The Kids on the Bus: The Academic Consequences of Diversity-Driven School Reassignments

Thurston Domina
Deven Carlson
James Carter III
Matthew Lenard
Andrew McEachin
Rachel Perera

Abstract

Many public school diversity efforts rely on reassigning students from one school to another. While opponents of such efforts articulate concerns about the consequences of reassignments for students' educational experiences, little evidence exists regarding these effects, particularly in contemporary policy contexts. Using an event study design, we leverage data from an innovative socioeconomic school desegregation plan to estimate the effects of reassignment on reassigned students' achievement, attendance, and exposure to exclusionary discipline. Between 2000 and 2010, North Carolina's Wake County Public School System (WCPSS) reassigned approximately 25 percent of students with the goal of creating socioeconomically diverse schools. Although WCPSS's controlled school choice policy provided opportunities for reassigned students to opt out of their newly reassigned schools, our analysis indicates that reassigned students typically attended their newly reassigned schools. We find that reassignment modestly boosts reassigned students' math achievement, reduces reassigned students' rate of suspension, and has no offsetting negative consequences on other outcomes. Exploratory analyses suggest that the effects of reassignment do not meaningfully vary by student characteristics or school choice decisions. The results suggest that carefully designed school assignment policies can improve school diversity without imposing academic or disciplinary costs on reassigned students.

INTRODUCTION

A growing body of evidence consistently demonstrates that desegregated schools deliver important benefits to a wide range of students and communities (Angrist & Lang, 2004; Ashenfelter, 2006; Billings, Deming, & Rockoff, 2014; Guryan, 2004; Johnson, 2011). Nevertheless, contemporary school systems working to offset resegregation trends and diversify schools face enormous political hurdles. Recent diversity initiatives in New York City, San Francisco, North Carolina's Charlotte-Mecklenburg County, Maryland's Montgomery County, and elsewhere sparked substantial backlash, particularly among relatively advantaged families concerned about potential harm to their own children.[1] These concerns echo a claim that

[1] Reports of parental opposition can be found in local newspaper reporting for these and other cities facing shifting policy contexts. For accounts of parental opposition that precede the current policy environment, see, for example, Delmont (2016), Hagerman (2018), and Parcel and Taylor (2015).

Journal of Policy Analysis and Management, Vol. 40, No. 4, 1197–1229 (2021)

Published by Wiley Periodicals, Inc.View this article online at wileyonlinelibrary.com/journal/pam
DOI:10.1002/pam.22326

has long reverberated throughout the debate over school desegregation: that school reassignments—often referred to as "mandatory busing"—exact a social and educational toll from reassigned students.

Are such concerns justified? Surprisingly little causal evidence exists to address this question. Much of the widely cited quasi-experimental work on school desegregation has used school reassignments as an instrument to estimate peer effects on student outcomes (e.g., Angrist & Lang, 2004; Billings, Deming, & Rockoff, 2014). These analyses, which suggest that students of color benefit on a range of outcomes when they attend school with a more racially diverse set of peers, do not speak to the experience and consequences of the reassignments that often make school diversity possible.

In this paper, we advance the literature on school desegregation by estimating the direct effects of contemporary diversity-oriented school reassignments on students' school choice behavior and short- and medium-term academic outcomes. Our analyses take advantage of an innovative socioeconomic desegregation plan that North Carolina's Wake County Public School System (WCPSS) operated between 2000 and 2010.[2] WCPSS aimed to ensure that no school enrolled more than 40 percent socioeconomically disadvantaged students (as measured by free or reduced-price lunch enrollments) or more than 25 percent below grade-level students (as measured by standardized tests). As part of its strategy for meeting these targets, WCPSS divided the district into geographic nodes that had no more than approximately 150 students. The district assigned each node to a "base" elementary, middle, and high school. These base schools serve as the default school of attendance for students in the node. However, throughout the policy period, students in all nodes could choose among their base school, magnet schools, and schools with alternative calendar options (e.g., year-round schooling).[3] To maintain socioeconomic and achievement balance, WCPSS annually reassigned a number of nodes—and the students residing in them—to different base schools, generally reassigning relatively high-poverty residential nodes to lower-poverty base schools and vice versa.[4] For students attending their node's base school, reassignment typically induced a move to the new base school, although some students elected to attend a school of choice. For students attending schools of choice, reassignment created a new educational option—the newly-assigned base school—although these students typically had the option of remaining at their school of choice. More than 20 percent of students enrolled in WCPSS experienced one or more reassignments during the decade in which the policy was in place.

In close collaboration with the district, we have assembled comprehensive student/year-level WCPSS administrative records covering the 1999/2000 to

[2] See Wake Education Partnership (2003) for a summary of the district's student assignment policy since its inception in 1981 through 2003. For a more recent overview, see Parcel and Taylor (2015). For the most recent policy, visit www.wcpss.net/schoolboard for WCPSS Board of Education Policy 6200 ("Student Assignment").

[3] The district launched its first magnet-themed schools in the late 1970s. WCPSS's magnet school program now includes more than 40 schools, representing roughly a quarter of all schools and enrolling approximately a fifth of all students.

[4] School assignments occurred on the node/grade/year level, meaning that the district assigned all students who lived in the same node and attended the same grade level to the same base school. When WCPSS made reassignments, however, it typically reassigned all grades in a given grade range (e.g., elementary, middle, or high school grades). For example, it could be the case that a node would be reassigned to a different base elementary school but maintain the same base middle school and high school. In other cases, WCPSS may change a node's base elementary, middle, and high school. In most cases, though, elementary school reassignments permanently changed students' subsequent schooling sequence whereby they attended different middle and high schools than they otherwise would have.

2010/2011 academic years. These records cover all students in grades K-12 beginning in 2002/2003, but exclude some students grades 10 to 12 in the earlier academic years. Using an event study design, we leverage WCPSS's node reassignment process to address the following research questions:

1. How did reassignment affect families' decisions to enroll in base schools or schools of choice?
2. What effect did reassignment have on students' academic outcomes in the short and medium term?
3. To what extent do the effects of reassignment vary between students who attended reassigned base schools and their peers who attended choice schools?

To preview our main results, we show: First, as intended, reassignment significantly increased the likelihood that students switched schools. This increased likelihood was much larger for students who attended their base school than it was for students who attended choice schools. Second, despite widespread concerns about the potential harms of "busing" to achieve diversity goals, we find no evidence of negative consequences of reassignment for reassigned students. Indeed, our analyses indicate that reassignment had modest positive effects on reassigned students' math achievement, in the range of 0.02 to 0.04 standard deviations. We further find that reassigned students' rates of suspension drop by about one percentage point in the year of reassignment and the subsequent year, a decline of 20 percent off the base suspension rate. Third, we find that students who do and do not attend their base school have similar outcome trajectories post-reassignment. Although the likely endogeneity of students' decisions to opt out of attending their base school prevents us from drawing firm causal conclusions on this score, this finding is inconsistent with the idea that school choice behaviors moderate the effects of reassignment.

Historical Evidence on the Effects of School Desegregation

More than a decade after the Supreme Court's landmark *Brown v. Board of Education* decision, the U.S. Office of Civil Rights began to mandate school desegregation in districts across the country. These mandates led to substantial changes in school segregation patterns and a profound redistribution of educational resources. Further, their implementation led to substantial improvements in educational achievement (Billings, Deming, & Rockoff, 2014; Card & Rothstein, 2007; Mickelson, Bottia, & Lambert, 2013), attainment (Baum-Snow & Lutz, 2011; Guryan, 2004; Johnson, 2011; Lutz, 2011; Reber, 2010), and job market outcomes (Ashenfelter, 2006; Johnson, 2011) for Black Americans, as well as reductions in exposure to the criminal justice system (LaFree & Arum, 2006; Weiner, Lutz, & Ludwig, 2009). This long line of studies demonstrating positive effects for Black students, coupled with the lack of evidence pointing to offsetting negative consequences for White students, supports a broad scholarly consensus that court-ordered desegregation in the wake of *Brown* improved educational effectiveness and substantially narrowed Black/White inequality in the U.S. (Condron et al., 2013; Reardon, 2016).

In the popular imagination, the enforcement of *Brown v. Board of Education* is most closely associated with the controversial practice sometimes referred to as "mandatory busing" (Delmont, 2016). In practice, however, school district desegregation plans bundled these diversity-motivated school reassignment and transportation efforts with a wide array of school reforms, including: school district consolidation (Beuchert et al., 2018), strategic school construction, redefining residential school zones, controlled choice strategies (e.g., magnet schools and year-round schooling), and the redistribution of educational finances (Clotfelter et al., 2018;

Rossell, 1990). Many of these treatments likely had both direct and indirect effects. Prior research convincingly demonstrates that these and other treatments worked together to produce positive net effects for historical desegregation enforcement efforts. However, this literature does not directly address persistent concerns about the direct effects of school reassignments.

"Mandatory Busing" and the Debate Over School Desegregation

Opponents of school desegregation have long emphasized concerns about the effects of school reassignment (Delmont, 2015). The U.S. Supreme Court's 1971 *Swann v. Charlotte-Mecklenburg Board of Education* ruling stipulated that reassignment "may impose burdens on some" and "either risk the health of the children or significantly impinge on the educational process" even as it endorsed school reassignment and transportation as a technique for remediating school segregation. These concerns persist into the present. In Wake County, 63 percent of parents surveyed in 2010 agreed that reassignment created problems for children (Parcel & Taylor, 2015, p. 38). Similar concerns continue to haunt other contemporary school diversity efforts (Carlson & Bell, 2021).

While several studies describe the experience of reassigned students (Eaton, 2001; Holland, 2012; Ispa-Landa, 2013; Lit, 2009; Wells & Crain, 1999) and others take advantage of school reassignment efforts to estimate the effects of school peers (Angrist & Lang, 2004; Billings, Deming, & Rockoff, 2014; Hill et al., 2020; Reber, 2005), we know of no study that directly estimates the effects of reassignment on reassigned students.

School reassignments likely affect students' educational experiences through a wide range of mechanisms. School reassignment often leads students to change schools, a treatment associated with negative short-term consequences (Grigg, 2012; Hanushek, Kain, & Rivkin, 2004; Schwartz, Stiefel, & Cordes, 2017). Additionally, because reassignment typically involves a move between schools with differing peer compositions, the effects of reassignment may vary with students' characteristics and the characteristics of students' newly assigned schools. Students reassigned to a school with new peers, culture, and norms may struggle to make friends (Holland, 2012; Ispa-Landa, 2013), creating social dynamics that likely have complex effects on youth educational outcomes (see, for example, Akerlof & Kranton, 2002; Cook, Deng, & Morgano, 2007; Crosnoe, 2011; Duncan, Boisjoly, & Harris, 2001; Moody, 2001). The challenges associated with reassignment may be particularly acute for students of color, who face heightened and racially biased behavioral scrutiny, raising their risk for suspension and other exclusionary punishments (Bacher-Hicks, Billings, & Deming, 2019; Capers, 2019; Grigg, 2012; Kinsler, 2011; Riddle & Sinclair, 2019; Welch & Payne, 2010). We might further expect students reassigned from poorly resourced schools with low-achieving peers to highly resourced schools may benefit from reassignment while students who are reassigned in the reverse direction may suffer (see Angrist, 2014; Durlauf & Ioannides, 2010; and Sacerdote, 2011, for reviews of peer effects in educational and other settings).

In addition to these direct effects on reassigned students, reassignments may have indirect or "spillover" effects on students who are not reassigned but whose school and classroom peers change due to reassignment. As is the case in schools that absorb students displaced by school closures (Brummet, 2014; Carlson & Lavertu, 2016; Steinberg & MacDonald, 2019), reassignment may affect non-reassigned students by inducing shifts in school and classroom peer composition as their schools accommodate new students.

School Desegregation in the Contemporary Policy Context

Contemporary school desegregation efforts operate very differently from the school desegregation efforts of the 1960s and 1970s. While historical school desegregation efforts sought to dismantle Jim Crow schooling, contemporary school desegregation efforts attempt to offset trends toward school segregation to maintain prior gains in school diversity. Contemporary school desegregation efforts thus represent a weaker intervention than the landmark efforts that followed federal desegregation enforcement. Furthermore, given the increasingly strict judicial scrutiny facing desegregation plans that prioritize race, many districts have abandoned racially sensitive school assignment plans and adopted in their place plans that explicitly target socioeconomic balance rather than racial diversity (Kahlenberg, 2012). While these plans share similar mechanisms with racial desegregation efforts, they target different students and thus have potentially different consequences for school compositions (Carlson et al., 2020; McMillian et al., 2018).

In addition, many contemporary desegregation plans operate alongside school choice initiatives. In some cases, districts introduce school choice as a mechanism to facilitate school desegregation (Betts et al., 2015; Rossell, 1990, 2003). In other cases, school choice plans may make it more difficult for districts to achieve school diversity, especially since affluent and White parents often use school choice to avoid racially and socioeconomically diverse schools (Billingham & Hunt, 2016; Denice & Gross, 2016; Fiel, 2015). In our context, school choice may moderate the effects of diversity-driven school reassignment. Reassignment may mean little to students who attended choice schools prior to reassignment, since they had the option to remain in their school of choice rather than move to a newly assigned base school. Furthermore, reassignment may induce students who had previously enrolled in their base school to move to a choice school rather than attend their nodes' newly assigned base school. These phenomena might lead us to expect more positive post-reassignment experiences for students who attend choice schools compared to students who attend their node's base schools.

Context: School Reassignment for Socioeconomic Balance in Wake County

Formed in 1976 via the merger of a majority-Black Raleigh city school district and a mostly-White surrounding county district, WCPSS has been engaged in questions about school segregation and desegregation throughout its history (Ayscue & Woodward, 2014; Parcel & Taylor, 2015). When, in the late 1990s, the courts rejected race-sensitive desegregation efforts in the nearby Charlotte-Mecklenburg Schools, WCPSS transitioned from racial desegregation efforts to socioeconomic desegregation. As described above, school reassignments for socioeconomic diversity were central to the district's school diversity efforts in the 2000 to 2010 period. While reassignments only modestly changed the student socioeconomic and racial composition in most WCPSS schools, it diversified some of the district's most segregated schools and seems to have acted as a counterbalance to resegregating pressures (Carlson et al., 2020).

The rate of school reassignment varied across the policy period from a low of approximately 2 percent of students in the 2002/2003 school year to a high of 8 percent of students in the 2007/2008 school year. Once reassigned, nodes typically remained associated with their new base schools for subsequent years. All WCPSS students, including those who were reassigned, could choose between their nodes' base school

Table 1. Descriptive statistics, WCPSS students 1999/2000 to 2009/2010.

	2000	2005	2010	Δ 2000–2010	2010/2000
Male students (%)	51.09	51.04	51.11	0.02	1.00
American Indian/Alaska (%)	0.27	0.27	0.29	0.02	1.07
Asian (%)	3.72	4.53	6.05	2.33	1.63
Hispanic (%)	4.3	8.78	13.37	9.07	3.11
African-American/Black (%)	26.22	26.61	25.41	−0.81	0.97
White (%)	63.46	56.55	50.55	−12.91	0.80
Multiple races (%)	2.03	3.25	4.3	2.27	2.12
Special education (%)	14.25	15.41	13.26	−0.99	0.93
School enrollment/capacity	99.35	106.65	92.88	−6.47	0.93
Reassigned (%)	7.12	6.92	7.62	0.5	1.07
Ever reassigned (%)	0.01	12.64	20.94	20.93	–
Grade	3.92	5.52	5.5	1.58	1.40
Chronically absent (%)	–	8.99	9.07	–	–
Suspended (%)	3.93	8.02	6.35	2.42	1.62
Attending base school (%)	64.04	71.1	72.32	8.28	1.13
# Schools in district	120	137	160	40	1.33
Administrative data sample	70,740	116,616	144,237		
Total number of students (CCD)	98,741	120,504	143,289	44,548	1.45

Notes: Sample includes all student/year observations available in WCPSS administrative records. WCPSS maintained administrative data for grades K-9 in 1999/2000, grades K-10 in 2000/2001, grades K-11 in 2001/2002, and grades K-12 in all years 2002/2003 through 2010/2011. Total number of students data are drawn from the Common Core of Data. Since these data include all students in all grades and years, they provide a more accurate account of district enrollment growth across the sample.

and a menu of magnet and year-round schools.[5] As we illustrate in Table 1, approximately two-thirds of WCPSS students in any given year attended their base school.

