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Effects of School Segregation and School Resources in a Changing Policy Context

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Desegregation policies have been rolled back across the country. Some advocates for dismantling desegregation argue that resources allocated to desegregation would pay off better if allocated to improve education in schools with disadvantaged populations. We test this claim by examining student achievement before, during, and after the end of court-ordered desegregation in Nashville, Tennessee. School-by-grade fixed effect models reveal no evidence that increases in a school's proportion of Black students impeded achievement growth. Increased exposure to students in poverty curtailed achievement growth, but enhanced option schools, which bring extraordinary resources to high-poverty, racially isolated schools, compensated for the effects of concentrated poverty. Schools that became specialized magnet schools, however, did not contribute to achievement gains and in some cases curtailed growth.

Keywords: *unitary status, school desegregation, school resources, achievement gaps*

Despite substantial progress at times, the gap between Whites and African Americans in educational achievement remains wide (Gamoran, 2001; Magnuson & Waldfogel, 2008; Rampey, Dion, & Donahue, 2009). For example, in the 2011 National Assessment of Educational Progress, administered to a random sample of U.S. schoolchildren, 52% of White fourth graders and 44% of White eighth graders were proficient in mathematics, whereas the comparable figures for Blacks were 17% and 13%, respectively (National Center for Education Statistics, 2012). The gaps were similar in reading, where among Whites, 44% of fourth graders and 43% of eighth graders scored proficient, as compared with 17% and 15% of Blacks in fourth and eighth grades, respectively. Racial and ethnic disparities took on a new meaning in the context of *No Child Left Behind* (*NCLB*), federal legislation enacted early in 2002 that required states to set high standards for educational performance and to hold districts and schools accountable for meeting them. Increasing numbers of schools failed to meet *NCLB*'s standard, often because high proportions of students in key subgroups—including racial and ethnic minorities, low-income and special education students, and English language learners—scored below state targets for achievement proficiency (Usher, 2011). Beyond the political ramifications, these inequalities have been implicated in gaps in educational attainment and wages, perpetuating racial inequality from one generation to the next (Johnson & Neal, 1998).

School segregation and unequal school resources are often cited as reasons for Black–White inequality in school performance. Originally, the two were thought to be linked—that is, segregated schools attended by Blacks were assumed to lack adequate resources, and hence Black children fared poorly—but at least by 1966, when James Coleman and his colleagues published their congressionally mandated study of *Equality of Educational Opportunity*, major differences in the resource levels of schools attended by Blacks and Whites were not readily apparent. Blacks *did* attend segregated schools, by and large (as they do today; see Gamoran & Long, 2007), and those who attended schools with more Whites tended to exhibit higher test scores, so desegregation appeared to be a plausible strategy for reducing achievement gaps, whereas equalizing resources did not. In any case, the U.S. Supreme Court (1954) had declared that "separate educational facilities are inherently unequal," so desegregation rather than a redistribution of resources emerged as the leading approach to ensuring equal educational opportunity for Blacks and Whites.

Sixty years later, whether desegregation is a more effective strategy than reallocating resources for reducing achievement gaps remains unsettled. Desegregation programs began to be dismantled in 1991, and by 2007, the U.S. Supreme Court had concluded that the desegregation programs operated by most school districts could no longer be defended (Orfield & Lee, 2004; U.S. Supreme Court, 1991, 2007). Meanwhile, other strategies, including resource reallocation, are touted as better approaches for reducing achievement gaps (Goldring, Cohen-Vogel, Smrekar, & Taylor, 2006). Decades of research have not yielded a consensus on the impact of resources and segregation on school performance, due in part to problems of selectivity that have afflicted the research studies. Can enhanced resources compensate for the challenges imposed by segregation in schools? We provide new evidence on this question by examining the results of a unique natural experiment from Nashville, Tennessee, a large, urban school district undergoing change in school assignment policies.

The Rise and Decline of School Desegregation

Whereas the Supreme Court decision demanding desegregation rested on moral and constitutional grounds, social science evidence also favored racially mixed schools for reducing achievement inequality. Beginning with the Coleman (1966) report, scores of studies indicated modest achievement benefits for Black students from attending schools with higher proportions of White students. Major reviews including those of Mahard and Crain (1983), Cook (1984), Schofield (1995), and Linn and Welner (2007) found achievement benefits from school desegregation, more consistently in reading than in mathematics, and school desegregation was likely responsible for a portion of the declining achievement gap during the 1970s and 1980s (Grissmer, Flanagan, & Williamson, 1998; Hedges & Nowell, 1999). Little evidence exists on the mechanisms through which desegregation may have boosted Black test scores, but the pattern may be attributed to a more equal distribution of resources (including resources unexamined in the Coleman report), and more inclusive social networks in desegregated schools (Hochschild & Scovronick, 2003). Meanwhile, desegregation appeared to do little harm to the test scores of Whites, although the research base for this conclusion is slim (Schofield, 1995).

Despite its measured benefits, desegregation has greatly diminished as an education policy (An & Gamoran, 2009; Frankenberg, Lee, & Orfield, 2003). Since 1991, more than 35 school districts have been declared "unitary," that is, not segregated by district policy, and therefore free from court oversight. In most cases, these districts have dismantled their desegregation programs (Orfield & Lee, 2004). As Hochschild and Scovronick (2003) observed, school desegregation was an educational success, but a political failure. Although beneficial, it has been no panacea (Perkinson, 1968). The modest achievement effects coupled with the cost and complexity of desegregation plans led many districts to abandon the approach at the first opportunity, and the fact that districts no longer operate "dual" school systems—one White, one Black—has led the courts to conclude that their responsibilities for overseeing student assignment policies have ended. The trend toward dismantling desegregation culminated with the Supreme Court's 2007 decision that school assignment could no longer be based on criteria of race, but the process had been underway already for many years (Orfield & Lee, 2004).

Although Lutz (2011) maintained that ending court-ordered desegregation need not automatically result in increased racial isolation, his empirical work along with other recent studies shows that segregation rises when court orders end (An & Gamoran, 2009; Reardon, Grewal, Kalogrides, & Greenberg, 2012). However, as Reardon et al. (2012) pointed out, the resegregation patterns of today are occurring in a very different climate than that which surrounded the desegregation efforts of decades ago, with some districts attempting to match changes in school assignment policies with resources directed to high-need students. As a result, resegregation may or may not result in a return to the degree of achievement inequalities that accompanied segregation. Reflecting on recent increases in racial isolation, Reardon et al. (2012) concluded, "We do not know, however, whether the increases in school segregation induced by the end of court-ordered desegregation plans lead to . . . increases in racial educational disparities. This is an important topic for future work" (p. 901).

From Court-Ordered to Court-Ended Desegregation in Nashville

Nashville, Tennessee, is one of many cities across the southern United States in which desegregation programs have recently ended. It took nearly 30 years after *Brown v. Board of Education* for Nashville to adopt a full-scale desegregation plan, which finally emerged in the 1980s when the district created racially mixed schools by busing students to schools across the county. By the mid-1990s, frustration with the plan due to the expense and complexities of busing, the particular burden of busing for minority students, and the persistent racial achievement gap led to a broad coalition in favor of allowing students to attend schools closer to where they live (Winders, 2013). This policy change was implemented in 1999, and because residential areas tend to be segregated, Nashville's schools have become more segregated (a series of papers by Goldring and her colleagues provides more details on Nashville's desegregation history; see Cohen-Vogel, Goldring, & Smrekar, 2010; Goldring et al., 2006; Goldring & Gamoran, 2003; Goldring, Hoover-Dempsey, & Rowley, 2004; Goldring & Smrekar, 2002; Smrekar & Goldring, 2009).

Anticipating increases in segregation, the district created new, specialized schools in an attempt to compensate for the increasing isolation of Black students and the increasing concentration of poverty. The primary mechanism for bringing extra resources to disadvantaged schools was the designation of elementary schools with the most concentrated poverty and the most Black isolation as "enhanced option" schools. These schools were granted reduced class size, an extended school year, and some mix of additional resources including preschool options, after-school tutoring, and social and health services. With these added resources, the district aimed to mitigate the effects of segregation and reduce the Black–White achievement gap.

