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School Segregation at the Classroom Level in a Southern 'New Destination' State

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Abstract

Using detailed administrative data for public schools, we document racial and ethnic segregation at the classroom level in North Carolina, a state that has experienced a sharp increase in Hispanic enrollment. We decompose classroom-level segregation in counties into within-school and between-school components. We find that the within-school component accounted for a sizable share of total segregation in middle schools and high schools. Recognizing its importance could temper the praise for school assignment policies that reduce racial disparities between schools but allow large disparities within them. More generally, we observe between the two components a complementary relationship, with one component tending to be large when the other one is small. Comparing the degree of segregation for the state's two largest racial/ethnic minority groups, we find that White/Hispanic segregation was more severe than White/Black segregation, particularly within schools. Finally, we examine enrollment patterns by course and show that school segregation brings with it differences by race and ethnicity in the courses that students take, with White students more likely to be enrolled in advanced classes.

Keywords: school segregation; racial and ethnic segregation; tracking; educational disparities

Introduction

Although racial segregation *between* schools has rightly been a longstanding subject of study and policy concern, it fails to reflect all the circumstances that discourage interracial contact of students. In particular, measures of between-school segregation can shed no light on segregation that may occur *within* schools as the result of such common practices as ability-grouping and academic tracking that may well result in unequal educational opportunities (Oakes 1985; Mickelson 2001; Tyson 2011). Long associated primarily with segregation between rich and poor or White and Black students, within-school segregation is increasingly seen as a problem where White and Hispanic students attend the same schools. It has emerged as a central concern in what has been called the "Latino education crisis," a crisis exemplified by the stagnation of Hispanic educational attainment over the last two decades (Gándara 2019). One study of California schools found that English learners experienced "intense segregation into schools and classrooms," where they were exposed to inexperienced teachers and a rudimentary curriculum (Gándara et al. 2003, pp. 28, 33). Dondero and Muller (2012, p. 494) find that Hispanic 10th graders in "new destination" school districts were less likely than their White peers to take college-preparatory math courses. Owing to the additional element of language, the segregation of Hispanic students may well be more pronounced than that associated with African American students, but the implications for educational achievement and equity are serious in any case for both groups of students.

To explore the nature and extent of contemporary segregation within schools, we examine racial and ethnic segregation at the classroom level within one state, North Carolina, distinguishing throughout between segregation that involves White and Hispanic

students from that pertaining to White and Black students.[2] We chose to study this single state for several reasons. First, the state has amassed a rich trove of detailed administrative data, down to the level of the classroom, over time. Without such detailed data, a study of the kind would not be possible. Second, this state of over 10 million residents has the advantage of considerable diversity across its 100 counties. In terms of racial and ethnic composition, these counties range from nearly all-White to majority Black. They are widely distributed along the rural/urban continuum, including densely settled metropolitan centers as well as sparsely populated rural expanses.[3] And some of these counties have experienced sizable increases in Hispanic population in recent years, as befits the state's informal designation as a "new destination" state.[4] As in other such states, the majority of Hispanic newcomers came from other U.S. locations. Of those born abroad, Mexico was by far the biggest source (60%) of all Hispanic immigrants. Another 21% came from three Central American countries, El Salvador, Honduras, and Guatemala (Tippett 2019). Over the period covered in our study, 1998 to 2017, the Hispanic share of all K-12 students in the state rose from 3% to 17%. In comparison to Hispanic people in other "new destination" states, those in North Carolina had less education and lower incomes, were less likely to speak English, and were more likely to be foreign born (Clotfelter, Ladd, and Vigdor (2012, p. 1610). Finally, and particularly relevant for studying school segregation, North Carolina was among the first states in the nation to become subject to the federal courts' emerging color-blind attitude toward school desegregation, one that would