The socioeconomic reassignment plan operated during a period of rapid population growth in WCPSS. As the CCD enrollment counts in Table 1 illustrate,[6] the total number of students enrolled in WCPSS schools increased by nearly 50 percent between 2000 and 2010, from 99,000 to 143,000, as the region experienced a population boom.[7] Hispanic and Asian students played a particularly important part in the district's enrollment growth. In 2000, approximately 5 percent of WCPSS students

[5] Ninety percent of magnet seats are allocated based on school preferences for students (codified in district policies) and student preferences for schools (i.e., ranks). The majority of students receive their first-choice preference. Ten percent of seats are reserved for lottery-based admission that uses the deferred acceptance (DA) algorithm to determine assignment. In this case, lottery numbers are used to break ties in the event that two students share identically ranked preferences. See Dur et al. (2021) for a detailed account of the district's magnet lottery. WCPSS guaranteed door-to-door transportation to students' base schools. The district did not guarantee transportation to magnet schools, although it did provide limited options for transportation to some magnet schools.

[6] Table 1 reports enrollment counts from two sources: the WCPSS administrative data on which our analyses are based and data from the National Center for Education Statistics' Common Core of Data (CCD). The number of cases in 2000 administrative data represent only students in grades K-9. The WCPSS administrative data sample expanded to include all students in grades K-10 in 2001, K-11 in 2002, and K-12 in 2003. As a result, CCD estimates of WCPSS enrollments converge WCPSS administrative data counts by the 2003 academic year, and these figures remain consistent throughout the sample.

[7] The "Raleigh-Cary, NC" metropolitan statistical area experienced the fourth-fastest population growth in the nation from 2000 to 2010 (Mackun & Wilson, 2011). Among large districts, WCPSS's enrollment growth was correspondingly among the fastest in the nation. At the beginning of the 1999/2000 school year, WCPSS was the 27th largest district in terms of student enrollment and by 2009/2010, it was the 16th largest. Calculations from the Common Core of Data indicate that, among districts larger than WCPSS at the start of the decade, only Gwinnett County (GA) had a larger growth rate.

Table 2. Characteristics of WCPSS students who ever experienced school reassignment and never experienced school reassignment, 2000 to 2010.

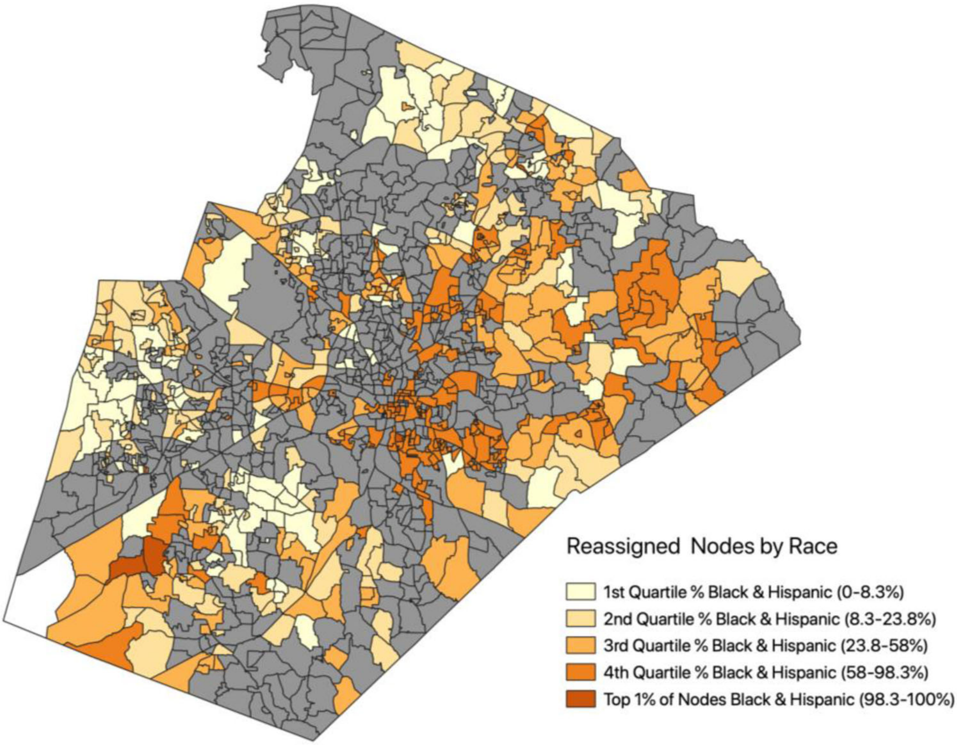
	Never reassigned	Ever reassigned	Never reassigned–Ever reassigned
Male	50.49	50.67	−0.18
American Indian/Alaska (%)	0.31	0.24	0.07
Asian (%)	5.63	5.21	0.42
Hispanic (%)	10.17	11.12	−0.95**
African-American/Black (%)	26.33	28.02	−1.69**
White (%)	53.54	51.70	1.84*
Multiple races (%)	4.02	3.70	0.32
Total students (n)	186,776	58,627	
% of all students	76.11%	23.89%	

Notes: Sample includes all student/year observations available in WCPSS administrative records. WCPSS maintained administrative data for grades K-9 in 1999/2000, grades K-10 in 2000/2001, grades K-11 in 2001/2002, and grades K-12 in all years 2002/2003 through 2010/2011. ***p < 0.001; **p < 0.01; *p < 0.05.

were Hispanic and less than 4 percent were Asian, while 27 percent were Black, and 62 percent were White. By 2010, 13 percent of WCPSS students were Hispanic and 6 percent were Asian, as White students declined to half of the district's population. During this period, new residents spread throughout the county, leading to rapid population growth in the district's urban core as well as its suburban periphery.

To accommodate this rapid enrollment growth, the district constructed 40 new schools during the 2000 to 2010 period. The district used reassignments to populate new schools, most of which were located in relatively affluent, high-growth neighborhoods on the district's suburban fringe. In many cases, though, new school construction sparked a cascade of reassignments throughout the district. Schools that lost assigned students to a newly constructed school typically received newly assigned students from neighboring existing schools. Although 40 percent of reassignments sent students to schools that had been newly constructed in response to enrollment growth, the district carefully considered school diversity as it constructed new school enrollment zones so that new school assignments often increased the socioeconomic and racial diversity of the peers to which reassigned students were exposed. As such, the district explicitly formulated its school reassignment policy to simultaneously address school diversity goals and school overcrowding.

The use of reassignments for both achieving targeted levels of socioeconomic balance and populating new schools meant that no WCPSS student was immune from the possibility of reassignment. More than one-fifth of elementary students enrolled in WCPSS between 2000 and 2010 experienced a school reassignment as a result of living in a node at the time of its assignment to a new base school. In Table 2, we compare students who were never reassigned with their peers who experienced reassignment. Black and Hispanic students are slightly over-represented among reassigned students and White students are correspondingly under-represented. Nonetheless, White students comprise more than half of the students WCPSS reassigned during the study period. In further analyses, we compare WCPSS node/grade units that experienced one or more reassignments during the study period with node/grade units that did not experience any reassignment. These analyses show that reassigned nodes exhibited greater population growth than those that maintained the same base school, but that the over-time change in racial/ethnic composition was broadly similar across the two sets of nodes. Similar analyses comparing the composition of WCPSS residential node/grade units that experienced one or more reassignments



Notes: Sample includes all student/year observations available in WCPSS administrative records. WCPSS maintained administrative data for grades K-9 in 1999/2000, grades K-10 in 2000/2001, grades K-11 in 2001/2002, and grades K-12 in all years 2002/2003 through 2010/2011.

Figure 1. Percent of Students in WCPSS Residential Nodes Identified for Reassignment Between 2000 and 2010 Who Are Black or Hispanic.
[Color figure can be viewed at wileyonlinelibrary.com]

during the study period with node/grade units that did not experience any reassignment found that nodes that experienced relatively rapid population growth were somewhat more likely to experience reassignment but that reassigned and never-reassigned nodes experienced similar changes in their racial composition over the study period.

The data that we map in Figure 1 further illustrate broad-based implementation of the district's reassignment policy. In this figure, we map the WCPSS residential nodes in which elementary school students were reassigned at least once at some point between 2000 and 2010 and characterize the racial and ethnic composition of the students who lived in these reassigned nodes—nodes that were never reassigned during this period are gray. As the map makes clear, reassignments occurred throughout the district, including nodes in the district's urban core as well as rapidly expanding suburban nodes at the district's northern and southern peripheries. Although nodes with high concentrations of minority students were more likely to experience reassignment than nodes that include predominately White students, the map highlights the diversity of nodes that experienced reassignments. The map further illustrates the district's patchwork pattern of racial residential segregation, a pattern that made it possible for the district to diversify schools via school assignments without dramatically increasing students' school commutes.

Although reassignment affected only a small proportion of students in any given year and reassigned students had the option to exercise choice rather than attend reassigned schools, the program generated significant controversy (Parcel & Taylor, 2015). In 2009, Republican school board candidates campaigning against the school reassignment plan in suburban Wake County unseated four Democratic incumbents, handing control of the board to a conservative majority that replaced the policy designed to achieve socioeconomic balance with one that put neighborhood schools at the forefront (Parcel & Taylor, 2015).

DATA AND EMPIRICAL STRATEGY

In partnership with WCPSS, we have built a unique panel data set that contains annual information on all students present in district administrative data between 1999/2000 and 2010/2011, the period during which the district implemented and operated the socioeconomic-based school assignments. These data include all WCPSS students in grades K-12 from 2002/2003 through 2010/2011. They further include all WCPSS students in grades K-9 in 1999/2000, all WCPSS students in grades K-10 in 2000/2001, and all WCPSS students in grades K-11 in 2001/2002. These data contain students' basic demographic and academic characteristics, their home address and residential node identifier, the school to which their residential node was assigned, and the school in which they were enrolled. Additionally, we observe the full list of magnet and year-round schools to which students could have applied.

Conceptualizing the Effects of Reassignment

Under the WCPSS assignment policy, school assignments occur at the node/grade/year level. That is, in a particular year, the policy assigns all students in the same grade in a given residential node to the same school. Reassignment, therefore, is a treatment administered at the node/grade level. This policy framework provides an opportunity to estimate the short- and medium-term effects of school reassignments on a wide range of student outcomes. Prior to detailing our strategy for doing so, however, we briefly discuss considerations relevant to interpreting our estimand, and describe how these considerations guide the progression of our analysis.

We are ultimately interested in estimating the effect of node reassignments on student academic outcomes. However, because these reassignments occurred in the context of a school assignment policy that provided families with additional choice options—notably magnet and year-round schools—students in reassigned nodes could exhibit several different schooling patterns without leaving the district, including:

- Moving from their old base school to their newly assigned base school
- Moving from their old base school to a magnet or year-round school
- Remaining enrolled in a magnet or year-round school
- Remaining enrolled in their old base school
- Moving from one magnet or year-round school to a different magnet or year-round school
- Moving from a magnet or year-round school to their newly assigned base school

In estimating the effects of reassignment, we consider all students in a node to have received the same policy treatment, regardless of their observed schooling pattern. This parameter is of significant interest to policymakers, since it provides information on the average effects of pulling the node reassignment policy lever. However, different post-reassignment schooling patterns are a potential source of treatment effect heterogeneity, and thus important to understand.

Consequently, we proceed by first analyzing how reassignment shapes families' schooling decisions and contexts, including the effect of reassignment on the distance to students' assigned school, mean achievement levels in their assigned school, and the demographic composition of their assigned school. We also estimate the effect of reassignment on students' probability of moving schools, attending their assigned base school, and leaving the district. The second portion of our analysis estimates the effect of node reassignment on student math and reading achievement, attendance, and disciplinary history. In this stage of our analysis, we also estimate two sets of effects for non-reassigned students: 1) Effects on students attending schools that receive students from reassigned nodes and 2) Effects on students attending schools that lost students due to reassigned nodes. Finally, we conclude with a set of exploratory analyses that assess the extent to which post-reassignment outcomes vary across students who attend their assigned base school and those who attend a school of choice. As noted above, students' decisions to opt out of attending their base school are likely endogenous, a reality that, given the nature of the treatment, complicates estimation of valid causal effects. Still, these descriptive analyses provide important information about potential differences in how students who did and did not attend their assigned base school experienced reassignment.

Research Design and Statistical Model

We estimate the effects of reassignment using an event study design, an approach that has been used to estimate the effects of other plausibly exogenous shocks, including school closure (Brummet, 2014), worker displacement (Jacobson, LaLonde, & Sullivan, 1992, 2005), school turnaround (Strunk & McEachin, 2014; Strunk, McEachin, & Westover, 2014), and the relaxation of court-ordered desegregation (Lutz, 2011). Intuitively, our analysis compares, for a reassigned node, student outcomes in the pre-reassignment period to outcomes in the post-reassignment period, and then benchmarks that difference against the secular trend in never-reassigned nodes. We define a node/grade as reassigned in year t when its school assignment is different from its school assignment in year t-1.

Our main empirical model takes the following form:

$$Y_{ingst} = \left[\sum_{k\leq-3}^{k\geq3}\left(\delta_k T_{ingtk}\right)\right] + \left(\zeta p^{in}_{ist,k\,=\,0}\right) + \left(\lambda p^{out}_{ist,k\,=\,0}\right) + \beta X_{inst} + \mu_{ng} + \sigma_t + \varepsilon_{ingst}, \quad (1)$$

where Y represents the outcome of interest for student i in grade g who lives in node n and attends school s in calendar year t. We specify the treatment for reassigned students via a matrix of dummy variables that indicates years relative to reassignment, which we index with k.[8] When $k < 0$, T_{ingtk} is a dummy variable indicating that a student lives in a node that will be reassigned in k years. When $k \geq 0$, T_{ingtk} takes a value of one if the student lives in a node that was reassigned k years ago.

[8] Although approximately 85 percent of WCPSS students who experienced a school reassignment experienced just one reassignment, some nodes and the students who lived in them experienced two, three, or even four reassignments during the policy period. In our empirical model, we estimate δ_k for each reassignment event, but only report coefficients for the first one. We exclude the subsequent reassignment terms from equation (1) for ease of interpretation.

We specify the reference category in this matrix of dummy variables to be k = -1. As a result, coefficient δ_k represents the conditional mean difference in Y_{ingst} between year k and year k = -1 (i.e., the year prior to reassignment) for reassigned students in a given node-grade, relative to the average change in Y_{ingst} over that same time period for students in nodes that were never reassigned. Our identification strategy thus hinges on the assumption that reassignment is, on average, unrelated to trends on the outcomes of interest that are not captured by the covariates in our model. This identifying assumption would fail to hold, for example, if current or future node reassignment were a function of node-level trends in academic performance or disciplinary infractions.