Evidence from diverse sources confirms the flow of additional resources to enhanced option schools during the time period of our study. Analyzing class sizes between 1999 and 2004, Houck (2010) reported that enhanced option schools enrolled nearly 5 students per class fewer than regular attendance-zone schools; this represents a reduction of approximately 25% from the district average of 20 students per class. Enhanced option schools also stayed open an extra 20 days each school year, representing approximately 11% more school days than the rest of the district. Houck (2010) also found that from 2000 to 2003, teacher salaries in enhanced option schools averaged between US$4,000 and US$6,000 more than average salaries in attendance-zone schools, apparently reflecting the extra service required of teachers.[1] Support services were also more plentiful in enhanced option schools. Smrekar and Goldring (2009) reported that 17% of staff in enhanced option schools were designated for support services—such as a full-time nurse, a home–school coordinator, a psychological counselor, and a guidance counselor—compared with 7% in other types of schools. On surveys, teachers in enhanced option schools gave higher ratings to the adequacy of resources in their schools and noted that higher proportions of students who needed support services received them, compared with teachers in other schools (Smrekar & Goldring, 2009). Enhanced option schools also have pre-kindergarten programs and after-school care, either at the school or at a nearby community center (Smrekar & Goldring, 2009).

The district also operates a variety of magnet schools. Academically selective magnet schools were originally created to avoid desegregation, but racial quotas enacted during the 1980s and 1990s created racial balance in the selective magnet schools. Since the desegregation plan was lifted, these schools have become predominantly White. Meanwhile, non-selective magnet schools, created during the desegregation period to attract Whites into Black neighborhoods with special scholastic offerings, have seen increasing enrollments of African Americans since court-ordered desegregation has ended. The district has recently created a third type of magnet school, called "design centers," which have specialized missions and voluntary choice enrollment but with access limited to a geographic cluster instead of city-wide choice. Among the themes of design center schools are Spanish Immersion, Advanced Academics, Language and Literature, Global Environmental Awareness, Paideia, Montessori, and Health and Medical Sciences. Located in predominantly Black areas, these too are largely African American in their enrollments. Thus, with the shift from controlled choice to open choice, the racial compositions of magnet schools have polarized, just like the attendance-zone schools (Gamoran, An, & Smrekar, 2005). Unlike enhanced option schools, design center and other magnet schools do not receive additional resources: Their class sizes are similar, average teacher salaries are no greater, and their school year is like that of the regular attendance-zone schools (Houck, 2010).

A remarkable feature of the new school assignment policy in Nashville is its subsequent stability. Despite leadership turnover (including new superintendents in 2001 and 2009), increasing accountability demands, and fluctuating budgetary pressures, the system of zoned, enhanced option, and magnet schools has remained in place for 15 years. Resource flows to enhanced option schools, in particular, have remained stable; in 2008, the 20 extra days of schooling were replaced with an extra 45 minutes each school day, and class sizes in Grades 4 and 5 have climbed to 20 students, but class size limits in Grades K–3 remain fixed at 15 and the array of support services and after-school care remain salient in the enhanced option schools (Metropolitan Nashville School District, 2009).

Expected Impact of School Segregation and School Resources

How should we expect the resegregation of Nashville's schools, combined with the creation of high-resource "enhanced option" schools and an expanding system of magnet schools, to affect the Black–White achievement gap? In the tradition of the Coleman report (1966) and the studies that followed it (e.g., Hanushek, Kain, & Rivkin, 2009; Linn & Welner, 2007; Schofield, 1995), we may expect test scores to be lower in racially isolated Black schools and in schools with high concentrations of children in poverty. As Black students are likely to attend increasingly segregated schools after desegregation ends, one may anticipate a rise in the Black–White achievement gap. If the scores of White students are positively affected by moving to predominantly White schools (a pattern that is not well tested in the existing literature), that would further exacerbate achievement inequality.

Do compensatory resources ameliorate achievement gaps? The research literature is equivocal. Studies from the 1960s to the 1980s found little evidence that average school resources had much influence on variation in student achievement (e.g., Barr & Dreeben, 1983; Coleman et al., 1966; Jencks et al., 1972). The general conclusion was that "throwing money at schools" was an ineffective approach to reform (e.g., Hanushek, 1996), although targeting resources at particular strategies such as improving teacher quality might have an impact (e.g., Murnane, 1975; Murnane & Levy, 1996). Although the impact of average resources was small, it may have been greater than zero. In a widely discussed meta-analysis, Greenwald, Hedges, and Laine (1996) found that increased expenditures and other resource indicators were associated with higher achievement. Most recently, the allocation of resources to a particular strategy—reduced class size in early elementary school—has been shown to have a positive effect on achievement in experimental as well as survey studies (Ehrenberg, Brewer, Gamoran, & Willms, 2001; Mosteller, Light, & Sachs, 1996). Although not universally accepted, the balance of the evidence suggests that increased resources may elevate achievement if the resources are directed to specific effective strategies.

Enhanced option schools in Nashville applied additional resources in line with research-based strategies. Reduced class size and additional school days have been supported in the research literature (Ehrenberg et al., 2001; Wiley & Harnischfeger, 1974). The evidence on after-school care is mixed, but some studies find that after-school care that provides homework or other academic support benefits student learning (Bell, Lewenstein, Shouse, & Feder, 2009; Bissell et al., 2003; Dynarski et al., 2004). Because enhanced option schools are predominantly composed of African American students, if the extra resources have their intended effects, the Black–White achievement gap may narrow rather than expand following the end of school desegregation, despite increased racial isolation that occurs as students attend school closer to where they live (Goldring et al., 2006).

In a concurrent study of the end of court-ordered desegregation in Charlotte-Mecklenburg, North Carolina, Billings, Deming, and Rockoff (2014) found that returning students to schools closer to their residences led to increased Black–White segregation and lower high school test scores and high school completion rates for minority students. Depressed achievement and attainment occurred only for the first cohort affected by the change in assignment policies, as subsequent cohorts did not exhibit diminished educational outcomes. The authors attributed their findings on achievement and attainment to compensatory resources that came too late to benefit the first cohort of students but in time to help others. In Charlotte-Mecklenburg, these resources included lower student–teacher ratios, school building renovations, additional supplies and equipment, and recruiting bonuses for teachers, all directed at schools with high concentrations of students in poverty (Mickelson, Smith, & Southworth, 2009). According to Billings et al. (2014), compensatory resources mitigated the effects of increasing segregation on educational outcomes.[2] If that holds for Nashville, students in enhanced option schools may not lose out academically even if segregation rises.

As with studies of school resources, research on the impact of magnet schools is also inconclusive. The only national study of urban magnet schools and student achievement concluded that magnet high schools boosted student achievement in reading, science, and social studies (but not mathematics) compared with public comprehensive schools (Gamoran, 1996). These results were robust to selectivity corrections implemented through statistical modeling. However, a study of career magnets in New York City, which compared lottery winners with lottery losers to rule out selectivity bias, found no test score effects (Crain et al., 1999). These studies, moreover, examined magnet schools during the desegregation era, when enrollments were typically managed through "controlled choice" plans, that is, plans that relied on racial quotas to ensure racially balanced enrollments. No evidence exists on what may happen to achievement trajectories when enrollment controls are lifted. Consequently, it is difficult to predict the implications for achievement gaps of an increase in magnet school options coupled with the elimination of racial enrollment criteria. As the academically selective magnet schools are becoming more White, and the non-selective magnets are increasingly Black, one may speculate that magnet schools may contribute to wider achievement gaps—not because of the effects of magnet schools per se, but because they constitute a form of between-school tracking which, because Whites tend to be over-enrolled and Blacks under-enrolled in the most selective locations, magnifies the overall achievement gap (Lucas & Gamoran, 2002).