[2] Throughout, we follow convention in using the term White to refer to non-Hispanic Whites or European Americans and Black to refer to non-Hispanic African Americans. We use the term Hispanic interchangeably with Latino/Latina/Latinx. We refer to these groups interchangeably as racial/ethnic, ethnoracial, or racial.
[3] For an analysis of segregation in rural schools more generally, see Logan and Burdick-Will (2017).
[4] Between 1990 and 2010, while the foreign-born population in the U.S. doubled, it increased six-fold in North Carolina (Portes and Rumbaut 2014, Table 9).

eventually bar even voluntary programs designed to integrate schools and would be affirmed by the Supreme Court in 2007.[5]

To study segregation at the classroom level, we analyze detailed state administrative data, which include the racial/ethnic composition of every section of every course taught in every one of the state's K-12 public schools, including charter schools. To assess changes over time, we present data for three school years, 1997/98, 2005/06, and 2016/17 and focus on differences between the three levels of schooling – elementary, middle and high schools. We are especially interested in within-school segregation and how it differs across the three levels of schooling.

In this study we pose three primary research questions. The first concerns the extent of racial and ethnic segregation in North Carolina over time, with special attention to the relationship between segregation within and between schools. The second is how White/Black segregation compares to White/Hispanic segregation, the latter being of particular interest given rising numbers of Hispanic students in North Carolina. Third, we ask whether there exist systematic differences in the courses taken by students in different racial and ethnic groups, a possible corollary to segregation at the classroom level.

Our first main finding is that both middle and high schools, but not elementary schools, exhibit a substantial amount of within-school segregation. This pattern is true for our basic measure of segregation, the dissimilarity index, and even more so for an alternative measure, the Coleman index. Moreover, within-school and between-school

[5] The Supreme Court codified this prohibition in the 2007 decision *Parents Involved in Community Schools v. Seattle School District No. 1,* a decision in which Chief Justice John Roberts declared sardonically, "The way to stop discrimination on the basis of race is to stop discriminating on the basis of race." (551 U.S. 701, 748 (2007)). Schools in North Carolina fell under this new color-blind judicial approach earlier than 2007, owing to decisions made by the Fourth Circuit Court of Appeals. For discussion of this approach, see Boger (2000) or King and Smith (2011, p. 194).

segregation show a marked tendency to offset one another. Where and when one of them is large, the other tends to be small. A high degree of between-school segregation at the elementary level, for example, tends to make individual schools relatively homogeneous, easing pressure to establish academic tracks or other distinctions between classrooms within the schools. In middle schools and high schools, by contrast, schools are larger and less internally homogeneous, inviting more distinctions inside schools.[6]

Second, we find that segregation between White and Hispanic students was more extreme than that between White and Black students. True at every level and subject we studied, this finding was driven by the high degree of within-school segregation of Hispanic students. This finding in itself is surprising and noteworthy, given the decades of discrimination and segregation directed toward Black students which has long plagued schools in the South. At the county level, we find that White/Black segregation is highest in counties with 40-50% Black students and White/Hispanic segregation is highest in counties with 20-30% Hispanic students.

Our third finding relates to patterns of course-taking. Not only were Black and Hispanic students often in separate classrooms, especially in 7th and 10th grade math courses, they tended to take less rigorous courses than their White peers. This underrepresentation of Black and Hispanic students relative to White students in advanced courses represents one of several reasons it is worth paying attention to within-school segregation.

[6] Another reason why between-school segregation for high schools might be consistently smaller than that for elementary schools is a form of mechanical bias (sometimes called the "scale effect") wherein measured segregation tends to be higher when enumeration units are smaller. Wong (2003) describes the scale effect as a manifestation of the more general "modified areal unit problem."

The first section of the paper reviews previous research relevant to our inquiry. The second describes our data, method of identifying classrooms, and measures of segregation within and between schools. Section III presents our basic findings regarding the extent of segregation at the classroom level. Section IV shows statewide disparities in patterns of course-taking by Black, Hispanic, and White students. Section V concludes with implications for policy and future research.