Following prior research in the school closure literature (Brummet, 2014), equation (1) includes the $p^{in}_{ist,k=0}$ and $p^{out}_{ist,k=0}$ terms to measure potential "spillover" effects of reassignment—effects on students who are not themselves reassigned, but who attend schools receiving ("in") and contributing ("out") reassigned students, respectively. The former term measures a school's receipt of reassigned students and is defined as the proportion of all students assigned to school s in year t who were assigned to a different school the prior year. More formally:

$$p^{in}_{ist,k=0} = \left(\frac{A_{s,t\neq s,t-1}}{A_{s,t}} * 10\right) * 1[T_{ingt,k=0} = 0]\,. \tag{2}$$

The latter term measures the proportion of students reassigned out of a school and is defined as the proportion of students assigned to school s in year t-1 who were assigned to a different school the following year. More formally:

$$p^{out}_{ist,k=0} = \left(\frac{A_{s,t-1\neq s,t}}{A_{s,t-1}} * 10\right) * 1[T_{ingt,k=0} = 0]\,. \tag{3}$$

Since district reassignments rarely affected more than 10 percent of students in a given school annually, we multiply both $p^{in}_{ist,k=0}$ and $p^{out}_{ist,k=0}$ by 10. All models additionally include the quadratic of $p^{in}_{ist,k=0}$ and $p^{out}_{ist,k=0}$ to capture potential nonlinearities in the association between peer reassignment and the outcomes. Importantly, we include $1[T_{ingt,k=0} = 0]$ to explicitly indicate that each term only applies to students whose node/grade is *not* reassigned in year t. Given this structure, ζ is an estimate of the change in achievement of non-reassigned students as the proportion of the student body consisting of newly reassigned students increases from zero to 0.1. Similarly, λ estimates the change in the achievement of non-reassigned students as the proportion of students reassigned out of that school increases from zero to 0.1.

The remaining contents of the model consist of a vector of observable student characteristics, X_{inst}, including dummies for student gender, race/ethnicity, limited English proficiency status, special education status, a node-by-grade fixed effect, μ_{ng}, a year fixed effect, σ_t, and an error term, ε_{ingst}. We estimate this model via OLS with standard errors clustered at the node-by-grade level.

Our approach to estimating the effects of reassignment has several appealing features. First, our treatment specification formally assesses whether students in the treatment and comparison groups exhibit differential trajectories on the outcome of interest in the years leading up to reassignment, directly testing the parallel trend assumption that underpins our identification strategy. In particular, one might worry that WCPSS used reassignment to address school-specific challenges that are unobservable in our data. In such cases, much like the "Ashenfelter Dip" in earnings that has been observed prior to participation in job training programs (Ashenfelter, 1978; Ashenfelter & Card, 1984), the pre-reassignment outcome trajectories of students in the treatment group may differ from that of their comparison group peers. Our approach assesses this possibility. (As we describe in the discussion of Table 5, the treatment and comparison groups share a common pretreatment trend on the outcomes of interest.)

Second, by estimating δ_k separately for the years following reassignment, our approach allows us to gauge whether short-term effects of reassignment—those in the first year or two after reassignment—differ from medium-term effects.

Third, our approach affords us the flexibility to estimate both the direct effects of reassignment on reassigned students, as well as any "spillover" effects on students who were not reassigned, but who attend schools that contribute or receive reassigned students. This latter set of effects has a precedent in the school closure literature, which routinely uses an approach like ours to estimate the effect of closure on students who are not themselves displaced, but attend schools receiving displaced students (e.g., Brummet, 2014; Steinberg & MacDonald, 2019).

RESULTS

In our first set of analyses, we use the model presented in equation (1) to examine how reassignment affects characteristics of students' assigned schools. In particular, we estimate the effects of reassignment on the distance (in miles) from the centroid of the students' residential node to their assigned school, mean academic performance in students' assigned school—measured as the average of all available scores on North Carolina's End-of-Grade (EOG) mathematics exam for students enrolled at the assigned school[9]—and school demographics, measured as the proportion of Black and Hispanic students enrolled in students' assigned school.

After gaining insight into how reassignment affects these aspects of students' assigned school, we turn to investigating how students and their families responded to reassignment. We do so by using the model presented in equation (1) to estimate the effects of reassignment on students' odds of moving schools, attending their base school, and attriting from district data (which we consider a proxy for moving to a private school, one of the handful of charter schools that operated in the area during the study period, or to another school district for students in grades K-12). Finally, we analyze how reassignments affect student educational outcomes, using the model in equation (1) to estimate the effects of reassignment on student achievement in mathematics and reading for grades 3 to 8, as well as absenteeism and exposure to exclusionary discipline for grades K-12. We use student scores on EOG reading and math tests administered each spring to all students in grades 3 to 8 to measure achievement. For each subject, we standardize scores within grade and year using the WCPSS mean and standard deviation. We measure student absenteeism with an indicator flagging students who missed 5 percent or more of the school days in the year in question.[10] And our measure of disciplinary actions is an annual indicator flagging students who were suspended one or more times in that school year. Table 3 presents descriptive statistics for the three sets of outcomes summarized above.

Reassignment and Students' Schooling Context

Our first two sets of analyses assess: 1) How reassignment affected the characteristics of students assigned schools, and 2) The schooling decisions that families

[9] As in the analyses of the effects of reassignment on reassigned students' achievement, we standardize these scores based on the WPCSS grade-by-year mean and standard deviation. Analyses on school mean reading scores return substantively similar results.
[10] Unlike the other outcomes, absenteeism data are unavailable prior to 2005.

Table 3. Dependent variables.

	Mean (SD)	N	Years	Grades
Characteristics of assigned school				
Distance to assigned school	4.610 (4.148)	1,098,210	2000-2010	K-12*
Mean math achievement	−0.003 (0.327)	909,749	2000-2010	K-8
Proportion Black or Hispanic	0.390 (0.176)	1,359,061	2000-2010	K-12*
Choice behaviors				
Move school	0.400 (0.490)	1,359,061	2000-2010	K-12*
Attend base school	0.731 (0.444)	1,359,061	2000-2010	K-12*
Leave district	0.055 (0.229)	1,216,025	2000-2009	K-11*
Educational outcomes				
Math achievement	0.000 (1.000)	567,450	2000-2010	3-8
Reading achievement	0.000 (1.000)	565,322	2000-2010	3-8
Chronic absenteeism	0.218 (.413)	911,394	2005-2010	K-12*
Suspension	0.065 (0.246)	1,359,061	2000-2010	K-12*

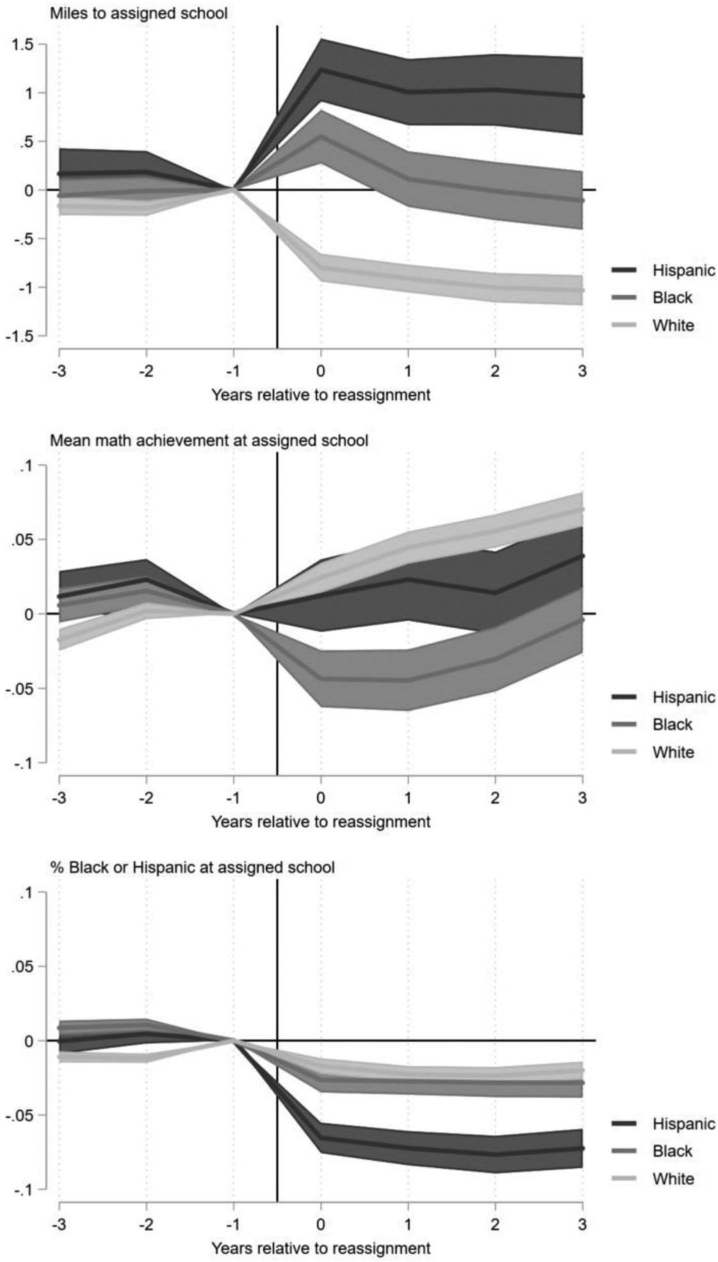
Notes: Sample includes all student/year observations available in WCPSS administrative records.
*WCPSS maintained administrative data for grades K-9 in 1999/2000, grades K-10 in 2000/2001, grades K-11 in 2001/2002, and grades K-12 in all years 2002/2003 through 2010/2011.

made in response to reassignment. Together, these analyses provide insights into how WCPSS implemented the school reassignment policy and how families' use of the district's school choice options interacted with reassignments. Further, these analyses provide important context for interpreting the effects on student achievement, absenteeism, and disciplinary actions that we present in the following section.

Table 4 presents the estimated effect of reassignment—denoted by δ_k in equation (1) above—on students' distance to their assigned school (left-hand panel), mean math achievement at their assigned school (middle panel), and proportion of Black or Hispanic students at their assigned school (right-hand panel.) As is the case for all subsequent analyses, we present estimates for each year from three years prior to reassignment through three years after reassignment, with the year prior to reassignment serving as the reference year. The estimates in the pre-reassignment period allow us to assess the extent to which students in treatment and comparison nodes exhibited similar patterns in the time period leading up to reassignment; separate estimates for each post-reassignment year reveal any dynamics in reassignment's effects.

We find that reassignment reduces the distance to a student's assigned school by between one-fifth and one-half of a mile, depending upon the specific post-reassignment year. However, as the results in Figure 2 and Table A1[11] indicate, the

[11] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's website and use the search engine to locate the article at http://onlinelibrary.wiley.com.



Notes: Data are drawn from WCPSS administrative records. Distance to assigned school data are available for students in all grades and years with administrative data; mean math achievement data are available for all students in years in which their assigned school enrolls students in grades 3 to 8; proportion Black and Hispanic data are available for students in all grades and years with administrative data. All models include controls for gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). See Table A1 for full model results.

Figure 2. Effects of Reassignment on Characteristics of Assigned School, Estimated Separately for Black, Hispanic, and White students.

Table 4. Effects of reassignment on characteristics of assigned school, with node-by-grade fixed effects.

	Distance to assigned school	Mean math achievement of assigned school	Proportion Black or Hispanic at assigned school
Three years before reassignment	−0.106*	−0.004	−0.003
	(0.048)	(0.004)	(0.002)
Two years before reassignment	−0.086*	0.010***	−0.002
	(0.038)	(0.003)	(0.001)
One year before reassignment	—	—	—
Year of reassignment	−0.160*	0.000	−0.026***
	(0.076)	(0.005)	(0.003)
One year after reassignment	−0.354***	0.016**	−0.030***
	(0.077)	(0.006)	(0.003)
Two years after reassignment	−0.452***	0.025***	−0.032***
	(0.082)	(0.006)	(0.003)
Three years after reassignment	−0.505***	0.045***	−0.029***
	(0.084)	(0.006)	(0.003)
Constant	4.953***	0.024*	0.351***
	(0.261)	(0.012)	(0.006)
N (student-year)	1,098,210	904,727	1,353,521
R-square (overall)	0.002	0.015	0.024

Notes: Data are drawn from WCPSS administrative records. Distance to assigned school data are available for students in all grades and years with administrative data; mean math achievement data are available for all students in years in which their assigned school enrolls students in grades 3 to 8; proportion Black and Hispanic data are available for students in all grades and years with administrative data. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—." Standard errors are reported in parentheses. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

full sample results mask considerable heterogeneity across the three racial/ethnic groups we analyze. The results for White students show reassignment decreasing the distance to their assigned school by between three-quarters of a mile and a mile. This pattern is largely attributable to WCPSS disproportionately reassigning White students to newly constructed schools located nearer to their residence. Hispanic students, by contrast, see reassignment increase the average distance to their assigned school by about a mile. The estimates for Black students generally show reassignment to have no average effect on distance to students' assigned school. Overall, the fact that the effect of reassignment differs by approximately two miles for White and Hispanic students provides a stark illustration of the reality that different WCPSS student groups experience reassignment very differently.

The center panel of Table 4, which presents the estimated effect of reassignment on the average achievement level in students' assigned school, reveals that reassignment has no effect on average achievement levels of students' assigned school in the initial year, but positive effects ranging from 0.02 to 0.05 standard deviations in subsequent years. As with the effects of reassignment on distance to school, though, the full-sample results fail to convey the whole story. Models estimated separately by race, reported in Table A1 and graphed in Figure 2, indicate that effects of reassignment on school quality for White students substantially differ from those for

Black and Hispanic students. For White students, reassignment results in students being assigned to schools with significantly higher achievement levels, relative to the achievement levels in schools assigned to their non-reassigned peers. The magnitude of these increases range from 0.02 to 0.07 standard deviations, depending upon the particular post-reassignment year. These effects contrast with those for Black students, for whom reassignment results in assignment to a school with significantly lower achievement levels in the first three post-reassignment years. Reassignment generally has no effect on the achievement level of schools to which Hispanic students are reassigned.

The right-hand panel of Table 4 presents the estimated effect of reassignment on the proportion of Black or Hispanic students attending a student's assigned school. The results clearly demonstrate that, on average, reassignment results in students attending schools with a lower proportion of Black or Hispanic students, relative to the schools attended by non-reassigned students. Put differently, reassignment results in students attending schools with larger proportion of White students. This pattern holds across all three racial/ethnic groups we examine, although as Figure 2 illustrates, the point estimates are larger for Hispanic students than for White or Black students. For Hispanic students, reassignment results in students attending a school where the percentage of Black or Hispanic students is approximately 7 percentage points lower, relative to the percentage of Black or Hispanic students in the schools attended by non-reassigned Hispanic students. The analogous estimates for White and Black students are notably smaller, in the range of 2 to 3 percentage points. Substantively, these patterns imply that White students are reassigned to schools with larger proportions of students who look like them, which stands in contrast to the manner in which Black and Hispanic students experience reassignment.