A distinctive feature of Nashville's changes in school assignment policies is that students now attend fewer schools over their elementary and secondary careers than they did under the previous plan developed to satisfy the court order. Prior to 1998, the typical student attended five schools: one from Grades K–2, another for Grades 3 to 4, another in Grades 5 to 6, followed by another school in Grades 7 to 8, and concluding with a high school from Grades 9 to 12. This system was developed to allow students to attend school close to home in some grades after being bused farther away in other grades (Smrekar & Goldring, 2009), and its complexity and instability was the source of widespread dissatisfaction (Winders, 2013). Under the new system, the typical student attends just three schools: an elementary school for Grades K–4, a middle school for Grades 5 to 8, and a high school for Grades 9 to 12. In light of prior research indicating that changing schools tends to disrupt student achievement trajectories (Grigg, 2012), attending fewer schools may also help elevate achievement. However, as Black and White students were similarly affected by the initiation and dismantling of busing, this change is unlikely to affect racial gaps in achievement.

This discussion gives rise to four research questions that can be addressed with data from Nashville:

Research Question 1: What happened to achievement gaps following the end of court-ordered desegregation in Nashville?

Based on prior research, one would expect that this policy change has led to increasing racial and economic segregation and contributed to larger achievement gaps.

Research Question 2: Did the allocation of compensatory resources to the most segregated schools via the mechanism of enhanced option schools mitigate the impact of segregation?

Past research suggests that compensatory resources may help prevent achievement gaps from widening despite increased segregation. The particular ways in which resources were used in Nashville—for smaller classes, extra learning time, and enhanced support services—have boosted learning in past research, so gains from compensatory resources seem likely in this case.

Research Question 3: Did the creation of specialized magnet schools further mitigate the consequences of ending court-ordered desegregation, either by limiting segregation or boosting achievement?

Evidence on magnet school effects is equivocal, and positive effects may not emerge in the Nashville context. Whereas selective magnet schools became increasingly populated by White students after the policy change, non-selective magnets were largely attended by Black students; thus the magnet schools did not hold back increases in segregation, and it is not clear whether the non-selective schools contributed to achievement gains more than neighborhood schools.

Research Question 4: Did the reduction in moves from one school to another (the new assignment policy no longer requires a school change between Grades 2 and 3 or Grades 6 and 7) elevate achievement?

As school mobility is associated with achievement losses, fewer moves may raise achievement, but it is unlikely to reduce achievement gaps because it applies similarly to students of all ethnic groups.

Fundamentally, this research is a case study, with features that are distinctive to Nashville. As a case study of the aftermath of court-ended desegregation, however, it has national policy implications. The specific features of the Nashville plan, including the deployment of compensatory resources and the use of choice, are relevant for a wide range of urban districts, and the resources selected—extra learning time, smaller class sizes, and supplemental services—are relevant for districts across the United States that are currently confronted with significant achievement gaps.

Our analytic approach closely follows that of Hanushek et al. (2009), who employed a comparable design in their analysis of school composition effects in Texas, finding that Black racial isolation had a negative impact on achievement. Although their study relied on slight enrollment fluctuations from year to year to identify school composition effects, our analysis of Nashville has the advantage of much greater variation in the composition and characteristics of the school a student attends from one year to the next, due to the shifting policy context. The natural experiment presented by Nashville's changing schools offers a powerful opportunity to test the effects of school characteristics—both composition and policy features—on levels and inequalities of student achievement.

Data and Method

To conduct our study, we used longitudinal data from the Nashville school district records. The sample included around 5,200 students in each grade level (3–8) over 5 school years, from 1998–1999 to 2002–2003. Because we used prior achievement to adjust for student selectivity, we excluded eighth graders in 1998–1999 and third graders in 2002–2003 (because these students had only 1 year of data in our time frame). Thus, our total sample included 51,167 unique students. We further excluded 10,851 students in other grades and years who had only one test score because of attrition. Finally, we excluded 1,042 students with multiple, but non-consecutive test scores. As a result, our analytical sample included 39,274 students, or 77% of the total 5-year sample.

We obtained good year-to-year coverage of student achievement because we have test scores of students even if they changed schools (as long as they remained in Nashville public schools). On average, we lost approximately 10% of the students from one year to the next. For our cohorts of maximum length—that is, third and fourth graders in 1998–1999 who remain in the data for 5 years—we retained about 55% of students for 5 years, and we retained more than 70% of these students for at least 4 years. We also included additional students who enrolled in a Nashville public school after 1998 along the way.

We compared students who remained in the sample with those who were excluded or attrited and found few meaningful differences. For example, test score differences across these samples generally ranged from 1 to 3 points (compared with standard deviations more than 40 points) and the direction of the differences varied. As shown in Online Appendix Table A1 (see the online appendix, available at http://epa.sagepub.com/supplemental), differences in percentages of students on free or reduced-price lunch were trivial in Grades 3 to 5, but rose to 6 to 10 percentage points in Grades 6 to 7, with lower percentages among those who remained in the sample. The only consistent difference across samples was that students who remained in the sample were more likely to exhibit discipline problems than those who attrited. Overall, the data provide a relatively complete picture of achievement in the Nashville public schools, and we can monitor growth for individual students as well as trends over time.

Our sample includes 110 schools attended by students in Grades 3 to 8 (the range of achievement data). Eleven of the 110 schools came into existence after the first year of our data series and 9 schools were eliminated before the last year. The remaining schools existed throughout the period of our analysis. At any given point in time, the number of schools varied from 99 to 102. The schools included 5 enhanced option schools and 16 magnet schools, including 2 selective magnets, 9 non-selective city-wide magnets, and 5 non-selective geographic clusters ("design centers"). The remaining schools were attendance-zone or "neighborhood" schools for all or part of the time period. Table A2 in the online appendix (available at http://epa.sagepub.com/supplemental) displays the numbers of schools and students in the sample, separately for each year.

Between 1998–1999 and 1999–2000, five attendance-zone schools changed their school type: Two zoned schools became magnet schools, two changed to enhanced option schools, and one became a design center school. In 2000–2001, one zoned school became an enhanced option school and two more became design center schools. The next year (2001–2002) two more zoned schools were converted to enhanced option schools and in 2002–2003, the last year of our data series, one zoned school became a design center school and one new design center school was established.

Dependent Variable

To measure achievement, we used students' scores on the Tennessee Comprehensive Assessment Program (TCAP), which included Terra Nova standardized tests of reading and mathematics for all students in Grades 3 to 8. (Means and standard deviations of all variables are provided in Online Appendix Table A3, available at http://epa.sagepub.com/supplemental.) These tests are aligned with state performance indicators and are equatable across grades and years. (For more information about the TCAP achievement tests, see Tennessee Department of Education, 2010.)

Independent Variables

Student- and school-level predictors also derive from school district administrative records. Individual background indicators included race/ethnicity, gender, free-lunch status, English language learners, and disability status. We also included an indicator of whether a student committed a serious disciplinary infraction that led to a suspension or expulsion; we lagged this indicator by a year to ensure it pre-dated changes in school type and composition. We further included three indicators of whether students changed schools during the time covered by our data. The first captures students who changed schools during the school year. The second indicates school changes that reflect grade promotion; for instance, sixth graders may attend a school that does not have a seventh grade and they therefore would need to change schools after the end of academic year. The third school-change variable captures any other school changes from one year to the next for reasons besides grade promotion. At the school level, the data include indicators of school type (enhanced option and magnet vs. zoned), as well as measures of racial and economic composition—percent Black and percent of students on free or reduced-price lunch for each grade level at each school.

Statistical Model

Two types of selectivity pose major challenges for work of this nature. One type of selectivity occurs at the school level: If school changes in composition or type are *endogenous* to prior school effects—for example, if schools that are performing especially well or especially poorly are more likely than others to become magnet or enhanced option schools—it may appear that school type or composition has a particular effect on students, when in fact, changes in school type or composition are *responses* to school performance rather than causes. We address this challenge by incorporating in our models a range of fixed effects that account for stable grade and school factors that likely affect our estimates.