I. Previous Research

The practice of sorting students within schools by ability or academic preparation has been a subject of longstanding interest in sociology and education. Based on his research in Boston, Parsons (1959) concluded that classroom assignments in elementary school and junior high school had a powerful influence over assignments to academic tracks in high school. Several early empirical studies established that academic performance was the primary criterion used by schools for assigning students to academic tracks in high schools, but that socioeconomic status, independent of measured ability, could also play a role (Alexander and McDill 1976; Rosenbaum 1976; Gamoran 1992a). Other research (Rist 1970) instead suggests a minor role for academic criteria, showing instead that racial minority and low-income students tend to be assigned disproportionately to general and remedial classes while economically advantaged students end up disproportionately in advanced classes. Oakes (1985), among others, draws attention to academic tracking and its effects on educational opportunity. These concerns are magnified by recent research showing racial bias in assignments to advanced or gifted classes (Mickelson 2015; Grissom and Redding 2016). These findings echo that of Useem (1992), who discovered that highly educated parents were most likely among all

parents to know about and be willing to intervene in the assignment of students into academic tracks, with the result that their children had the highest rate of assignment to the advanced math track in middle school.

Such tracking and other forms of academic grouping can have tangible consequences for the students involved, ranging from racial attitudes to subsequent academic achievement (see, e.g., Allport 1954, Rosenbaum1970, Tyson 2011, and Walseman and Bell 2010). In a study of classroom assignments in three urban districts, Kalogrides and Loeb (2013) present evidence that classrooms populated by more advantaged students tend to have better educational resources, such as more experienced teachers, than those populated by their less advantaged peers. Mickelson (2015) finds that students assigned to academically-gifted, pre-International Baccalaureate, or college prep tracks were exposed to a richer curriculum, more motivated fellow students, and better teachers, as compared to students consigned to lower tracks. Whether placement in advanced classes affects students' achievement has been a contested hypothesis. Gamoran and Mare (1989, p. 1177) present evidence that placement in the college track raises the math achievement of high school students, controlling for previous achievement. Card and Giuliano (2014) find no effect for gifted students, but a positive one for students who were placed in gifted classes because of their previous achievement rather than their IQ.

Whatever its causes or consequences, such academic grouping can certainly influence the degree of interracial contact within schools. Tyson (2011, p. 6) states, "With Black and White students largely segregated within the schools they attend, racialized tracking has made it possible to have desegregation without integration." Morgan and McPartland (1981) demonstrate how such patterns of assignment can affect interracial

contact. They analyze data from a massive survey undertaken by the Office of Civil Rights in 1976 that covered some 43,000 schools. In each school, students in 18 randomly selected classrooms were categorized by race in order to calculate school-level segregation indices. The authors find that such segregation was most intense in high schools and lowest in elementary schools. In a finding that would be confirmed in subsequent research, they conclude that the bulk of segregation at the elementary level is due to disparities between, not within, schools.

Clotfelter, Ladd and Vigdor (2003) also examine segregation at the classroom level. They used administrative data for North Carolina to study segregation in grades 1, 4, 7, and 10, using English classes in grades 7 and 10 as representative classrooms. For the state as a whole, they find that within-school segregation accounted for just a fifth of all White/non-White segregation in public schools at grades 1 and 4, but over half in 7th grade and nearly two thirds of the total in grade 10 (p. 1481). Replicating the 1981 Morgan-McPartland analysis of school-level segregation, the authors found that White/non-White segregation in high schools was highest for schools with 50-60% non-White enrollment (Clotfelter, Ladd and Vigdor 2003, p. 1494).[7]

Other studies that examine classroom-level segregation include Conger (2005) and Kalogrides and Loeb (2013). The former examines administrative data for elementary schools in the massive and diverse New York City school district. Consistent with previous studies, she concluded that segregation between elementary schools in that district was much more severe than segregation within those schools. In grade 1, for example,

[7] Middle schools showed two peaks and segregation in elementary schools was mostly flat across all racial compositions, rising only in schools 80 to 90% non-White (Clotfelter, Ladd and Vigdor 2003, p. 1494).