It is important to recognize that, as we note above, reassignment represented just one component of WCPSS' broader student assignment policy throughout the period we study. The district also allowed families to select among magnet programs and year-round schooling options. The analyses reported in the left-hand and middle columns of Table 5 consider the extent to which reassignment affects the way students and families interact with these school choice options. The results in the first column of Table 5 demonstrate that reassignment significantly increases the probability that students change schools. In the year of reassignment, reassigned students are approximately 30 percentage points more likely to attend a different school than they did the year prior, relative to their non-reassigned peers. However, in subsequent years, reassigned students are 1 to 2 percentage points less likely to change schools. Together, these results suggest that reassignment induces an initial school move that is then followed by a period of relative stability. Additional analyses, reported in Table A2, indicate that Black and, especially, Hispanic students are more likely than White students to move schools in response to reassignment.[12]

The analyses reported in the middle column of Table 5 illustrate that, in the year of reassignment, reassigned students are six percentage points less likely to attend their assigned base school than their unaffected peers.[13] Subsequent analyses,

[12] Supplemental analyses, which are available from the authors by request, demonstrate that the effects of reassignments on the probability of moving school does not differ substantially for students reassigned from schools with relatively high proportions of students who qualify for free or reduced-price lunch and students reassigned from schools with relative low proportions of students who qualify for free or reduced-price lunch. We similarly find little difference in the effects of reassignment across the free or reduced-price lunch concentration of students' newly assigned schools. All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's website and use the search engine to locate the article at http://onlinelibrary.wiley.com.

[13] We note, however, that the significant coefficients for three and two years prior to reassignment indicate that students who experience reassignment have declining rates of attending their base school

Table 5. Effects of reassignment on moving school, attending base school, and leaving WCPSS, with node-by-grade fixed effects.

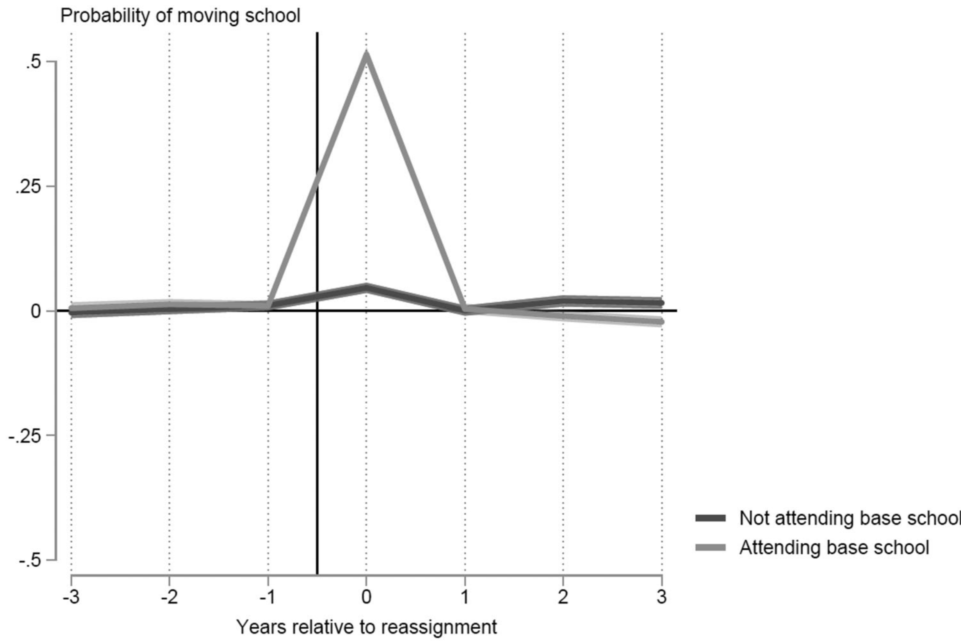
	Move school	Attend base school	Leave district
Three years before reassignment	−0.007	0.020***	−0.001
	(0.004)	(0.004)	(0.002)
Two years before reassignment	0.000	0.009**	0.000
	(0.003)	(0.003)	(0.002)
One year before reassignment	—	—	—
Year of reassignment	0.330***	−0.058***	0.006***
	(0.005)	(0.004)	(0.002)
One year after reassignment	−0.008*	−0.003	0.004*
	(0.004)	(0.004)	(0.002)
Two years after reassignment	−0.013***	0.020***	0.001
	(0.004)	(0.004)	(0.002)
Three years after reassignment	−0.022***	0.023***	−0.002
	(0.004)	(0.005)	(0.002)
Constant	0.907***	0.782***	−0.069***
	(0.033)	(0.029)	(0.008)
N (student-year)	1,353,521	1,353,521	1,211,003
R-square (overall)	0.126	0.008	0.012

Notes: Data are drawn from WCPSS administrative records. Move school and attend base school data are available for students in all grades and years with administrative data; leave district data are available for all students in grades K-11 with administrative data (twelfth graders are excluded from the analysis). All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—." Standard errors are reported in parentheses. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

reported in Table A2, suggest that Black students are somewhat more likely to respond to reassignment by leaving their base school than are White or Hispanic students, although this difference is substantively small. This result suggests that reassignment induced a relatively small proportion of students to take advantage of WCPSS's controlled school choice policy, moving to a magnet or calendar alternative rather than moving to a newly reassigned school. In addition, discussions with WCPSS administrators suggest that some students took advantage of a grandfather clause allowing students in reassigned nodes who were entering the last year in their original school (for example, elementary students who were entering the fifth grade) to remain in their current school through its terminal grade. More broadly, however, the results of this analysis indicate that the modal response to reassignment was to move from one base school to a newly assigned base school.

Consistent with that interpretation, Figure 3 reports the results of an analysis in which we estimate the effect of reassignment on changing schools separately for students who do and do not attend their base school. As the graph makes clear, reassignment has little effect on the probability of changing schools for students who do not attend their base school. By contrast, reassignment substantially increases

prior to reassignment. This finding raises the possibility that this model may overestimate the dip in base school attendance in the year after reassignment.



Notes: Data are drawn from WCPSS administrative records. Move school data are available for students in all grades and years with administrative data. Models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—."

Figure 3. Effects of Reassignment on School Moves, Estimated Separately for Students Who Attend Base School and Students Who Attend Schools of Choice.

the probability of changing schools for students who attend their base school. In particular, we estimate reassignment to increase the probability of changing schools for students in base schools by nearly 55 percentage points. This is a dramatic effect, especially considering the fact that the sample includes students in the treatment and comparison groups who make structural moves between elementary, middle, and high schools.

Finally, the results reported in the right-hand column of Table 5 indicate that reassignment has little effect on students' probability of leaving the district. Because we use attrition from WCPSS as our proxy for leaving the district, we cannot distinguish between students leaving the district for private schools or homeschools, moving to other public school districts, or dropping out of school altogether. Nonetheless, we find that reassignment increases students' probability of leaving the district by approximately half a percentage point in each of the first two years after reassignment. Supplemental analyses, reported in Table A2, indicate that the effects of reassignment on attrition do not vary systematically across racial/ethnic groups.

Considered together, the results we report in this section provide important context for interpreting the effects of reassignment on students' educational outcomes that we present in the next section. We highlight two particular takeaways. First, the analyses above point to important racial disparities in WCPSS's implementation of reassignment. Our analyses indicate that White students tend to be reassigned to relatively high performing schools located relatively close to home. In many cases, this was due to the district building new schools in disproportionately White and affluent suburban areas experiencing rapid population growth, and predominantly populating these schools with students from crowded nearby schools. By contrast, district reassignments often sent Hispanic students to relatively distant schools and Black students to relatively low-achieving schools.

Second, although our analyses indicate that reassignment often induced students to move from one base school to another, they also underscore the role that school choice played in WCPSS's implementation of reassignment. Indeed, our analyses show that reassignment reduced students' probability of attending their base school by 6 percentage points. Further, although node reassignment had no immediate effect on district attrition, we find some evidence to suggest that reassignment modestly increased the chances that WCPSS students left the district in subsequent years.

Effects of Reassignment on Student Achievement, Absenteeism, and Disciplinary Actions

In Table 6, we report the estimated effects of reassignment on students' short- and medium-term achievement, absenteeism, and disciplinary outcomes—estimates represented by the δ_k term in equation (1). As in the analyses above, we first direct attention to the pre-assignment years, where the universally insignificant estimates indicate that treatment and comparison group students exhibited a similar trajectory in the time period leading up to reassignment. Such findings allay concerns about the possible endogeneity of WCPSS's reassignment decisions conditional on covariates and node-grade and year fixed effects and thus instill a degree of confidence in the validity of our estimates. Further analyses indicate that there is no significant variation in pre-treatment trends across the cohorts for which we have data.[14]

Shifting the focus to the post-reassignment period, the left-most panel in Table 6 reports the effects of reassignment on student mathematics achievement, as measured by the North Carolina EOG Test in mathematics, which was administered each spring to nearly all students in grades 3 to 8. In the year immediately following reassignment, the results indicate no significant difference between reassigned students and their comparison group peers. In the second, third, and fourth years, however, reassigned students' mathematics scores are significantly higher than those of the comparison group. The magnitudes of these effects are modest: 0.02 standard deviations in the second year and approximately 0.04 standard deviations in the third and fourth years. However, this finding suggests that rather than slowing student mathematics achievement growth, reassignment provides students with a very modest boost that appears to accumulate over time. As the supplemental analyses presented in Table A3 indicate, these results are largely consistent across racial and ethnic groups, although the estimated effects of reassignment on Hispanic students' mathematics achievement are not statistically different from zero.

The estimates reported in the second panel of Table 6 point to a similar pattern of effects on reading achievement. We note, however, that reassigned student reading achievement declines significantly in the year of reassignment by approximately 0.02 standard deviations. However, we find that reassigned student reading achievement rebounds in the subsequent years. Two years after reassignment, we

[14] To test for pre-trend stability across reassignment cohorts, we interact the event history treatment variables with reassignment cohort. F-tests on the cohort × pre-trend interactions, available by request, fail to reject the null hypothesis that interactions are jointly equal to zero.

Table 6. Effects of reassignment on math and reading achievement, chronic absenteeism, and suspension, with node-by-grade fixed effects.

	Math achievement	Reading achievement	Chronic absenteeism	Suspension
Three years before reassignment	−0.011	0.007	0.000	0.002
	(0.008)	(0.009)	(0.005)	(0.002)
Two years before reassignment	−0.008	0.010	0.002	−0.002
	(0.008)	(0.008)	(0.004)	(0.002)
One year before reassignment	—	—	—	—
Year of reassignment	−0.014	−0.017*	−0.001	−0.007***
	(0.008)	(0.008)	(0.004)	(0.002)
One year after reassignment	0.020*	0.009	0.002	−0.008***
	(0.009)	(0.008)	(0.004)	(0.002)
Two years after reassignment	0.038***	0.020*	0.000	0.003
	(0.009)	(0.009)	(0.004)	(0.002)
Three years after reassignment	0.046***	0.013	−0.007	0.001
	(0.010)	(0.010)	(0.004)	(0.002)
Constant	−0.406*	−0.236	0.029	0.038
	(0.185)	(0.169)	(0.045)	(0.022)
N (student-year)	565,158	563,033	911,394	1,353,521
R-square (overall)	0.308	0.292	.010	0.068

Notes: Data are drawn from WCPSS administrative records. Math and reading achievement data are available for students in grades 3 to 8; chronic absenteeism data are available for students in all grades in years 2005 to 2010; suspension data are available for students in all grades and years with administrative data. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—." Standard errors are reported in parentheses. ***p < 0.001; **p < 0.01; *p < 0.05.

find a positive and significant 0.02 standard deviation effect on reading achievement. Supplementary analysis again provides little evidence that the effects of reassignment vary by race or ethnicity.[15]

The third column in Table 6 presents the estimated effect of reassignment on student absenteeism, which we define as missing more than 5 percent of the school year. The results indicate that reassignment had no measurable effects on chronic absenteeism. This null result is reassuring given persistent worries that reassignment disrupts students' schooling and induces social costs. We further find no evidence of systematic differences in the effect of reassignment on student absenteeism by racial or ethnic group.

Finally, the results reported in the right-most column of Table 6 point to modest protective treatment effects on students' exposure to exclusionary discipline. Reassigned students' experience a decline in suspension rates of 0.7 percentage points in the year of reassignment, which remain depressed in the subsequent year. While these effects are small in absolute terms, they represent an approximate 20 percent

[15] Additional supplementary models, available from the authors by request, were used to investigate the extent to which the effects of reassignment on achievement vary with students' grade at the time of reassignment. These models provide no evidence to suggest that the effects of reassignment are different for students who are reassigned in early grades rather than later grades.

decline from the sample's conditional mean suspension rate of 0.038. Further analyses by race and ethnicity indicate that this protective effect of reassignment holds exclusively for Black and Hispanic students. These effects are especially important given the difficulty policymakers, educators, and researchers have had in designing interventions to ameliorate racial discipline disparities (Carter et al., 2017; Steinberg & Lacoe, 2017; Welsh & Little, 2018).[16]

Do the Effects of Reassignment Vary with Origin or Destination School Characteristics?

One might expect the effects of reassignment to vary with the characteristics of students' pre-reassignment schools. In particular, prior research documenting the effects of peer poverty (Agostinelli et al., 2020) suggests that students moved from relatively high-poverty schools may benefit from reassignment while students reassigned from relatively low-poverty schools may suffer. We assess this possibility by stratifying students' assigned schools into quartiles based on the proportion of students receiving free or reduced-price lunch (FRL) and estimating the effects of reassignment separately for each quartile. These supplemental analyses, reported in Figures A1 to A4, indicate no systematic differences across school FRL quartiles in the effects of reassignment.[17]

One might also expect the effects of reassignment to vary depending on whether students were assigned to an existing school or a newly opened school (e.g., Hasim, Strunk, & Marsh, 2018; Lafortune & Schonholzer, 2017; Neilson & Zimmerman, 2014). As a result of rising student enrollments during the study period, approximately 42 percent of the students reassigned under the WCPSS policy were reassigned to a new school and the remaining were reassigned to an existing school. Reassignments to a new versus existing school arguably constitute different treatments, since newly established schools were typically desirable, modern buildings located in relatively affluent, high-growth neighborhoods. However, supplementary analyses reported in Figure A5 indicate that the effects of reassignment to an existing school are similar to the effects of reassignment to a new school.

Do Effects Vary with Students' Use of School Choice?

Our primary analyses estimate the effects of reassignment, rather than the effect of students attending their reassigned base school. Above we describe the relevance

[16] We note that since data on students in grades 10 to 12 become available for analyses across the panel's first three years, our analyses of the effects of reassignment on suspension do not draw from students in all grades in all years. We estimate two sets of supplementary analyses to address potential limitations due to the absence of students in grades 10, 11, and 12 in the panel's early years. First, we estimate analyses of the effects of reassignment on suspension exclusively for students in grades K-9. These models suggest that the protective effects of reassignment are slightly smaller in elementary and middle school grades than high school (where suspension is more common). Second, we estimate the effects of reassignment on chronic absenteeism and suspension exclusively on all students in the 2002/2003 through 2009/2010 school years. These models, which are estimated on a more balanced panel, return nearly identical effects to the models reported in Table 6.

[17] It is also possible that the effects of node reassignment to a school that has a greater concentration of students who qualify for free or reduced-price lunch than the node's previously assigned school might have different effects than node reassignment to a school with a lesser concentration of students who qualify for free or reduced-price lunch. However supplementary analyses, estimated separately on students whose node's assigned school moved up or down a quartile after reassignment, point to no significant treatment effect heterogeneity along these lines. Details on these analyses and their results are available by request from the authors. All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's website and use the search engine to locate the article at http://onlinelibrary.wiley.com.