The second type of selectivity occurs at the student level. It may be that accomplished students gravitate toward schools of particular type or composition, making it appear that school type or composition affects achievement when achievement differences actually reflect who attends which school rather than the differential effects of schools. We address this challenge by controlling for individual-level characteristics, including prior achievement and a host of background variables, that potentially affect both selection into schools and subsequent achievement.

Formally, we modeled achievement Y for student i in grade G and year T as

$$Y_{iGT} = \alpha_{iGT} + \beta \mathbf{X}_{iGT} + \gamma \mathbf{S}_{iGT} + \delta_S + \lambda_G + \psi_T + \theta_{SG} + \xi_{GT} + \eta_I + \varepsilon_{iGT}, \quad (1)$$

where **X** and **S** represent vectors of time-varying covariates at the student level (e.g., disciplinary sanctions and school change), and the school and grade level (e.g., racial composition, economic composition, and school type). We further included fixed characteristics of the school (δ), grade (λ), and year (ψ), as well as school-by-grade (θ) and grade-by-year (ξ) interactions. Finally, ε represents the error term.

School fixed effects (δ) absorb time-invariant differences in schools, and to some extent, neighborhoods. Grade (λ), year (ψ), and grade-by-year (ξ) fixed effects adjust for statewide changes in achievement by grade and year, as well as for changes in test difficulty. School-by-grade fixed effects (θ) account for time-invariant differences across grades within schools. These changes may include school- or district-wide factors (e.g., curriculum), as well as systematic variation in the achievement and student composition that varies by grade (Hanushek et al., 2009).

By including these fixed effects, our analyses focus on the effects of changes in the policy conditions—school composition and school type—that occurred within each school, measured at the level of a particular grade in a particular year. In this sense, each school-by-grade combination serves as its own control, and our analyses assess the impact of policy changes for successive cohorts that move through changing policy conditions.

With school-by-grade fixed effects in the model, estimates of how schools affect achievement derive from grade-level, time-varying characteristics of schools. All schools experience annual fluctuation in composition, and hence our estimates of composition effects are based on all 110 schools in the sample. Although 11 specialized schools were created during the period of our study, only 6 *changed* type during this time: One zoned school was converted to an enhanced option school in 2000–2001 and 2 more in 2001–2002, and 2 zoned schools became design center schools in 2000–2001 and 1 more in 2002–2003. With school-by-grade fixed effects in our models, estimates of school type effects derive from students' experiences in the 6 schools that changed type from zoned to enhanced option (3 schools) and zoned to design center (3 schools). These effects are estimated over hundreds of students, in 5 grade levels, for each school that underwent the change from zoned to enhanced option or design center; essentially 15 pooled analyses (3 schools times 5 grades) for each of the two school type changes.

We also included individual-level factors (η)—race/ethnicity, gender, free-lunch status, English language learner status, and disability status—into the model. We further included academic achievement in the prior year (α) to predict academic achievement of the current year (*Y*). This pretest measure captures a range of factors that influence a student's knowledge at the start of the current year, which also influences achievement at the end of the year (Hanushek et al., 2009).[3] This model meets our primary aim by allowing us to monitor the association between the changing racial composition of the Nashville schools and students' changing achievement levels.[4] Because students are clustered within schools, we estimated robust clustered standard errors to accompany the regression coefficients.

Results

We begin with descriptive findings for school composition and test score trends. Then, we present results of statistical models designed to test our hypotheses.

Changes in School Composition

As expected, Nashville's schools became increasingly segregated following the end of court-ordered desegregation. In 1998–1999, 11 schools had 70% or more Black enrollment; in 1999–2000, this number rose to 16, and by 2002–2003 it had nearly doubled to 21. Although the proportion of Black students in the district increased slightly during this time period (from 41% Black in 1995–1996 to 45% Black in 1999–2000, according to a school district report), the increase in high-minority schools was primarily a reflection of the change in assignment policies, which had an immediate impact. The prevalence of schools with half or more of their students on free or reduced-price lunch increased more gradually, from 55 in 1998–1999 to 66 in 2002–2003.

A more systematic analysis of segregation trends is presented in Table 1, which provides indices of Dissimilarity and Segregation. The index of Dissimilarly represents the proportion of students from one group or another that would need to change schools to bring about an even allocation of Blacks and Whites. Exposure indices gauge isolation by showing the exposure rate of one group to another, for example, the percentage of Blacks enrolled in the school of the average White student, overall and for each type. The Segregation index is the percentage divergence between the rate of exposure and the percentage of Whites in the district as a whole. This index can be decomposed, for example, to indicate segregation due to differences between types of schools (e.g., zoned and magnet), and differences within types of schools. For comparison, we also show trends in segregation by free and reduced-price lunch status.

The first row of Table 1 shows that the index of Dissimilarity for Blacks versus Whites increased from .28 to .35, a rise of 25% in 5 years. The Segregation index increased more than 50%, from .12 to .19 in the same period. Part of the increase was between types: In 1998–1999, when there were only two types of schools (zoned and magnet), virtually none of the segregation was between types, that is, the two types had similar racial compositions (even though the magnets included both selective and non-selective schools). That changed over time, as the new types of schools had distinctive racial compositions, particularly the nearly all-Black enhanced option schools. Meanwhile, segregation between schools within types also increased, as the attendance-zone schools diverged in their racial compositions, and as the selective magnets became increasingly non-Black and the non-selective magnets became increasingly Black.

By contrast, the lower panel of Table 1 shows that socioeconomic segregation was much more stable over time. The index of Dissimilarity, for example, increased from .36 in 1998–1999 to .38 in 2002–2003. Although the trend in socioeconomic segregation was little more than flat, it occurred at a relatively high level, as the Dissimilarity index for economic status substantially exceeded that for Blacks versus Whites at

TABLE 1
Segregation Indices for Nashville, 1998–2002 (Grades K–8)

	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003
Black–White segregation					
Index of Dissimilarity	.28	.33	.36	.34	.35
Total segregation	.12	.16	.19	.17	.19
Segregation between schools	.12	.14	.16	.14	.15
Segregation between types	.00	.02	.03	.04	.04
Exposure rates by types[a]					
Zone	.44	.45	.44	.45	.44
Magnet/design center	.55	.32	.26	.25	.24
Enhanced		.15	.06	.08	.07
Poor–non-poor segregation					
Index of Dissimilarity	.36	.37	.38	.37	.38
Total segregation	.19	.19	.20	.20	.19
Segregation between schools	.18	.18	.18	.17	.17
Segregation between types	.01	.02	.02	.03	.02
Exposure rates by types[b]					
Zone	.40	.41	.40	.38	.36
Magnet/design center	.63	.51	.51	.51	.46
Enhanced		.11	.09	.11	.12

[a]Exposure rate of Black students to White students.
[b]Exposure rate of students on free or reduced-price lunch to students not on free or reduced-price lunch.

the outset (.36 compared with .28) whereas it was only slightly higher than the rapidly rising Black–White rate at the end of the period (.38 vs. .35).

Trends in Achievement Gaps

Figure 1 displays changes in the racial achievement gaps over time, overall and adjusted for free-lunch status. The top two lines (squares and diamonds) show the raw gaps in mathematics and reading, respectively. (Other than year, grade, and gender, no fixed effects are included in the computations for this figure.) In mathematics, despite an initial drop, the gap at the end of the period was nearly as large as it was in the beginning. In reading, the achievement gap was about 2 points smaller in 2002–2003 than it was in 1998–1999, a statistically significant but a substantively small decline in inequality. The bottom two lines (circles and triangles) present the gaps controlling for free-lunch status. More than 40% of the gap in reading and nearly 30% in mathematics are attributable to race differences in economic standing, as reflected in the control for free lunch. Still, the racial gaps are substantial and the decline in reading, though still statistically significant, is small compared with the size of the gap. Thus, the larger context for the impact of policy changes we assess is one of persisting racial inequality. In light of the considerable increase in segregation, however, the lack of an *increase* in Black–White inequality is intriguing and further motivates our analyses.

