipment (e.g., furniture, lab equipment, audio-visual equipment), professional development, curriculum development, and contracted instructional services (i.e., instructional and enrichment services provided by community-based organizations).
Instructional support	School-level instructional support services, such as counseling, attendance outreach, drug counseling, health-related services, referral and evaluation of students who may be identified as in need of special education support services, and parent involvement and after-school programs.
Noninstructional expenditures, school	Expenditures made in support of basic classroom instruction.
Leadership, supervision & administration	Included in this category is spending on principals, assistant principals, supervisory staff, school secretaries, and materials and supplies related to the general administration of the school.
Ancillary support services	Food services, transportation, school safety, and computer support.
Building services	Custodial and building maintenance, energy costs and leases.
Leases	Leases for space for instructional purposes.
System & subdistrict costs	Includes system and subdistrict administrative costs, as well as instructional and pedagogical staff operating out of the central and subdistrict offices and sabbaticals and leaves. The chancellor's office and central operational offices are also included, as are other systemwide obligations such as debt service, retiree health and welfare, and the office of the special commissioner for investigation.

Source: New York City Department of Education, *School-Based Expenditure Reports, Technical Appendices.*

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