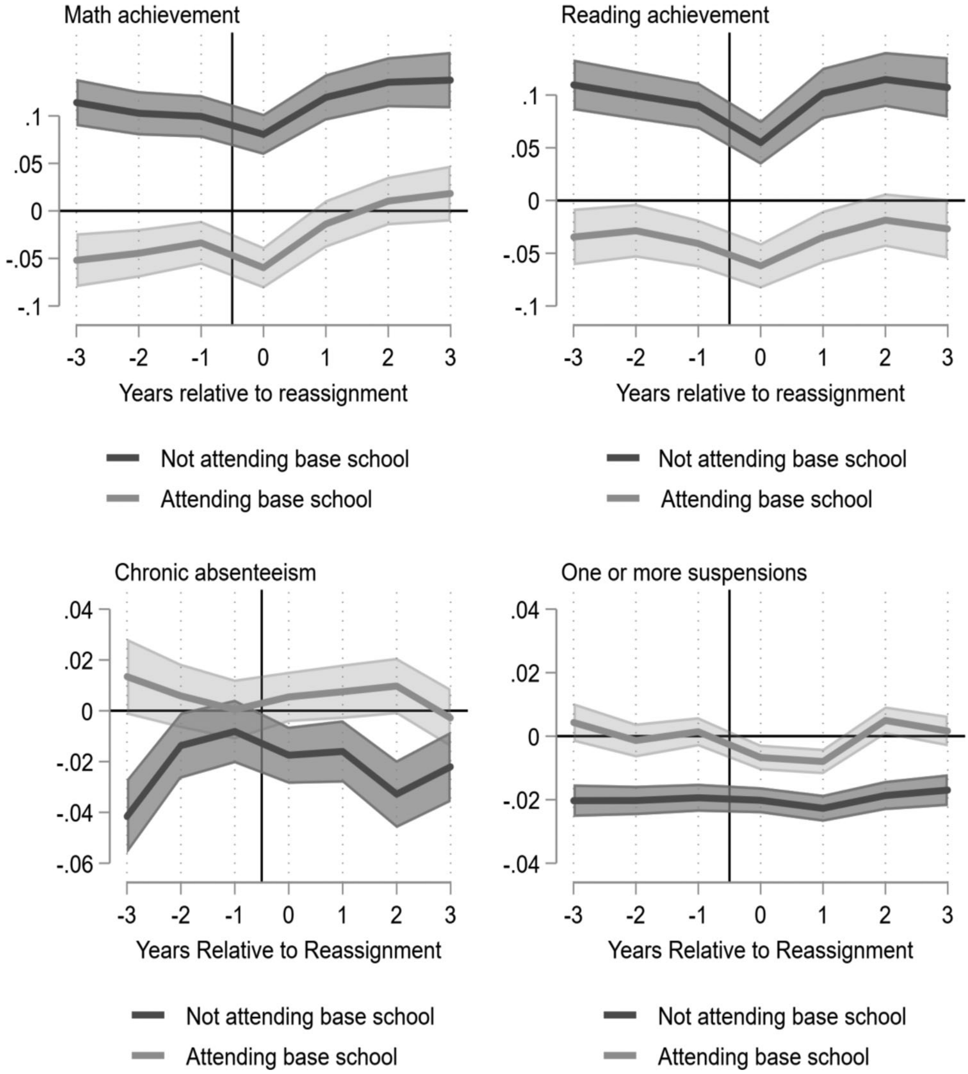
of this estimand for both policymaking and understanding the consequences of diversity-motivated reassignments in contemporary educational systems. However, we also recognize the schooling choices that families make in response to reassignment are a potential source of heterogeneity in the effects of reassignment, and thus important to understand. Indeed, during our study period, approximately one-third of WCPSS school students took advantage of the district's controlled choice plan to attend magnet, year-round, or other schools of choice. And, as we report above, reassignment increases students' probability of not attending their base school by approximately 6 percentage points in the year after reassignment.

In an effort to understand whether reassigned students who attend their base school exhibit different outcomes than reassigned students who attend a choice school, we estimate a variant of the model depicted in equation (1) where we interact an indicator for attending one's assigned base school with the matrix of treatment indicators. To ease interpretation, we set the reference category in these analyses as four years prior to reassignment and graphically depict outcome trends before and after reassignment in Figure 4. We emphasize that potential endogeneity of reassigned students' decision to attend a choice school precludes a causal interpretation of these estimates, but they still provide useful descriptive evidence on the outcome trajectories of these two groups of students.

Figure 4 illustrates that students attending choice schools are, on average, more advantaged than their peers attending their assigned base school, a fact that likely reflects unmeasured characteristics of students and families who opt into choice schools. More informative for our purposes, however, are the relative trajectories of the trendlines for these two groups of students. For the achievement and disciplinary outcomes, the trend lines for the two groups are remarkably parallel in the years following reassignment, providing evidence that the effects of reassignment were broadly similar across these two groups of students. A formal test fails to reject the null hypothesis that the two trends are equal to one another. By contrast, Figure 4 provides evidence of diverging experiences on chronic absenteeism. While chronic absenteeism is generally steady in the first three post-reassignment years for students who attend their base school, it declines over this period for students enrolled in schools of choice. A formal test rejects the null that the two trends are equal to one another. Together, the results presented in Figure 4 provide evidence that the effects of reassignment, particularly on achievement outcomes, are broadly similar for students who do and do not attend their assigned base school.

We additionally estimate the effect of students' attending their reassigned base school in an instrumental variables (IV) framework, instrumenting students' endogenous decision to attend their base school with an indicator for reassignment. However, the design of WCPSS's school assignment policy, particularly the fact that reassignments took place in a context where families had ready access to school choice options, makes it nearly certain that the exclusion restriction fails to hold. It is implausible to assume that the effects of reassignment only operate through students' attendance at their newly assigned base school, an implausibility reinforced by the results in Figure 4. We present the results of this analysis, estimated in a two-stage least squares framework, in Table A4.[18] Given that the IV approach simply scales the estimates in Table 6 by the proportion of reassigned students who attend their newly assigned base school, it is unsurprising that, from an absolute value standpoint, the estimates in Table A4 are larger than their analogs in Table 6.

[18] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's website and use the search engine to locate the article at http://onlinelibrary.wiley.com.



Notes: Data are drawn from WCPSS administrative records. Math and reading achievement data are available for students in grades 3 to 8; chronic absenteeism data are for students in all grades in years 2005 to 2010; suspension data are available for students in all grades and years with administrative data. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—."

Figure 4. Post-Reassignment Trends on Math and Reading Achievement, Chronic Absenteeism, and Suspension Estimated Separately for Students Who Are Attending Their Base School and Students Not Attending Their Base School.

Effects of Reassignment on Non-Reassigned Students

In addition to affecting reassigned students, reassignments might also affect the educational outcomes of students who are not themselves reassigned, but who attend a school that receives or contributes reassigned students. As discussed above, we specified equation (1) in a manner that allows us to estimate these effects, including the terms $p^{in}_{ist,k=0}$ and $p^{out}_{ist,k=0}$ to represent the proportion of students reassigned into and out of, respectively, school s in year t. Each of these terms theoretically ranges from zero (a school whose enrollment was unaffected by reassignment) to one (a school whose entire enrollment was reassigned in or out). In practice, however, since the district consistently reassigned students out of and into many different schools, most observed values on both measures fall between zero and 0.10.[19]

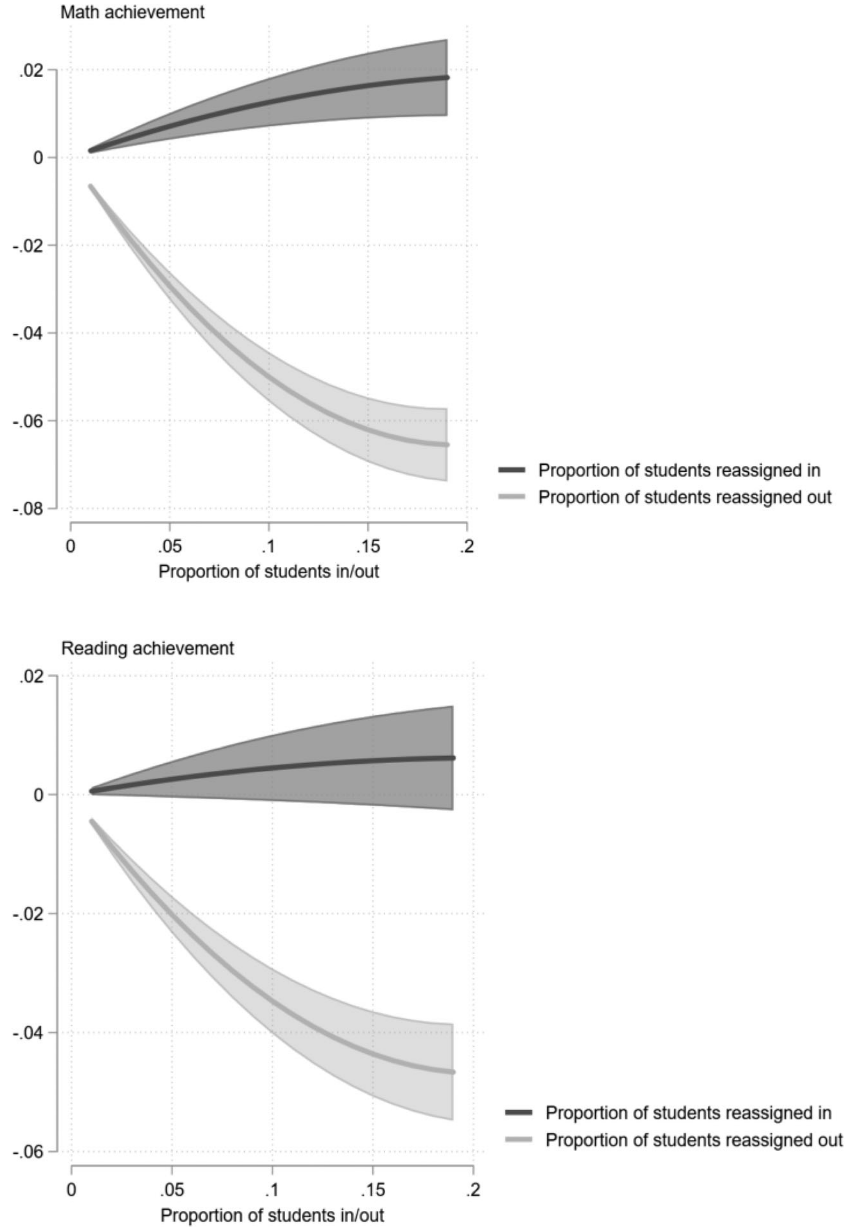
Table 7 reports the estimated coefficients for these spillover terms (derived from the same models we report in Table 6). As described in equation (2), we have scaled these terms to allow them to be interpreted as the change in non-reassigned students' outcomes for each 10-percentage point increase in students reassigned into or out of students' schools. The plots in Figure 5 further facilitate substantive interpretation of these effects. These plots present the linear combination of the coefficients on the first- and second-order terms, bounded with a 95 percent confidence interval, for $p^{in}_{ist,k=0}$ and $p^{out}_{ist,k=0}$ values ranging from 0.01 to 0.20—this range accounts for the vast majority of observed values on these measures. For both achievement outcomes, Figure 5 indicates that the achievement of non-reassigned students slightly increases in the proportion of students reassigned into their school. The magnitude of these effects is quite small across the range we analyze, always less than 0.01 standard deviations in reading and less than 0.02 standard deviations in math. By contrast, Figure 5 indicates that, in both subjects, non-reassigned students' achievement declines in the proportion of students reassigned out of their school. In reading, these achievement declines are less than 0.01 standard deviations for very low levels of out-migration, but nearly 0.05 standard deviations when 20 percent of the student body has been reassigned out of the school. The analogous declines in math are 0.01 and 0.065 standard deviations. For the attendance and suspension outcomes, all estimated effects are substantively quite modest, with all increases or decreases less than one percentage point.

It is important to contextualize the estimates presented in Table 7 and Figure 5 within the structure of the model we use to estimate them. In particular, we highlight the fact that the coefficient for the $p^{in}_{ist,k=0}$ term is estimated conditional on $p^{out}_{ist,k=0}$, and vice versa. Although such an approach provides a plausible estimate of the effect of each process, it does not necessarily provide an estimate of non-reassigned students' change in achievement as a result of reassignment. As described above, WCPSS primarily used reassignments to change the socioeconomic composition of schools in the district. Consequently, most affected schools both received and contributed reassigned students. As such, in practice, the negative effects of reassignments out of the school are likely offset, and potentially even overwhelmed, by the positive effects of incoming reassignments, and vice versa.

DISCUSSION AND CONCLUSIONS

As trends toward socioeconomic segregation across public schools intensify across the U.S. (Marcotte & Dalane, 2019; Owens, Reardon, & Jencks, 2016) and the courts

[19] The population mean for $p^{in}_{ist,k=0}$ is 0.026 and the standard deviation is 0.074. For $p^{out}_{ist,k=0}$, the population mean is 0.041 and the standard deviation is 0.069.



Notes: Data are drawn from WCPSS administrative records. Math and reading achievement data are available for students in grades 3 to 8. Effect on non-reassigned students in receiving schools is estimated as ($\zeta p^{in}_{ist,k=0}$) in equation (1); see equation (2) for more detail on this variable's construction. Effect on non-reassigned students in contributing schools is estimated as ($\lambda p^{out}_{ist,k=0}$) in equation (2); see equation (3) for more detail on this variable's construction. Both spillover variables are scaled such that a 1-unit shift represents a 10-percentage point shift in the proportion of reassigned students. All models include controls for student race/ethnicity, gender, special education and ELL status, effects of reassignment event history, node-by-grade fixed effects, and year fixed effects.

Figure 5. Predict Mathematics and Reading Achievement for Non-Reassigned Students by the Proportion of Students Reassigned Into and Out Of School.

Table 7. Estimated spillover effects of reassignments into and out of non-reassigned students' schools.

		Math achievement	Reading achievement	Chronic absenteeism	Suspension
Effect on non-reassigned students in receiving schools	Linear	0.016***	0.006	−0.005***	−0.001
		(0.003)	(0.003)	(0.001)	(0.001)
	Quadratic	−0.033***	−0.014	0.007**	0.001
		(0.007)	(0.007)	(0.003)	(0.001)
Effect on non-reassigned students in contributing schools	Linear	−0.067***	−0.046***	0.003*	−0.007***
		(0.004)	(0.004)	(0.002)	(0.001)
	Quadratic	0.173***	0.113***	−0.008	0.017***
		(0.011)	(0.010)	(0.005)	(0.003)
N (student-year)		565,158	563,033	663,878	1,071,138

Notes: Data are drawn from WCPSS administrative records. Math and reading achievement data are available for students in grades 3 to 8; chronic absenteeism data are for students in all grades in years 2005 to 2010; suspension data are available for students in all grades and years with administrative data. Effect on non-reassigned students in receiving schools is estimated as ($\zeta p^{in}_{ist,k=0}$) in equation (1); see equation (2) for more detail on this variable's construction. Effect on non-reassigned students in contributing schools is estimated as ($\lambda p^{out}_{ist,k=0}$) in equation (2); see equation (3) for more detail on this variable's construction. Both spillover variables are scaled such that a 1-unit shift represents a 10-percentage point shift in the proportion of reassigned students. All models include controls for student race/ethnicity, gender, special education and ELL status, effects of reassignment event history, node-by-grade fixed effects, and year fixed effects. Standard errors are reported in parentheses. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

increasingly restrict racially sensitive school desegregation efforts (Liebowitz, 2018; Reardon et al., 2012), school districts across the United States are considering diversity efforts broadly similar to the socioeconomic reassignment policy that WCPSS implemented between 2000 and 2010 (Kahlenberg, 2012). Like the debate over racially sensitive busing in the post-*Brown* era, contemporary school desegregation policy discussions raise important questions about potential unintended negative effects of school reassignment for reassigned students.