Effects of School Composition and School Type

To test our hypotheses, we present results from two analytic models for each subject (reading and mathematics), and we estimate these models for the sample as a whole (which includes Whites, Blacks, Latinos, and Asians) and separately for White and Black students. The two models reveal the impact of school race and poverty composition (Model 1) and of school composition and school type (Model 2) on achievement in mathematics and reading.

Results for All Students. Table 2 displays findings for school composition and school type effects in reading and mathematics for the

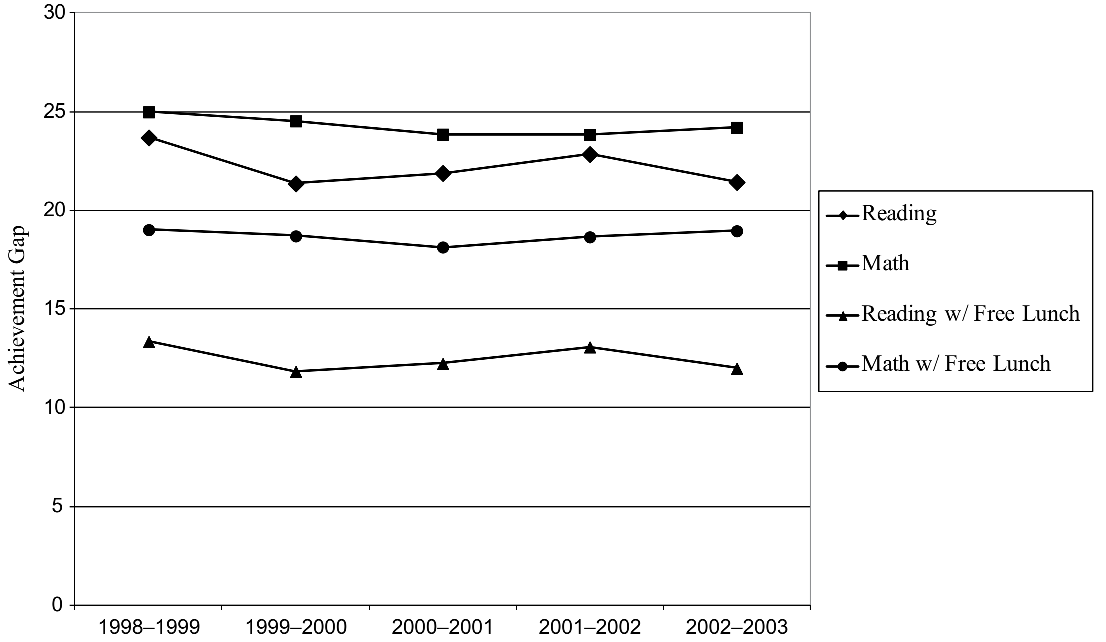

FIGURE 1. *Black–White achievement gap over time.*

sample as a whole. At the student level in both subjects, we see less achievement growth among Blacks and Latinos as compared with Whites, lower gains for students on free and reduced-price lunch compared with their more advantaged peers, and lower growth for special needs students than for non-disabled students.

In mathematics only, Asians exhibit more growth than students of other ethnic backgrounds, and girls gain less than boys, whereas English language learners gain less only in reading. Changing schools depresses achievement, whether during or between school years and whether for structural or other reasons (see Grigg, 2012, for further analysis of mobility patterns in these data). Interestingly, the largest negative coefficients are for structural changes, an event that was reduced from 4 times to 2 times over the course of a student's school career following the change in assignment patterns (or from 2 times to 1 time during Grades 3–8, the span covered by our data). Students who had experienced disciplinary problems also exhibit lower achievement gains than other students.

Turning to our main interest, the first and third columns exhibit small positive coefficients for racial composition and larger negative coefficients for economic composition, but none of these is statistically significant.[5] The second and fourth columns add predictors for school type, and the analysis reveals a significant positive effect of enhanced option schools in mathematics, with a coefficient that is more than twice as large in mathematics (10.66) as in reading (4.10). The results also show significant negative effects of magnet/design center schools in both subjects. Note that the magnet/design center school effect does not derive from the selective magnet schools in the data set, which underwent no change during the period under study. Instead, it reflects the creation of three design center schools, which had specialized missions but, unlike the enhanced option schools, did not receive supplementary resources. The negative coefficient for the percentage of students on free and reduced-price lunch on reading achievement is also statistically significant in this model.

Results for Whites and Blacks Separately. Table 3 replicates the results for Table 2, but analyzed for Whites only. Whereas the student-level parameters are similar, the school-level results are quite different. There are no significant effects of enhanced option or magnet schools in either subject. As few Whites attended enhanced option schools, it is not surprising that no effects emerge.

TABLE 2

Effects of School Composition and School Type in Reading and Mathematics for All Students

	Reading		Math	
Prior year's achievement	0.69***	0.69***	0.72***	0.72***
	(0.004)	(0.004)	(0.005)	(0.005)
Black	−4.79***	−4.79***	−4.25***	−4.25***
	(0.22)	(0.22)	(0.21)	(0.21)
Latino	−2.66***	−2.66***	−3.00***	−3.00***
	(0.48)	(0.48)	(0.52)	(0.52)
Asian	−0.19	−0.19	4.23***	4.22***
	(0.48)	(0.48)	(0.54)	(0.54)
Female	0.03	0.03	−0.81***	−0.82***
	(0.18)	(0.18)	(0.18)	(0.18)
Free/reduced lunch	−4.01***	−4.01***	−3.38***	−3.37***
	(0.21)	(0.21)	(0.20)	(0.20)
Handicapped	−7.68***	−7.68***	−9.36***	−9.36***
	(0.33)	(0.33)	(0.37)	(0.37)
ESL	−1.38***	−1.38***	0.51	0.51
	(0.37)	(0.37)	(0.36)	(0.36)
School change (within year)	−1.31***	−1.31***	−1.98***	−1.98***
	(0.36)	(0.36)	(0.40)	(0.40)
Student mobility (structural)	−2.58***	−2.54***	−2.71***	−2.63***
	(0.39)	(0.39)	(0.47)	(0.47)
School change (other switch)	−1.24***	−1.23***	−1.50***	−1.46***
	(0.29)	(0.29)	(0.37)	(0.37)
Prior year's discipline problem	−2.47***	−2.47***	−3.06***	−3.06***
	(0.20)	(0.20)	(0.22)	(0.22)
Proportion Black (grade)	0.44	0.77	0.87	1.65
	(1.99)	(1.99)	(3.13)	(3.11)
Proportion free/reduced lunch (grade)	−3.71	−4.06*	−4.91	−5.71
	(1.93)	(1.95)	(3.08)	(3.07)
Magnet/design center		−2.30*		−5.19**
		(0.99)		(2.01)
Enhanced option		4.10		10.66**
		(2.61)		(3.98)

Note. All models include school, grade, year, year-by-grade, and school-by-grade fixed effects. Robust clustered standard errors are reported in parentheses. N = 83,314 student-years. ESL = English as a second language.
*p < .05. **p < .01. ***p < .001 (two-tailed).

Moreover, when Whites attended magnet schools, they tended to enroll in the selective magnets, so the lack of effects for the non-selective design center schools is also unsurprising. With respect to composition, the parameters more closely replicate those in Table 2, particularly the negative coefficients for high proportions of low-income students, though they are not statistically significant.