segregation within schools accounted for less than a tenth of all White/non-White segregation in schools (Conger 2005, p. 227). In addition, she finds (p. 238) that Hispanic students were the most isolated group of students. More recently, Kalogrides and Loeb (2013) examine data at the classroom level for three large urban school districts. Using the dissimilarity index, they distinguish as in previous studies between-school from within-school segregation. The share of White/non-White segregation in these urban districts due to within-school segregation ranged from 4 to 14% at the elementary level, from 17 to 20% in middle schools, and from 11 to 29% in high schools (p. 308). Notably, they observe that Black/non-Black segregation exceeded Hispanic/non-Hispanic segregation in grades 6 to 8 in all three districts, but there was no appreciable difference at the elementary or high school levels.

II. Data and Method

We build on and extend this existing literature by providing a detailed analysis of classroom- level segregation for an entire state over an 18-year period. Our task is complicated in part because, although they are all subject to state guidelines and requirements, school districts often make different choices in the specific courses they offer and the course titles they use. In this section, we first describe the data and then turn to our analytic methods.

A.Data

We examine detailed administrative records that allowed us to determine how many students, by racial and ethnic group, were enrolled in every section taught in every public school, including charter schools, for three school years: 1997/98, 2005/06 and 2016/17 (henceforth, 1998, 2006, 2017). The beginning and ending years were

determined by data availability. We included a third year in order to distinguish the segregation trends that coincided with the relaxation of pressure previously exerted by federal courts on local school boards to maintain racial balance from more recent trends. Although we considered using the midpoint of the period for the third year, we selected 2006 partly because it was the last year before the Great Recession. Starting in 2007, the recession was not only disruptive overall but was far more disruptive in some North Carolina counties than in others. That year was also sufficiently after the first color-blind rulings of the Fourth Circuit Court of Appeals in the early 2000s but before the Supreme Court's 2007 decision that solidified that doctrine. The eight years between 1998 and 2006 allows time for observable increases in segregation in counties where federal oversight was removed. Charter schools, which were first authorized in 1996 with a cap of 100 schools, were operating throughout the full period. After the cap was lifted in 2011, the number quickly rose to 170 by 2018. [8]

Although the precise format of the records changed over the period, we were able to recover for each year comparable information describing the racial and ethnic composition of every classroom for the grades and subjects we focus on, as noted in more detail below. Our calculations using these data classify students based on their self-identified membership in one of three racial/ethnic groups: non-Hispanic Black, or African American; Hispanic, or Latino/Latina/Latinx; and non-Hispanic White. For these categories we use the

[8] Although the initial legislation called for charter schools to "reasonably reflect" the racial and ethnic composition of their surrounding areas, the state softened the language in 2013 by requiring only that charter schools "shall make efforts foe the population of the school to reasonably reflect" the surrounding areas (Ladd, Clotfelter and Holbein, 2017, p. 538). Recent research shows that charter schools have contributed to racial segregation in the state (Clotfelter, Hemelt, Ladd and Turaeva, 2020, and Ladd and Turaeva, 2020).

familiar shortened terms of Black, Hispanic, and White, respectively. Students in other ethnic groups are not considered in the study. [9]

B. Identifying Classrooms

Our first data challenge was to identify classes within each school that would form the basis for our calculations of within-school segregation. Our aim was to identify groupings of students that correspond to the common notion of a class – a collection of students who gather together in a classroom all or part of each school day to be taught by a teacher. Identifying such groups is by no means straightforward. For one thing, administrative practices differ across districts and schools. Although the state education department is quite explicit about the names, course numbers, and content of various courses, districts and charter schools retain considerable discretion about exactly how they will structure the course offerings in their schools. And even within districts, some schools offer courses that other schools do not.