Our analysis of WCPSS's reassignment policy provides evidence that these concerns are exaggerated. More than 20 percent of K-12 students enrolled in WCPSS experienced a school reassignment at some point between 2000 and 2010. Although WCPSS policy provided all students with a menu of school choices, our analyses indicate that most students responded to reassignment by moving to their newly assigned base school. Rather than depressing these students' educational outcomes, we find that reassignment provided a modest boost to reassigned students' mathematics achievement. Our analyses further suggest that reassignment had a smaller positive effect on reassigned students' reading achievement, no effect on reassigned students' probability of chronic absenteeism, and a small short-term reduction in students' probability of suspension.

Importantly, our analyses indicate that the effects of reassignment are relatively consistent across the WCPSS student population. While our analyses suggest that the district implemented reassignments in a racially disproportionate manner, increasing the distance between reassigned Hispanic students' homes and their base schools and leading Black students to be assigned to lower-achieving schools, we find little evidence to suggest that the effects of reassignment on student educational outcomes vary by race or ethnicity. Further, we find limited evidence to suggest that the effects of reassignment vary with either the characteristics of students' base schools or students' newly assigned schools.

Of course, these findings only speak directly to the effects of WCPSS's socioeconomic reassignment policy implemented during the decade from 2000 to 2010. While the district's model is influential, it is important to note that WCPSS initiated socioeconomic reassignments after decades of racially sensitive school desegregation efforts. In part as a result of this historical context, WCPSS's reassignment policy had negligible effects on average levels of segregation across the district, although it did substantially reduce racial segregation for students who would have otherwise attended majority-minority schools (Carlson et al., 2020). Reassignments undertaken in the context of a more sweeping desegregation effort could have different effects for student outcomes. We additionally note several distinctive characteristics of the WCPSS policy context: First, WCPSS is a large, county-wide school district that serves a diverse community with a relatively strong local economy. WCPSS's size and diversity made it possible for the district to distribute reassignments across a wide range of communities, which span a geographic footprint of more than 800 square miles. Further, although in some cases the district reassigned students to schools that were far from their homes, in most cases, the "checkerboard" pattern of racial and socioeconomic residential segregation in the county allowed it to increase socioeconomic and racial diversity in schools without dramatically increasing students' travel time to school. In addition, WCPSS provided relatively generous funding to its schools and distributed resources relatively equitably across the district. As a result, reassignments rarely induced large changes in the quality of the educational settings to which students were exposed.

Second, WCPSS implemented its reassignment plan during a period of rapid population growth and used reassignment both to maintain socioeconomic and academic balance across schools but also to accommodate that growth. As such, approximately 40 percent of the students who were reassigned during the study were reassigned to a new school. While supplementary analyses do not suggest that the effects of reassignment to a new school varied meaningfully from the effects of reassignment to an existing school, it is possible that the district's growth had unmeasured consequences for the policy.

Finally, WCPSS implemented its reassignment plan in a policy context in which all students had access to a menu of school choice options that included magnet school and year-round calendar options. While our analyses suggest that most reassigned students moved to their newly reassigned school, students in reassigned residential nodes were more likely to take advantage of choice options than their peers in residential nodes that were not reassigned. These choice options likely undermined the effectiveness of reassignment as a tool for maintaining socioeconomic balance across schools. At the same time, we suspect that it would be politically difficult to implement a policy that used aggressive reassignments to achieve demographic diversity in schools without providing similar choice options in the contemporary political and legal climate.

We further note that school choice may help to explain the encouraging pattern of post-reassignment outcomes in our analyses. Although our research design does not allow for strong causal statements about how students' schooling decisions may moderate the effects of reassignment, our findings do not suggest that student use of school choice drives the positive reassignment effects. The trends in educational outcomes for reassigned students who attend base schools roughly parallel the trends in educational outcomes for their peers who attend schools of choice. We caution, however, that these findings are exploratory. Our findings do not rule out the possibility that students who were most at risk to experience negative effects of reassignment used choice options to avoid such impacts. Future research should more thoroughly investigate the interaction between school choice and school desegregation in the contemporary era (Marcotte & Dalane, 2019).

We are unable to empirically assess the ways these distinctive attributes of the WCPSS context shaped the socioeconomic reassignment policy's implementation and effects. However, we suspect that each plays a role in accounting for the pattern of policy effects that we report here. Of course, not all districts using reassignment as a policy lever to improve school diversity have access to the same contextual and educational resources as WCPSS. Furthermore, we note that even in this district's context, school reassignments eventually proved to be politically contentious. In 2009, voters in Wake County elected a slate of school board candidates who had actively campaigned against the reassignment policy. WCPSS discontinued reassignment for socioeconomic diversity during the decade that followed their election.

Nonetheless, we hope our findings provide encouragement for policymakers—in WCPSS and elsewhere—who are interested in finding new ways to pursue diversity in contemporary public schools. In our view, reassignment is a crucial tool for pursuing that worthwhile goal, a view buttressed by our findings that policymakers can reassign students without causing educational harm. Furthermore, we believe our findings may understate the social benefits of WCPSS's 2000 to 2010 reassignment policy since they only begin to capture the wide range of ways in which reassignment—and desegregation more broadly—might influence student experiences. Perhaps most notably, our results do not account for social benefits that all students encounter as they navigate more diverse learning environments. As such, we believe that WCPSS's reassignment policy provides an important model for school desegregation efforts in the contemporary context.

THURSTON DOMINA is the Distinguished Professor of Educational Policy and Organizational Leadership at the University of North Carolina–Chapel Hill, CB 3500 Peabody Hall, Chapel Hill, NC 27599-3500 (e-mail: tdomina@unc.edu).

DEVEN CARLSON is an Associate Professor of Political Science at the University of Oklahoma, 205 Dale Hall Tower, 455 W. Lindsey Street, Norman, OK 73019 (e-mail: decarlson@ou.edu).

JAMES CARTER III is a Research Analyst for the Wake County Public School System, 5625 Dillard Drive, Cary NC 27518 and a Ph.D. Candidate at the University of North Carolina–Chapel Hill (e-mail: jcarter3@wcpss.net).

MATTHEW A. LENARD is a Ph.D. Candidate at Harvard University, 14 Appian Way, Larsen 501 Cambridge, MA 02138 (e-mail: mlenard@g.harvard.edu).

ANDREW MCEACHIN is the Director of Collaborative for Student Growth at NWEA, 121 NW Everett Street, Portland, OR 97209 and a Policy Researcher in the Departments of Economics, Statistics, and Sociology at the RAND Corporation (e-mail: Andrew.mceachin@nwea.org).

RACHEL M. PERERA is a Doctoral Candidate at Pardee RAND Graduate School, 1776 Main Street, Santa Monica, CA 90401 (e-mail: rperera@prgs.edu).

ACKNOWLEDGMENTS

The research team is grateful to the Wake County Public School System for providing data access and assistance throughout this research process. We extend particular thanks to Bradley McMillen, Coleen Paeplow, Elc Estrera, Glenn Carrozza, Robert Siwiec and the WCPSS Department of Data, Research, and Accountability for guidance and support throughout the project. The team is also grateful to seminar participants at Rice University's Houston Education Research Consortium, the University of California, Irvine's Center for Administrative Data Analysis, the University of Connecticut's Center for Education Policy Analysis, Research, and Evaluation, University of North Carolina Chapel Hill's Education Inequality Seminar, and panel attendees at the annual meetings of the American Educational Research Association, the Association for Education Finance and Policy, and the Association for Public Policy Analysis and Management for helpful feedback. The project was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health (award no. R01HD094007).

REFERENCES

Agostinelli, F., Doepke, M., Sorrenti, G., & Zilibotti, F. (2020). It takes a village: The economics of parenting with neighborhood and peer effects. NBER Working Paper No. w27050. Cambridge, MA: National Bureau of Economic Research.

Akerlof, G. A., & Kranton, R. E. (2002). Identity and schooling: Some lessons for the economics of education. Journal of Economic Literature, 40, 1167–1201.

Angrist, J. D., & Lang, K. (2004). Does school integration generate peer effects? Evidence from Boston's Metco program. American Economic Review, 94, 1613–1634. Available at https://doi.org/10.1257/0002828043052169.

Ashenfelter, O. C. (1978). Estimating the effect of training programs on earnings. The Review of Economics and Statistics, 60, 47–57.

Ashenfelter, O. C. (2006). Evaluating the role of Brown v. Board of Education in school equalization, desegregation, and the income of African Americans. American Law and Economics Review, 8, 213–248. Available at https://doi.org/10.1093/aler/ahl001.

Ashenfelter, O. C., & Card, D. (1984). Using the longitudinal structure of earnings to estimate the effect of training programs. Cambridge, MA: National Bureau of Economic Research.

Ayscue, J. B., & Woodward, B. (2014). Segregation again: North Carolina's transition from leading desegregation then to accepting segregation now. Civil Rights Project-Proyecto Derechos Civiles.

Bacher-Hicks, A., Billings, S., & Deming, D. (2019). The School to Prison Pipeline: Long-Run Impacts of School Suspensions on Adult Crime. NBER Working Paper No. w26257. Cambridge, MA: National Bureau of Economic Research. Available at https://doi.org/10.3386/w26257.

Baum-Snow, N., & Lutz, B. F. (2011). School desegregation, school choice, and changes in residential location patterns by race. American Economic Review, 101, 3019–3046. Available at https://doi.org/10.1257/aer.101.7.3019.

Betts, J., Kitmitto, S., Levin, J., Bos, J., & Eaton, M. (2015). What happens when schools become magnet schools? A longitudinal study of diversity and achievement. Washington, DC: American Institutes for Research. Available at https://eric.ed.gov/?id=ED556800.

Beuchert, L., Humlum, M. K., Nielsen, H. S., & Smith, N. (2018). The short-term effects of school consolidation on student achievement: Evidence of disruption? Economics of Education Review, 65, 31–47.

Billingham, C. M., & Hunt, M. O. (2016). School racial composition and parental choice: New evidence on the preferences of White parents in the United States. Sociology of Education, 89, 99–117.

Billings, S. B., Deming, D. J., & Rockoff, J. (2014). School segregation, educational attainment, and crime: Evidence from the end of busing in Charlotte-Mecklenburg. The Quarterly Journal of Economics, 129, 435–476. Available at https://doi.org/10.1093/qje/qjt026.

Brummet, Q. (2014). The effect of school closings on student achievement. Journal of Public Economics, 119, 108–124. Available at https://doi.org/10.1016/j.jpubeco.2014.06.010.

Capers, K. J. (2019). The role of desegregation and teachers of color in discipline disproportionality. The Urban Review, 51, 789–815. Available at https://doi.org/10.1007/s11256-019-00505-6.

Card, D., & Rothstein, J. (2007). Racial segregation and the Black–White test score gap. Journal of Public Economics, 91, 2158–2184. Available at https://doi.org/10.1016/j.jpubeco.2007.03.006.

Carlson, D., & Bell, E. (2021). Socioeconomic status, race, and public support for school integration. AERA Open, 7, 1–16.

Carlson, D., Bell, E., Lenard, M. A., Cowen, J. M., & McEachin, A. (2020). Socioeconomic-based school assignment policy and racial segregation levels: Evidence from the Wake County Public School System. American Educational Research Journal, 57, 258–304. Available at https://doi.org/10.3102/0002831219851729.

Carlson, D., & Lavertu, S. (2016). Charter school closure and student achievement: Evidence from Ohio. Journal of Urban Economics, 95, 31–48. Available at https://doi.org/10.1016/j.jue.2016.07.001.

Carter, P. L., Skiba, R., Arredondo, M. I., & Pollock, M. (2017). You can't fix what you don't look at: Acknowledging race in addressing racial discipline disparities. Urban Education, 52, 207–235.

Clotfelter, C. T., Hemelt, S. W., Ladd, H. F., & Turaeva, M. (2018). School segregation in the era of immigration and school choice: North Carolina, 1998–2016. CALDER Working Paper Series, 56.

Condron, D. J., Tope, D., Steidl, C. R., & Freeman, K. J. (2013). Racial segregation and the Black/White achievement gap, 1992 to 2009. The Sociological Quarterly, 54, 130–157.

Cook, T. D., Deng, Y., & Morgano, E. (2007). Friendship influences during early adolescence: The special role of friends' grade point average. Journal of Research on Adolescence, 17, 325–356.

Crosnoe, R. (2011). Fitting in, standing out: Navigating the social challenges of high school to get an education. Cambridge, UK: Cambridge University Press.

Delmont, M. F. (2016). Why busing failed: Race, media, and the national resistance to school desegregation. Oakland, CA: University of California Press.

Denice, P., & Gross, B. (2016). Choice, preferences, and constraints: Evidence from public school applications in Denver. Sociology of Education, 89, 300–320.

Duncan, G. J., Boisjoly, J., & Harris, K. M. (2001). Sibling, peer, neighbor, and schoolmate correlations as indicators of the importance of context for adolescent development. Demography, 38, 437–447.

Dur, U., Hammond, R. G., Lenard, M. A., Morrill, M., Morrill, T., & Paeplow, C. (2021). The attraction of magnet schools: Evidence from embedded lotteries in school assignment. Working Paper.

Durlauf, S. N., & Ioannides, Y. M. (2010). Social interactions. Annual Review of Economics, 2, 451–478.

Eaton, S. E. (2001). The other Boston busing story: What's won and lost across the boundary line. New Haven, CT: Yale University Press.

Fiel, J. (2015). Closing ranks: Closure, status competition, and school segregation. American Journal of Sociology, 121, 126–170. Available at https://doi.org/10.1086/682027.

Grigg, J. (2012). School enrollment changes and student achievement growth: A case study in educational disruption and continuity. Sociology of Education, 85, 388–404.

Guryan, J. (2004). Desegregation and Black dropout rates. The American Economic Review, 94, 31.

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Disruption versus Tiebout improvement: The costs and benefits of switching schools. Journal of Public Economics, 88, 1721–1746.

Hashim, A. K., Strunk, K. O., & Marsh, J. A. (2018). The new school advantage? Examining the effects of strategic new school openings on student achievement. Economics of Education Review, 62, 254–266.

Hill, D. V., Hughes, R., Lenard, M. A., Liebowitz, D. D., & Page, L. C. (2020). The effects of changing the family income and academic skill levels of students' peers. Presented at the Association for Public Policy Analysis & Management Fall Research Conference.

Holland, M. M. (2012). Only here for the day: The social integration of minority students at a majority White high school. Sociology of Education, 85, 101–120.

Ispa-Landa, S. (2013). Gender, race, and justifications for group exclusion: Urban Black students bussed to affluent suburban schools. Sociology of Education, 86, 218–233.

Jacobson, L. S., LaLonde, R. J., & Sullivan, D. G. (1992). Earnings losses of displaced workers. Available at https://doi.org/10.17848/wp92-11.

Jacobson, L. S., LaLonde, R. J., & Sullivan, D. G. (2005). Estimating the returns to community college schooling for displaced workers. Journal of Econometrics, 125, 271–304.

Johnson, R. (2011). Long-run impacts of school desegregation & school quality on adult attainments. NBER Working Paper No. w16664. Cambridge, MA: National Bureau of Economic Research. Available at https://doi.org/10.3386/w16664.

Kahlenberg, R. D. (2012). The future of school integration: Socioeconomic diversity as an education reform strategy. New York, NY: Century Foundation.

Kinsler, J. (2011). Understanding the Black–White school discipline gap. Economics of Education Review, 30, 1370–1383. Available at https://doi.org/10.1016/j.econedurev.2011.07.004.

Kreisman, D., & Steinberg, M. P. (2019). The effect of increased funding on student achievement: Evidence from Texas's small district adjustment. Journal of Public Economics, 176, 118–141.

Lafortune, J., & Schonholzer, D. (2017). Do school facilities matter? Measuring the effects of capital expenditures on student and neighborhood outcomes. Working Paper.