Results for Blacks appear in Table 4. In this case, the concentration of low-income students has a significant negative effect on reading achievement. By contrast, achievement growth is insensitive to the concentration of Black students. As in the sample for all students, the effects of magnet schools are negative and those of enhanced option schools are positive, with the enhanced option effect again larger in mathematics than in

TABLE 3
Effects of School Composition and School Type in Reading and Mathematics for White Students

	Reading		Math	
Prior year's achievement	0.71***	0.71***	0.74***	0.74***
	(0.005)	(0.005)	(0.01)	(0.01)
Female	−0.41	−0.41	−1.42***	−1.43***
	(0.27)	(0.27)	(0.27)	(0.27)
Free/reduced lunch	−3.87***	−3.86***	−3.35***	−3.34***
	(0.33)	(0.33)	(0.33)	(0.33)
Handicapped	−5.39***	−5.38***	−7.25***	−7.25***
	(0.44)	(0.44)	(0.51)	(0.51)
ESL	−3.20***	−3.20***	0.26	0.27
	(0.60)	(0.60)	(0.59)	(0.59)
School change (within year)	−1.90**	−1.90**	−1.59*	−1.59*
	(0.67)	(0.67)	(0.71)	(0.71)
Student mobility (structural)	−2.39***	−2.38***	−2.89***	−2.86***
	(0.62)	(0.62)	(0.68)	(0.68)
School change (other switch)	−1.11*	−1.10*	−2.00***	−1.97***
	(0.47)	(0.47)	(0.57)	(0.57)
Prior year's discipline problem	−2.13***	−2.13***	−3.43***	−3.43***
	(0.34)	(0.34)	(0.38)	(0.38)
Proportion Black (grade)	1.63	1.67	−0.90	−0.51
	(2.61)	(2.62)	(3.89)	(3.92)
Proportion free/reduced lunch (grade)	−3.68	−3.82	−5.39	−5.92
	(2.54)	(2.55)	(3.75)	(3.76)
Magnet/design center		−0.92		−5.71
		(1.35)		(4.02)
Enhanced option		−5.87		0.32
		(5.34)		(5.22)

Note. All models include school, grade, year, year-by-grade, and school-by-grade fixed effects. Robust clustered standard errors are reported in parentheses. N = 36,850 student-years. ESL = English as a second language.
*p < .05. **p < .01. ***p < .001 (two-tailed).

reading and statistically significant in both subjects. Thus, the effects of enhanced option schools pertain to the Black students who constitute the vast majority of their student populations.[6] Online Appendix Table A4 (available at http://epa.sagepub.com/supplemental) shows that of the school composition and school type effects, only the enhanced option effects are significantly different in the Black and White subsamples.

Robustness Checks

We estimated a variety of additional models to assess the robustness of our findings to modeling assumptions. Full results from these models are available on request.

Collinearity of Percent Black and Percent Free Lunch. One concern is that the negative effects of the percentage of students on free and reduced-price lunch coupled with non-significant, positive coefficients for percent Black might reflect a pattern of collinearity rather than school effects. (Percent Black and percent free lunch are correlated at .62.) To check for this possibility, we re-estimated each of the models in Tables 3 and 4 with only one compositional indicator (racial composition or poverty composition). We found that percent free and reduced-price lunch retained its negative effect in each model, with the significant effects for Blacks remaining significant in the robustness check. Meanwhile, the coefficients for percent Black

TABLE 4
Effects of School Composition and School Type in Reading and Mathematics for Black Students

	Reading		Math	
Prior year's achievement	0.66***	0.66***	0.68***	0.68***
	(0.005)	(0.005)	(0.006)	(0.006)
Female	0.47*	0.46*	−0.29	−0.30
	(0.23)	(0.23)	(0.23)	(0.23)
Free/reduced lunch	−3.54***	−3.54***	−2.99***	−2.99***
	(0.27)	(0.27)	(0.27)	(0.27)
Handicapped	−10.65***	−10.66***	−12.26***	−12.26***
	(0.46)	(0.46)	(0.46)	(0.45)
ESL	1.84**	1.85**	2.35***	2.35***
	(0.63)	(0.63)	(0.60)	(0.60)
School change (within year)	−1.01*	−1.02*	−1.96***	−1.97***
	(0.43)	(0.43)	(0.47)	(0.47)
Student mobility (structural)	−2.45***	−2.38***	−2.15***	−2.02***
	(0.47)	(0.47)	(0.56)	(0.55)
School change (other switch)	−1.11**	−1.08**	−1.10*	−1.05*
	(0.36)	(0.36)	(0.44)	(0.44)
Prior year's discipline problem	−2.58***	−2.58***	−2.70***	−2.69***
	(0.25)	(0.25)	(0.28)	(0.28)
Proportion Black (grade)	−1.25	−0.58	2.81	4.04
	(2.54)	(2.51)	(3.47)	(3.41)
Proportion free/reduced lunch (grade)	−4.81*	−5.50*	−4.97	−6.07
	(2.43)	(2.47)	(3.51)	(3.50)
Magnet/design center		−3.02**		−4.82**
		(1.10)		(1.84)
Enhanced option		6.30*		12.71***
		(2.55)		(3.86)

Note. All models include school, grade, year, year-by-grade, and school-by-grade fixed effects. Robust clustered standard errors are reported in parentheses. $N = 40{,}552$ student-years. ESL = English as a second language.
*$p < .05$. **$p < .01$. ***$p < .001$ (two-tailed).

never achieved statistical significance, although they sometimes changed sign from positive to negative. Thus, it is unlikely that collinearity has accounted for our findings.

Compositional Effects Between Schools Versus Effects Across Grades Within Schools. A second issue is that our models do not distinguish between differences across schools in compositional change and those that reflect differences across grades within schools. We assessed this possibility by including school-by-year fixed effects. These models preclude estimation of school type effects (because school types do not vary within schools in a given year) but they allow estimation of compositional effects, focusing on differences across grades within schools. As in our original models, these results failed to yield significant effects for racial composition, and as depicted in Online Appendix Table A5 (available at http://epa.sagepub.com/supplemental), all the coefficients were small and positive. At the same time, the coefficients for poverty composition remained negative and similar to those in the original results, with the exception of the coefficients in math for Whites and in reading for Blacks, both of which dropped to near zero. However, even these differences from the original model were not statistically significant. On the whole, and particularly with respect to our main question about racial composition effects, the results are robust to the inclusion of school-by-year fixed effects.[7]

Inclusion of Additional Tests of Prior Achievement as Student Controls. A third concern is that whereas school fixed effects rule out selectivity among schools that change composition and type, we have relied on statistical modeling to adjust for selectivity among students who attend schools of different types and compositions. We can increase the rigor of this control by taking into account a second prior test score, which we do in two alternate ways: including a second year of prior achievement (i.e., a 2-year lag) and including prior achievement in the opposite subject (i.e., controlling for prior math score in the reading analysis and vice versa). For comparability, we maintained the original sample by imputing a second test score for cases that had only one. As portrayed in Online Appendix Table A6 (available at http://epa.sagepub.com/supplemental), the original results (left column) are highly robust to both alternative specifications (middle two columns), as the coefficients closely replicate those of the original models and yield the same conclusions.

School Type Effects Versus Student Mobility Effects. A fourth issue is that our results do not distinguish between effects for students who move from one school type to another and effects for students who remained in schools that changed types from one year to the next. This is an important concern because of the possibility that schools are selecting students with varied achievement trajectories rather than having effects on those trajectories. Consequently, we re-estimated our models focusing only on schools that changed type, and only on students who stayed in the same schools during the transition. As shown in the right column of Online Appendix Table A6, our findings about school type are unaffected by these constraints.[8] The compositional effects were more volatile, however, with inflated standard errors possibly derived from the smaller and more constrained sample of schools. In particular, percent Black exhibited a larger positive effect on math achievement and a larger negative effect on reading achievement, compared with the original analysis. On the whole, however, the constrained sample largely reproduces the original findings.

Interactions of School Type by Prior Achievement. A final possibility is that the school type and composition effects may operate differently for students in different parts of the achievement distribution. This is a particular concern because Blacks and Whites had different average levels of achievement, so it is worthwhile to consider whether the Black–White differences in the effects of enhanced option schools may reflect achievement interactions rather than race interactions. However, supplementary analyses yielded little evidence of interactions for prior achievement by school type and composition. One exception to that conclusion is that higher achieving Black students suffered more from attending schools with high proportions of students on free and reduced-price lunch than lower achieving Black students, a pattern that did not emerge among Whites. We also note that our data may not be well suited to this additional degree of model complexity, as the standard errors in these models became very large. Hence, this issue may deserve further attention. In any case, these additional analyses did not change our main conclusions.