In order to reflect the distinctive patterns of elementary, middle, and high schools, we chose to focus our attention on 4th, 7th, and 10th grades. At the elementary level, the task of identifying classrooms was straightforward, since most students spend the bulk of their school day in self-contained classes. In middle school, determining a "typical" classroom may be more complicated if schools allow students to change classes during the course of

[9] We exclude them because of their very small shares relative to the three main groups of interest for this study: Blacks, Whites and Hispanics. As we explain in the text, measures of segregation are suspect when the proportion of one group is very small; indices for these other groups would be especially susceptible to such problems. The only use we make of data on students in other racial and ethnic categories is to include them in total enrollment, which we use in calculating percentage Black and Hispanic and in our calculations to identify the specific courses in each school, where we employ data for students in all racial and ethnic categories, as explained in the following subsection.

the day for certain subjects. And in high school, it is nearly universal practice for students to move between classes during a school day.

To simplify the task of identifying classroom groupings in middle school and high school, we chose to focus on two basic subjects that are taken by almost all students and whose academic importance cannot be doubted: English and mathematics. Most students will find themselves, once a day, in classrooms with fellow students studying English. And the same will be true for math. Hence, the racial ethnic composition of those two sets of classrooms within each school, should be fairly representative of a student's broader academic school experience. Therefore, to reflect classroom assignment patterns in middle schools, we performed separate analyses of the composition of English/language arts classes and of math classes taken by 7th graders. And we did the same in high schools for 10th graders. Within each class, we examine the racial composition only of students in the designated grade. Thus our analysis proceeds throughout by examining five sets of classes: 4th grade, 7th grade English, 7th grade math, 10th grade English, and 10th grade math.

In selecting which courses to use to identify classes, we allowed for variation across school districts and schools in curricular configurations. Within each school containing one of our selected grade levels, we sought to determine the course or courses that, taken together, enrolled all of the students in our selected grade one time. Out of all the possible math courses that might be taken by a 7th grader, for example, we determined for each school the set of courses whose total enrollment came closest to matching that school's total enrollment of 7th graders.[10] Among the math courses that schools offered to 7th

[10] Up to 2013, the state's detailed census of classrooms was recorded in School Activity Reports, which reported the number of students by grade and race/ethnicity in every section of every course, by school, but not the identities of those students. For each school, we employed an algorithm that selected the course or

graders in 2017, for example, were *Math Grade 7, Math Compacted Grade 7, NC Math I,* and *Math Local Elective.*

Table 1 shows for 2017 exactly which courses were taken most often in 7th and 10th grade English and math. For each subject and grade we examine, the table shows the courses that accounted for at least 1% of all students in the state at each grade level. In 7th grade English, there was little variation, with nearly all 7th graders being enrolled in the same standard *English Language Arts Grade 7* course. We found more variety in the remaining three classifications. As shown in Table 1, the most common math course taken by 7th graders was *Math Grade 7*, which enrolled 83% of all students. For 10th grade English, the standard *English II* accounted for 45% of all enrollments, and its Honors version covered almost as many. Another four courses each accounted for at least 1% of all English enrollments in 10th grade. Math courses in 10th grade were less concentrated, with four courses accounting for the same share held by the top two English courses. Students, depending on their degree of advancement, might be taking *NC Math II* (48% were), *NC Math III (*21%), *NC Math II Honors* (12%), or *NC Math III* (7%), or a variety of other math courses, including *NC Math I, Pre-calculus Honors, Math Local Elective, NC Math I (Occupational Course of Studies), Foundations of NC Math II*, and *Advanced Functions and Modeling*.

courses whose total enrollment across all sections in the school most nearly matched that school's enrollment for the grade. After 2013, classroom census information was reported only in a data set called Course Membership, which provides information on every course taken by every student. With this more detailed data, we could form our classes by assigning every student to exactly one section of a course. From the possible courses (7th grade English courses allowed by the state, for example), we looked for the course most commonly taken by students (in the 7th grade) in that school. For all the students who took this course, we defined our classes in the school based on enrollments in that course. For any students who did not enroll in that most commonly taken course, if there were any, we selected the next most commonly taken course and defined classes based on that course, too. For any students who took neither of those courses, we repeated the process until all students had been assigned to one section of a course in the relevant grade and subject.