LaFree, G., & Arum, R. (2006). The impact of racially inclusive schooling on adult incarceration rates among US cohorts of African Americans and Whites since 1930. Criminology, 44, 73–103.

Liebowitz, D. D. (2018). Ending to what end? The impact of the termination of court-desegregation orders on residential segregation and school dropout rates. Educational Evaluation and Policy Analysis, 40, 103–128.

Lit, I. W. (2009). Bus kids: Children's experiences with voluntary desegregation. New Haven, CT: Yale University Press.

Lutz, B. (2011). The end of court-ordered desegregation. American Economic Journal: Economic Policy, 3, 130–168. Available at https://doi.org/10.1257/pol.3.2.130.

Marcotte, D. E., & Dalane, K. (2019). Socioeconomic segregation and school choice in American public schools. Educational Researcher, 48, 493–503.

McMillian, M. M., Fuller, S., Hill, Z., Duch, K., & Darity Jr., W. A. (2018). Can class-based substitute for race-based student assignment plans? Evidence from Wake County, North Carolina. Urban Education, 53, 843–874.

Mickelson, R. A., Bottia, M. C., & Lambert, R. (2013). Effects of school racial composition on K–12 mathematics outcomes: A metaregression analysis. Review of Educational Research, 83, 121–158. Available at https://doi.org/10.3102/0034654312475322.

Moody, J. (2001). Race, school integration, and friendship segregation in America. American Journal of Sociology, 107, 679–716.

Neilson, C. A., & Zimmerman, S. D. (2014). The effect of school construction on test scores, school enrollment, and home prices. Journal of Public Economics, 120, 18–31.

Owens, A., Reardon, S. F., & Jencks, C. (2016). Income segregation between schools and school districts. American Educational Research Journal, 53, 1159–1197.

Parcel, T. L., & Taylor, A. J. (2015). The end of consensus: Diversity, neighborhoods, and the politics of public school assignments. Chapel Hill, NC: UNC Press Books.

Quillian, L., & Campbell, M. E. (2003). Beyond Black and White: The present and future of multiracial friendship segregation. American Sociological Review, 68, 540–566.

Reardon, S. F. (2016). School segregation and racial academic achievement gaps. RSF: The Russell Sage Foundation Journal of the Social Sciences, 2, 34–57.

Reardon, S. F., Grewal, E. T., Kalogrides, D., & Greenberg, E. (2012). Brown fades: The end of court-ordered school desegregation and the resegregation of American public schools. Journal of Policy Analysis and Management, 31, 876–904.

Reber, S. J. (2010). School desegregation and educational attainment for Blacks. Journal of Human Resources, 45, 893–914.

Riddle, T., & Sinclair, S. (2019). Racial disparities in school-based disciplinary actions are associated with county-level rates of racial bias. Proceedings of the National Academy of Sciences, 116, 8255–8260.

Rossell, C. (1990). The carrot or the stick for school desegregation policy: Magnet schools or forced busing. Philadelphia, PA: Temple University Press.

Rossell, C. (2003). The desegregation efficiency of magnet schools. Urban Affairs Review, 38, 697–725.

Sacerdote, B. (2014). Experimental and quasi-experimental analysis of peer effects: Two steps forward? Annual Review of Economics, 6, 253–272.

Schwartz, A. E., Stiefel, L., & Cordes, S. A. (2017). Moving matters: The causal effect of moving schools on student performance. Education Finance and Policy, 12, 419–446.

Steinberg, M. P., & Lacoe, J. (2017). What do we know about school discipline reform? Education Next, 17(1).

Steinberg, M. P., & MacDonald, J. M. (2019). The effects of closing urban schools on students' academic and behavioral outcomes: Evidence from Philadelphia. Economics of Education Review, 69, 25–60.

Strunk, K. O., & McEachin, A. (2014). More than sanctions: Closing achievement gaps through California's use of intensive technical assistance. Educational Evaluation and Policy Analysis, 36, 281–306. Available at https://doi.org/10.3102/0162373713510967.

Strunk, K. O., McEachin, A., & Westover, T. N. (2014). The use and efficacy of capacity-building assistance for low-performing districts: The case of California's district assistance and intervention teams. Journal of Policy Analysis and Management, 33, 719–751. Available at https://doi.org/10.1002/pam.21658.

Weiner, D. A., Lutz, B. F., & Ludwig, J. (2009). The effects of school desegregation on crime. NBER Working Paper No. 15380. Cambridge, MA: National Bureau of Economic Research.

Welch, K., & Payne, A. A. (2010). Racial threat and punitive school discipline. Social Problems, 57, 25–48.

Welsh, R. O., & Little, S. (2018). The school discipline dilemma: A comprehensive review of disparities and alternative approaches. Review of Educational Research, 88, 752–794.

Wells, A. S., & Crain, R. L. (1999). Stepping over the color line: African-American students in White suburban schools. New Haven, CT: Yale University Press.

APPENDIX

Table A1. Effects of reassignment on characteristics of assigned school by student race/ethnicity, with node-by-grade fixed effects.

Year	Distance to assigned school			Mean math achievement at assigned school			Proportion Black or Hispanic at assigned school		
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Three years before reassignment	−0.164***	−0.059	0.167	−0.018***	0.006	0.012	−0.011***	0.009***	0.000
	(0.049)	(0.088)	(0.134)	(0.004	(0.006)	(0.009)	(0.002)	(0.003)	(0.004)
Two years before reassignment	−0.188***	−0.009	0.185	0.002	0.015**	0.023**	−0.012***	0.011***	0.005
	(0.040)	(0.074)	(0.110)	(0.003	(0.005)	(0.007)	(0.002)	(0.002)	(0.003)
One year before reassignment	—	—	—	—	—	—	—	—	—
Year of reassignment	−0.799***	0.549***	1.235***	0.024***	−0.044***	0.012	−0.017***	−0.026***	−0.065***
	(0.073)	(0.141)	(0.165)	(0.005	(0.010)	(0.012)	(0.003)	(0.004)	(0.005)
One year after reassignment	−0.911***	0.112	1.006***	0.045***	−0.045***	0.023	−0.023***	−0.027***	−0.072***
	(0.073)	(0.146)	(0.173)	(0.006	(0.011)	(0.014)	(0.003)	(0.005)	(0.006)
Two years after reassignment	−1.005***	−0.012	1.030***	0.056***	−0.030**	0.014	−0.024***	−0.028***	−0.077***
	(0.077)	(0.152)	(0.188)	(0.006	(0.011)	(0.014)	(0.003)	(0.005)	(0.006)
Three years after reassignment	−1.032***	−0.108	0.964***	0.070***	−0.004	0.039**	−0.020***	−0.028***	−0.072***
	(0.079)	(0.154)	(0.204)	(0.006	(0.011)	(0.014)	(0.003)	(0.005)	(0.007)
Constant	4.298***	5.823***	5.130***	0.079***	−0.115***	−0.045***	0.317***	0.416***	0.405***
	(0.033)	(0.072)	(0.100)	(0.003	(0.007)	0.010)	(0.002)	(0.003)	(0.005)
N (student-year)	601,002	283,285	114,843	492,150	236,780	94,825	746,235	354,798	133,776

Notes: Data are drawn from WCPSS administrative records. Distance to assigned school data are available for students in all grades and years with administrative data; mean math achievement data are available for all students in years in which their assigned school enrolls students in grades 3 to 8; proportion Black and Hispanic data are available for students in all grades and years with administrative data. All models include controls for gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—." Standard errors are reported in parentheses.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Table A2. Effects of reassignment on moving school, attending base school, and leaving WCPSS by student race/ethnicity, with node-by-grade fixed effects.

Year	Move school			Attend base school			Leave district		
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Three years before reassignment	−0.012*	−0.006	0.002	0.027***	0.004	−0.006	−0.002	0.004	−0.004
	(0.006)	(0.006)	(0.011)	(0.005)	(0.006)	(0.012)	(0.002)	(0.003)	(0.006)
Two years before reassignment	−0.001	−0.001	0.007	0.016***	−0.003	−0.003	0.000	0.005	−0.009
	(0.005)	(0.006)	(0.010)	(0.005)	(0.005)	(0.009)	(0.002)	(0.003)	(0.005)
One year before reassignment	—	—	—	—	—	—	—	—	—
Year of reassignment	0.305***	0.343***	0.425***	−0.048***	−0.081***	−0.056***	0.002	−0.003	−0.009
	(0.006)	(0.007)	(0.012)	(0.006)	(0.006)	(0.014)	(0.002)	(0.003)	(0.005)
One year after reassignment	−0.014**	0.001	0.007	0.013*	−0.034***	−0.018	0.009***	0.011***	0.01
	(0.005)	(0.006)	(0.010)	(0.006)	(0.006)	(0.015)	(0.002)	(0.003)	(0.005)
Two years after reassignment	−0.024***	−0.006	0.020	0.048***	−0.023***	−0.024	−0.004	0.007*	0.009
	(0.005)	(0.007)	(0.011)	(0.006)	(0.006)	(0.015)	(0.003)	(0.003)	(0.005)
Three years after reassignment	−0.024***	−0.017*	−0.011	0.059***	−0.029***	−0.033*	0.008***	0.010**	0.01
	(0.005)	(0.007)	(0.011)	(0.006)	(0.007)	(0.016)	(0.002)	(0.003)	(0.006)
Constant	0.861***	0.861***	0.876***	0.701***	0.763***	0.700***	−0.005***	−0.007***	0.009*
	(0.008)	(0.007)	(0.011)	(0.004)	(0.005)	(0.013)	(0.001)	(0.002)	(0.004)
N(node-by-grade)	746,235	354,798	133,776	746,235	354,798	133,776	746,235	354,798	133,776

Notes: Data are drawn from WCPSS administrative records. Move school and attend base school data are available for students in all grades and years with administrative data; leave district data are available for all students in grades K-11 with administrative data (twelfth graders are excluded from the analysis). All models include controls for student gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—." Standard errors are reported in parentheses. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Table A3. Effects of reassignment on math and reading achievement, chronic absenteeism, and suspension by student race/ethnicity, with node-by-grade fixed effects.

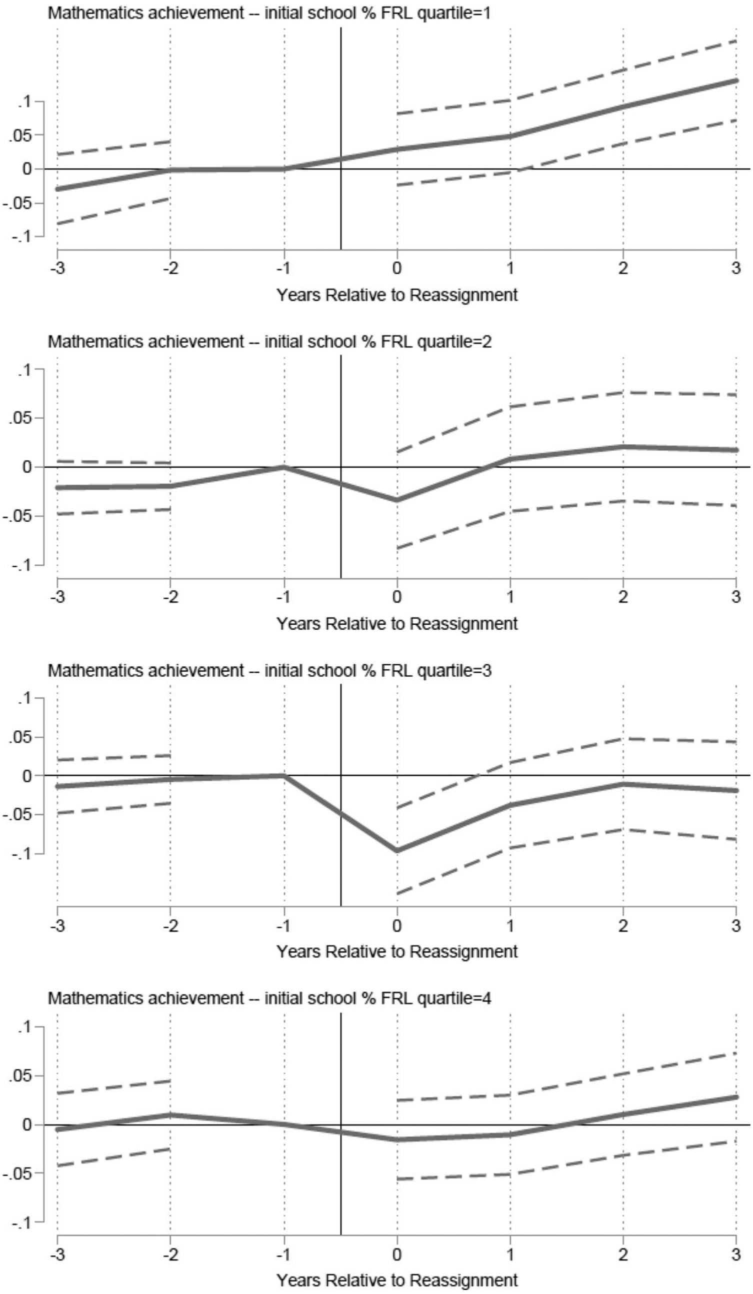
Year	Math achievement			Reading achievement			Chronic absenteeism			Suspension		
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Three years before reassignment	−0.012	−0.001	−0.039	0.004	0.024	−0.005	−0.006	0.006	−0.019	0.000	0.001	0.005
	(0.012)	(0.014)	(0.031)	(0.011)	(0.015)	(0.034)	(0.006)	(0.008)	(0.014)	(0.002)	(0.004)	(0.007)
Two years before reassignment	−0.008	−0.003	−0.022	0.001	0.018	0.032	0.010	−0.002	−0.009	−0.001	−0.004	−0.005
	(0.011)	(0.013)	(0.028)	(0.010)	(0.015)	(0.030)	(0.006)	(0.007)	(0.013)	(0.002)	(0.004)	(0.006)
One year before reassignment	—	—	—	—	—	—	—	—	—	—	—	—
Year of reassignment	0.000	−0.017	−0.041	−0.021*	0.010	−0.026	−0.005	0.006	−0.009	0.000	−0.012**	−0.022***
	(0.011)	(0.014)	(0.026)	(0.010)	(0.014)	(0.029)	(0.005)	(0.007)	(0.011)	(0.002)	(0.004)	(0.005)
One year after reassignment	0.030**	0.001	−0.012	0.014	0.015	−0.027	−0.001	0.009	−0.004	0.002	−0.009*	−0.019***
	(0.011)	(0.015)	(0.029)	(0.010)	(0.016)	(0.031)	(0.005)	(0.007)	(0.012)	(0.002)	(0.004)	(0.005)
Two years after reassignment	0.043***	0.033*	0.014	0.026*	0.027	−0.004	0.002	0.009	−0.013	0.003	0.010*	0.003
	(0.012)	(0.016)	(0.029)	(0.011)	(0.017)	(0.032)	(0.006)	(0.008)	(0.012)	(0.002)	(0.004)	(0.005)
Three years after reassignment	0.046***	0.038*	−0.001	0.015	0.019	−0.053	−0.006	0.001	−0.016	0.004*	0.004	0.003
	(0.013)	(0.017)	(0.033)	(0.012)	(0.018)	(0.035)	(0.006)	(0.008)	(0.013)	(0.002)	(0.005)	(0.005)
Constant	0.381***	−0.586***	−0.399***	0.448***	−0.490***	−0.371***	−0.005*	−0.024***	0	0.002	0.040***	0.017***
	(0.008)	(0.013)	(0.037)	(0.008)	(0.013)	(0.039)	(0.002)	(0.004)	(0.007)	(0.001)	(0.004)	(0.005)
N(node-by-grade)	317,131	150,203	49,494	316,806	149,836	48,459	600,640	277,732	101,121	600,640	277,732	101,121

Notes: Data are drawn from WCPSS administrative records. Math and reading achievement data are available for students in grades 3 to 8; chronic absenteeism data are available for students in all grades in years 2005 to 2010; suspension data are available for students in all grades and years with administrative data. All models include controls for student gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—." Standard errors are reported in parentheses. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Table A4. Instrumental variable estimates of the effects of moving to reassigned school.