School Effects Over Time: Simulations

Whereas the pattern of results is reasonably clear and robust, the coefficients alone do not reveal the overall effects of schools over time. For a fuller picture, we simulate the effects of school type and composition for hypothetical students who encountered particular patterns of school enrollment that are of policy interest. The simulations are displayed in Figures 2 (reading) and 3 (mathematics). Each simulation begins with a third-grade student in 1998–1999 (prior to enactment of the reform) whose achievement was average for his or her racial group in that grade and year. Then, based on the separate fixed effect regressions for Whites and Blacks (see Tables 3 and 4), we simulate the student's achievement trajectory under three different scenarios of school enrollment:

- A White student who remained in a zoned (neighborhood) school over the entire period (1998–1999 to 2002–2003);

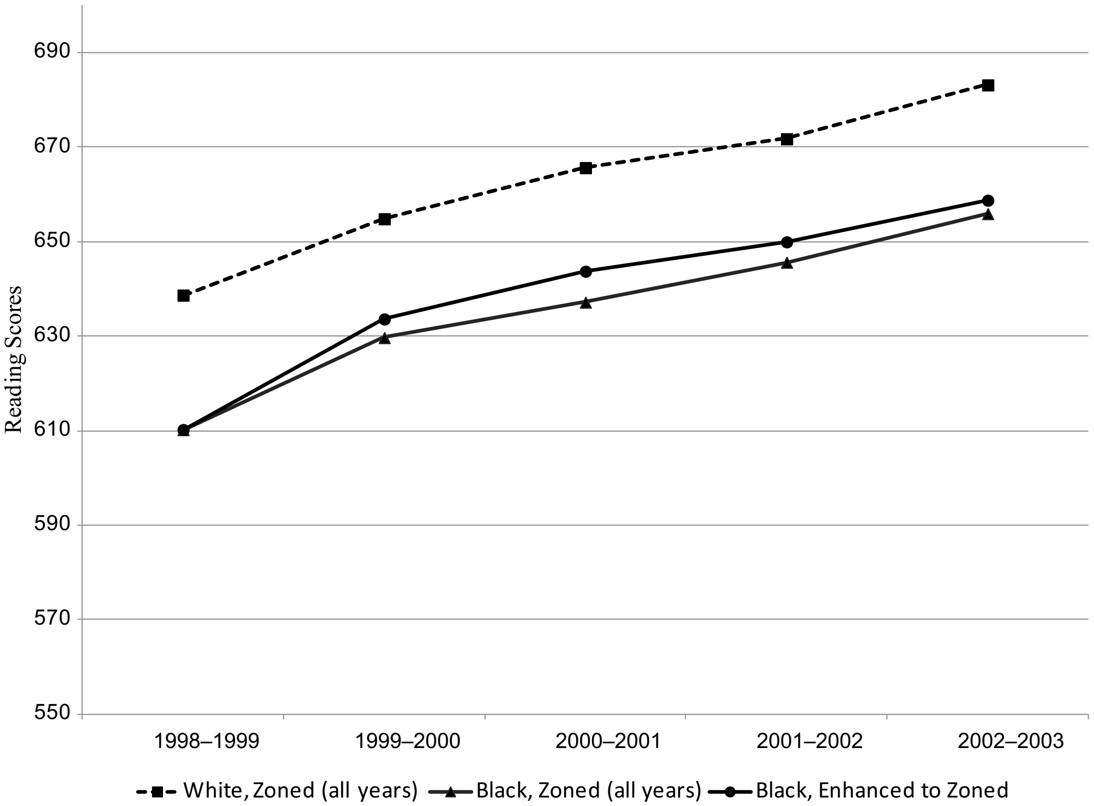

FIGURE 2. *Simulated reading achievement of hypothetical student by school type.*

- a Black student who remained in a zoned school over the entire period; and
- a Black student whose school changed from zoned to enhanced option in 1999, and who then moved back to a zoned school in 2001.

For the simulations, we allow school type to vary according to the enrollment pattern in each scenario, and school composition parameters are set to the race-, grade-, and year-specific means for that school type. For example, the school composition parameters in the first scenario are those of a zoned school attended by the average White student in that grade and year, and the school compositions in the second scenario are those of a zoned school attended by the average Black student in that grade and year. In the third scenario, the school composition parameters are those of a zoned school in 1998–1999, 2001–2002, and 2002–2003, and of an enhanced option school in 1999–2000 and 2000–2001. Likewise, student-level parameters are set at the average for the specific race, grade, and year for each scenario, except for prior achievement which, after third grade, is the simulated achievement level of the previous year in that scenario.

The most striking pattern in Figure 2 is the dramatic Black–White achievement gap that persisted throughout the period. The benefits of enhanced option schools, though evident in the figure, are dwarfed by the achievement gap. Note that in the simulation, the benefit of the enhanced option gain is tempered by the loss created by high concentrations of low-income students in enhanced option schools.

Figure 3 portrays the same simulations for mathematics. Although the patterns are largely the same—a large achievement gap, small benefits of changing schools fewer times—the larger effects of enhanced option schools that appeared in the mathematics analyses are more pronounced in the figure. For students who attended enhanced option schools, the achievement gap was notably narrowed—and this occurred despite the dampening effects of increased proportions of low-income students. Moreover, the simulation suggests that

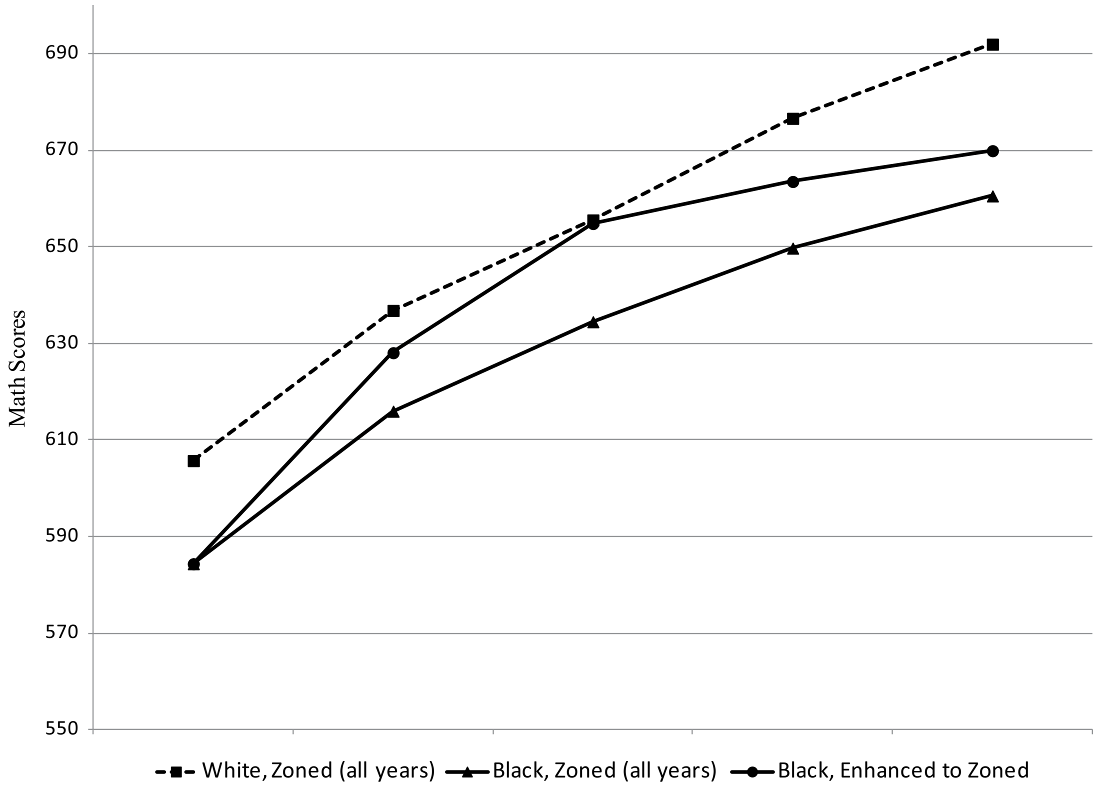

FIGURE 3. *Simulated math achievement of hypothetical student by school type.*

enhanced option schools provided sufficient "lift" over 2 years to close the Black–White achievement gap. This is the case because (a) enhanced option effects in mathematics were large, both in an absolute sense and relative to the achievement gap and to composition effects; (b) the creation of enhanced option schools was a policy that served Blacks far more than other students; and (c) most clearly in mathematics, enhanced option schools benefitted Blacks while they neither helped nor harmed Whites. As students transitioned back to zoned schools, however, the simulations reveal that the gains were diminished.