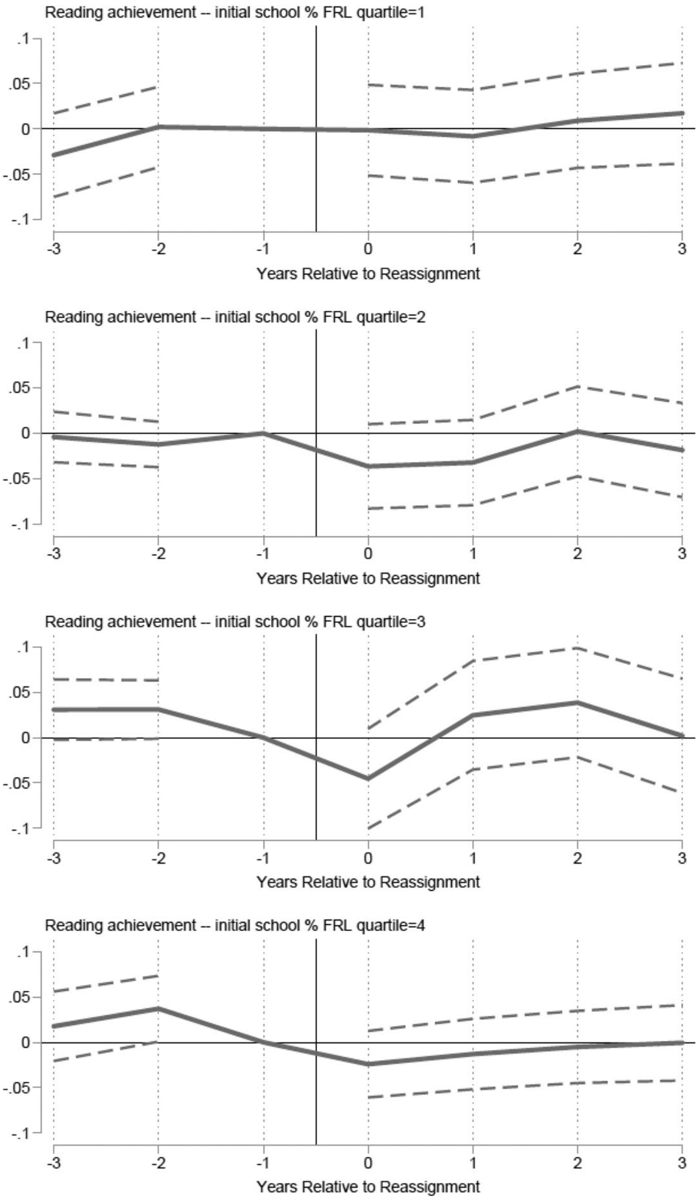
Year	Reading scores	Math scores	Chronic absenteeism	Suspension
Year of reassignment	−0.029**	−0.023*	−0.002	−0.011***
	(0.013)	(0.013)	(0.006)	(0.003)
One year post reassignment	0.013	0.030**	0.003	−0.011***
	(0.013)	(0.013)	(0.006)	(0.002)
Two years post reassignment	0.029**	0.055**	0.000	0.004*
	(0.013)	(0.013)	(0.006)	(0.002)
Three years post reassignment	0.018	0.066**	−0.009	0.002
	(0.014)	(0.015)	(0.006)	(0.003)

Notes: Results are from model that simultaneously instruments for each of the post-reassignment annual measures of "node reassigned, attends base" with the set of annual indicators for node reassignment. Data are drawn from WCPSS administrative records. Heteroskedastic robust standard errors clustered at the node-grade level presented in parentheses below coefficient estimate. Coefficients in each column are estimates of the effect of a student moving to their reassigned school on the outcome listed at the top of each column and are from a single panel instrumental variables (IV) regression. In these regressions, we instrument the potentially endogenous indicators for a student attending their reassigned school at time t (i.e., year of reassignment, one year post reassignment, etc.) with indicators that a student lives in a node that was reassigned t years ago. Models include covariates measuring subsequent node reassignments, the proportion of students reassigned in and out of a school, and measures of student special education status, sex, and race/ethnicity. Models also include fixed effects for node-grade and calendar year. See the discussion of equation (1) in the main text for further detail on the measures included in the model. Standard errors are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.



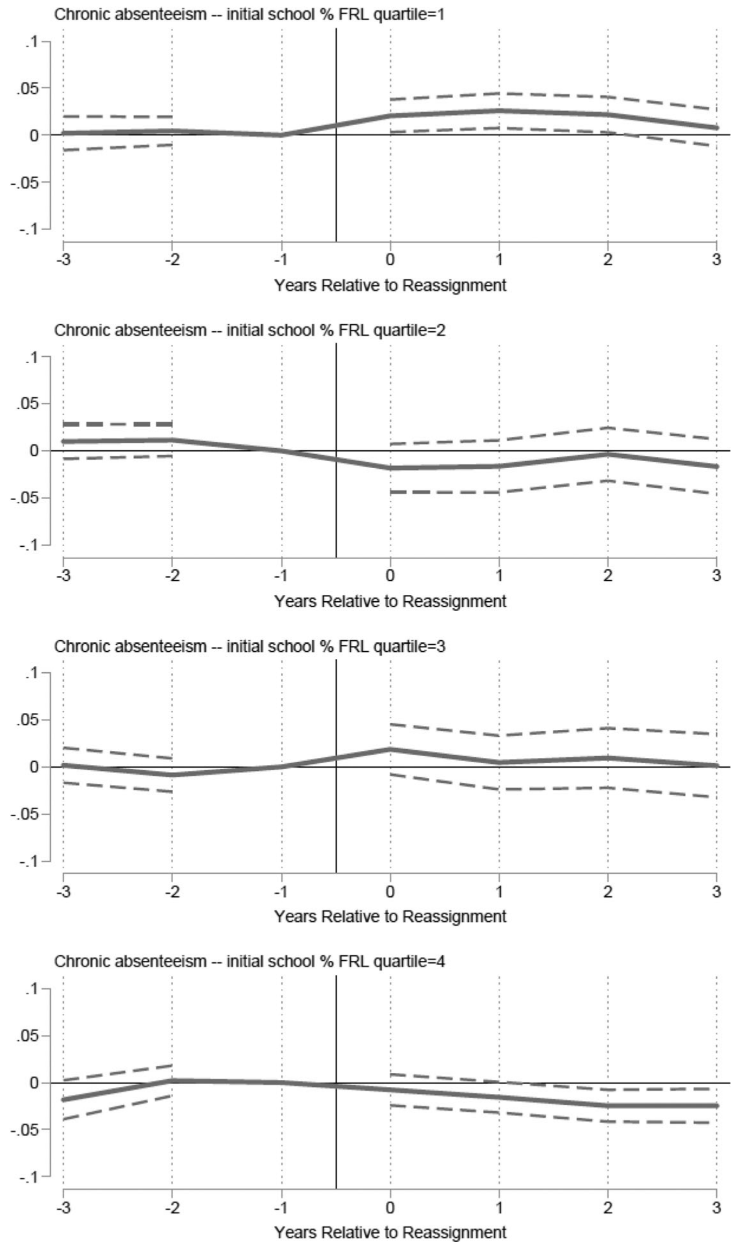
Notes: Data are drawn from WCPSS administrative records. Math achievement data are available for students in grades 3 to 8. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1).

Figure A1. Effects of Reassignment on Mathematics Achievement, Estimated Separately by Quartiles of Free/Reduced Price Lunch Enrollment at Students' Assigned School.



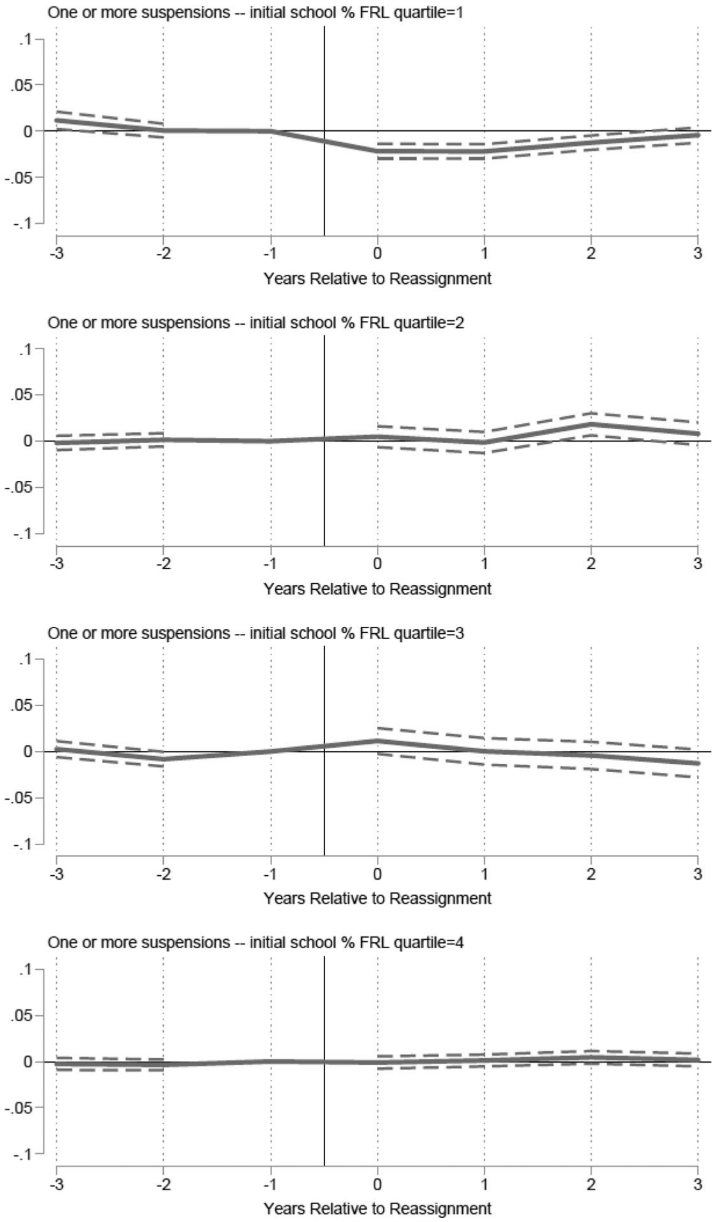
Notes: Data are drawn from WCPSS administrative records. Reading achievement data are available for students in grades 3 to 8. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—."

Figure A2. Effects of Reassignment on Reading Achievement, Estimated Separately by Quartiles of Free/Reduced Price Lunch Enrollment at Students' Assigned School.



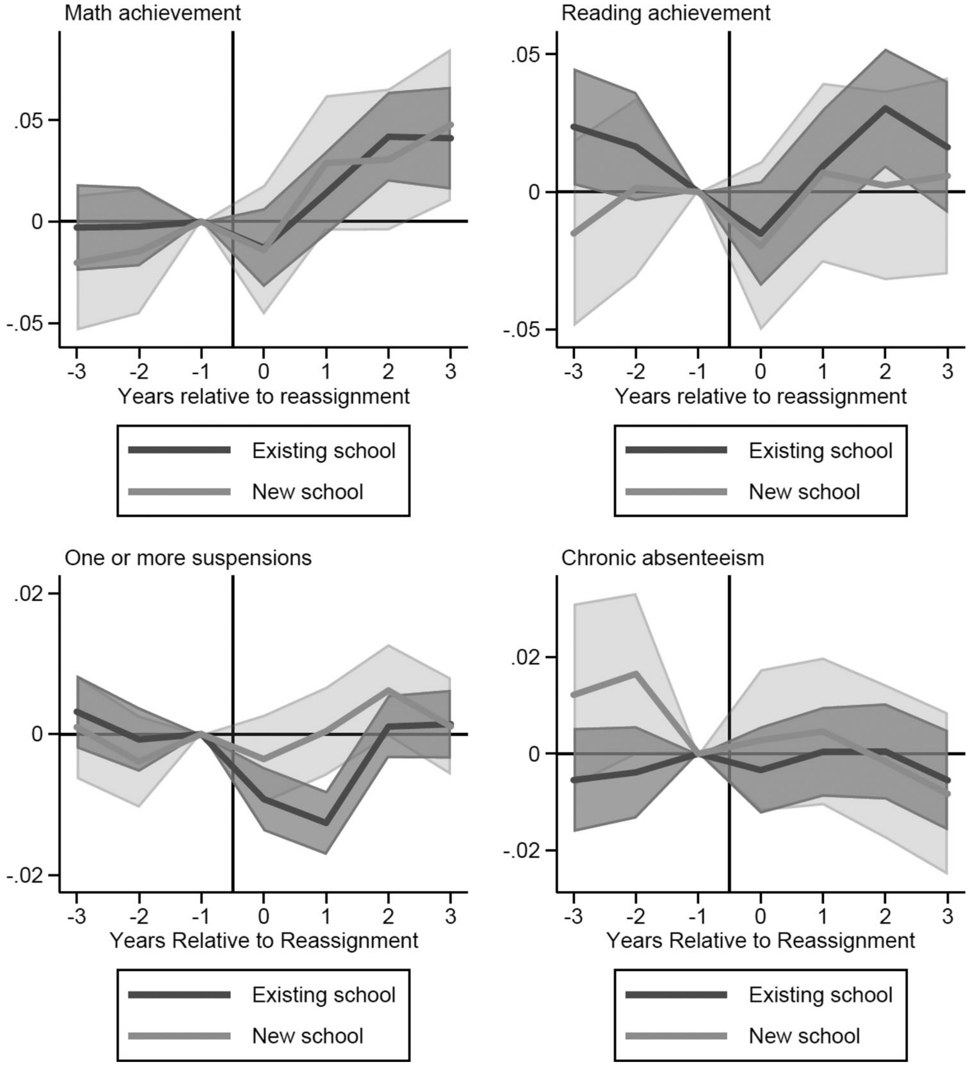
Notes: Data are drawn from WCPSS administrative records. Chronic absenteeism data are available for students in all grades in years 2005 to 2010. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—."

Figure A3. Effects of Reassignment on Probability of Chronic Absenteeism, Estimated Separately by Quartiles of Free/Reduced Price Lunch Enrollment at Students' Assigned School.



Notes: Data are drawn from WCPSS administrative records. Suspension data are available for students in all grades and years with administrative data. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision. One year before reassignment represents the reference year and is indicated by "—."

Figure A4. Effects of Reassignment on Probability of Suspension, Estimated Separately by Quartiles of Free/Reduced Price Lunch Enrollment at Students' Assigned School.



Notes: Data are drawn from WCPSS administrative records. Math and reading achievement data are available for students in grades 3 to 8; chronic absenteeism data are for students in all grades in years 2005 to 2010; suspension data are available for students in all grades and years with administrative data. All models include controls for student race/ethnicity, gender, special education and ELL status, percent of students reassigned into student's assigned school, percent of students reassigned out of student's assigned school, node-by-grade fixed effects, and year fixed effects as described in equation (1). While all models include terms for four or more years before and after reassignment, these are not reported here due to imprecision.

Figure A5. Effects of Reassignment to New and Existing Schools on Student Educational Outcomes.