Discussion and Conclusion

We are now in position to answer the research questions that prompted this investigation:

1. As court-ordered desegregation ended, Black–White segregation between schools increased. This occurred both between school types and, for magnet schools, within school types. Increased racial segregation did *not* magnify achievement gaps, but the concentration of low-income students exacerbated achievement inequality.
2. Compensatory resources, as manifested by enhanced option schools, mitigated the effects of economic segregation. Nonetheless, achievement gaps remained wide, especially in reading. Simulations suggest that enhanced option schools helped narrow the achievement gap in mathematics, but the gains diminished after students returned to zoned schools.
3. Non-selective magnet/design center schools did *not* counteract the effects of increasing segregation; in contrast, the non-selective design center schools, which were heavily populated by Black students, tended to work to the detriment of students who attended them, compared with attendance-zone schools.

4. Reduction in the number of times students were required, by district policy, to change schools had benefits for achievement, further mitigating the potential negative effects of increased segregation that accompanied the end of court-ordered desegregation. However, this benefit was a relatively small part of the overall policy effects.

A major question about these findings concerns their generalizability. We may have confidence about these patterns in Nashville, but would they hold in other settings? It seems clear that the effects of school racial composition are context specific. For example, applying similar models to data from the entire state of Texas, Hanushek et al. (2009) found that increases in the proportion of Black students negatively affected student achievement. By contrast, we found no changes in achievement that derived from increases in the proportion of Black students, although increasing proportions of students on free and reduced-price lunch tended to reduce achievement. Hanushek, Kain, and Rivkin's main analyses did not include the percentage of students on free or reduced-price lunch, but they reported that their findings for percent Black were not sensitive to the inclusion of this variable. These contrasting results may reflect the different conditions under which racial composition varied: Whereas the Texas analyses relied on natural variation from one year to the next, the Nashville case involved deliberate manipulations in school assignment policies from which changes in racial composition were anticipated. This anticipation may have resulted in a greater sensitivity to the challenges of increasing segregation, which at a minimum may have prevented the unequal allocation of resources that has accompanied segregation in the past. The ultimate manifestation of this anticipation, of course, was the creation of enhanced option schools designed to mitigate the effects of increasing segregation. As Reardon et al. (2012) argued, resegregation is occurring under conditions that differed from those that brought about segregation, so it is not surprising that the results may vary.

Although our results for racial composition are different than those of Hanushek et al. (2009), they are strikingly similar to those of Billings et al. (2014), who studied a similar natural experiment in Charlotte-Mecklenburg. The latter study had the additional feature of comparing effects for a cohort that experienced increased segregation without additional school resources with effects for a second cohort that experienced increased segregation along with additional resources for racially isolated schools. Whereas segregation had negative effects on achievement for the first cohort, it did not in the second. Viewing the results from Nashville alongside those from Charlotte-Mecklenburg lends confidence to the conclusion that compensatory resources may buffer the effects of racial isolation on educational outcomes for Blacks. In addition to compensatory resources, both Nashville and Charlotte-Mecklenburg created conditions under which students began to attend school closer to home, which may also have contributed to the absence of negative education effects of attending school with high proportions of minority peers (Goldring et al., 2006).

Importantly from a policy perspective, Nashville offers an explicit comparison of three strategies for dealing with compositional changes: schools with enhanced resources but without a specialized mission or theme, schools with specialized themes without enhanced resources, and attendance-zone schools without enhanced resources. We observed increases in racial isolation in all three types of schools, but the achievement patterns differed substantially: Compared with zoned schools, achievement in the special-themed design center schools declined, whereas achievement in the extra-resourced enhanced option schools rose. In Nashville, extra resources were a more effective strategy than school choice for elevating the achievement of Black students. Although the findings are specific to Nashville, they are promising enough to warrant further experimentation in other districts struggling to reduce achievement gaps in an era of court-ended desegregation.

It is also important to recognize that our findings on resources are limited to elementary schools. We do not know whether the achievement benefits of enhanced option schools would have been sustained in later grades.[9] Research on class size indicates that smaller classes matter chiefly in kindergarten and first grade; although class size effects are sustained over time, they do not increase even when small classes persist

(Ehrenberg et al., 2001). Although class size reduction is not the only element of enhanced option schools, it is an important one. Indeed, as there are no district-wide achievement data prior to Grade 3, our analyses may have understated the benefits of enhanced option schools.

In light of findings from other jurisdictions about the negative consequences of racial isolation for the achievement of African Americans, and in consideration of the moral and constitutional objections to isolation discussed in the *Brown* decision, our findings cannot be taken as a dismissal of the problems of racial isolation. However, in a context in which the courts are unsympathetic to desegregation as a policy lever, our results suggest that significant and sustained levels of compensatory resources, used for high-impact practices such as smaller classes, longer school days, and after-school tutoring, may be a viable strategy for reducing achievement gaps.

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Notes

1. Teachers in enhanced option schools were not more experienced or more qualified than those in attendance-zone schools (Houck, 2010; Smrekar & Goldring, 2009).

2. However, compensatory resources in Charlotte-Mecklenburg schools did not mitigate effects of the school assignment change on increased rates of arrests and incarceration among African American youth.

3. We also estimated gain-score models and found similar substantive results. In fact, we found that gain-score models produced slightly larger effects of school type on achievement. These results are available on request.

4. In earlier versions of this article, we included student as well as school fixed effects to account for selection on unobserved fixed characteristics of students. However, following Hanushek, Kain, and Rivkin (2009, see Note 21, p. 360), we became concerned that student fixed effects would exacerbate the influence of measurement error. Student fixed effects can reduce bias from unobserved heterogeneity, but can also reduce information about the effect relative to measurement error (the “signal-to-noise ratio”), according to Hanushek et al. (2009). In models with school-by-grade and school-by-year fixed effects, racial composition and school type effects are identified by changes in school characteristics between and within cohorts. If student fixed effects were added to the model, effects of school racial composition and school type would be identified solely through within-cohort variation. Hanushek et al.’s (2009) approach seemed particularly compelling for our analysis because the gradual introduction of a small number of specialized schools makes it important to compare the effects of school type across cohorts as well as within cohorts.

5. We also estimated models that controlled for the percentage of Hispanic students in the school-by-grade. This variable did not have significant effects in any model, and its inclusion led to no meaningful changes in any other results.

6. Supplementary analyses indicated that the effects of enhanced option schools did not differ significantly for schools in their first year versus later years of enhanced option status.

7. We considered the possibility that compositional effects may differ by school type. We found no significant differences in composition effects in models with school-by-year fixed effects, estimated separately by school type. However, the standard errors in these models were very large and the data may not be adequate to address this question.

8. For example, the effects of enhanced option schools for Blacks, which were 6.30 and 12.71 in reading and math, respectively, in the original specification, were 5.26 and 11.17 in the more restricted specification, and both were statistically significant despite the much smaller sample (8,081 Black student-years as compared with 40,552 in the main sample).

9. The data do include middle school students in enhanced option schools because some schools

changed school type before phasing out their upper grades. Unfortunately, there were too few of these students to test separately for enhanced option effects in the middle grades.

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