C. Measuring Segregation

Counties are the natural units of analysis for measuring racial imbalance in North Carolina schools. In contrast to the patterns in many other states, 89 of the state's 100 counties have county-wide school districts [11] Moreover, their large size generally corresponds to a single housing market, making a county's racial composition a reasonable reference point. Hence, we measure segregation as the degree to which the classrooms in a county depart from being racially balanced, where the racial composition of public school students, including those in charter schools, throughout the county is the reference.

Our primary measure of segregation is the dissimilarity index. For two groups of students, it can be used to measure racial imbalance between schools in a county, where the subscript *btw* refers to between schools:

$$D_{btw} = 0.5 * \sum_j \left| \frac{X_j}{X} - \frac{W_j}{W} \right| \quad (1)$$

where X_j and W_j are the number of students of group X and W, respectively, in school j and X and W are the total number of each group in the county. The dissimilarity index in this case measures the proportion of group X students, for example, who would need to be moved to another school in order to achieve racial balance across all schools in a county. The index has a minimum value of zero (indicating racially balanced schools) to 1.0 (indicating totally separate schools for students of type X and W).

[11] In 2017, only 11 counties contained more than one school district. Historically, there were many more school districts, but consolidation over time has reduced the number for this state of over 10 million people to 115 districts. The decision of a county to continue to have more than one school district is in part a decision about school segregation. For that reason, it makes sense to use the county, not its individual school districts, as the unit for measuring segregation.

In the present paper, we calculate a second dissimilarity measure for each county by applying the index to all the *classrooms,* rather than the schools, of a county. To do this, we use enrollments of individual classrooms to calculate the corresponding dissimilarity index (where the subscript *tot* refers to total classroom segregation):

$$D_{tot} = 0.5 * \sum_i \left| \frac{X_i}{X} - \frac{W_i}{W} \right| \quad (2)$$

where X_i and W_i are the number of students of group X and W, respectively, in classroom i. Since this total classroom-level measure will reflect imbalances within schools as well as between schools, D_{tot} will be greater than or equal to D_{btw}.[12] To reflect the portion of total classroom-level segregation in a county that can be attributed to imbalances within schools (*w/in*), we take the difference:

$$D_{w/in} = D_{tot} - D_{btw} \quad (3)$$

Table 2 summarizes these three measures of segregation.[13]

We present as well calculations based on a second approach to school segregation, the Coleman index. This index, which is based on the proportional gap between actual and maximum potential interracial exposure, has one feature that makes it especially attractive in the current application. Whereas the division of the dissimilarity index into between- and within-school parts outlined above is an approximation, the Coleman index can be exactly decomposed into two such components.[14] We use the dissimilarity index as our

[12] This inequality is a direct manifestation of the scale effect, noted above, which causes calculated segregation indices to be large when enumeration units are small and small when enumeration units are large. .

[13] Wong (2003) discusses a similar decomposition of the dissimilarity index applied in a geographical context to segregation in local areas that are contained in larger regional areas.

[14] This difference has been long recognized (e.g., Becker 1978) and exploited (e.g., Clotfelter, Ladd, and Vigdor 2003; Clotfelter 2004).

basic measure because of the tendency for the Coleman index to be correlated with the racial composition of the populations being studied.[15] Thus, neither measure is perfect for our uses. Our preferred measure, the dissimilarity index, has the virtues of familiarity and apparent unbiasedness, but we note that calculations based on it will tend to understate the magnitude of within-school segregation.

These indices are subject to one more measurement problem. Along with other indices commonly used to measure segregation by imbalance across units like schools or neighborhoods, these indices become unreliable when the share of one of the groups being studied is a very small percentage of the total or when the units of grouping individuals are small.[16] This feature makes calculations of segregation problematic in counties with very small proportions of Black or Hispanic students. Since we are interested in comparisons of segregation across counties with different demographic makeups or over time during a period in which the enrollments of Hispanic students have grown markedly, we mitigate this defect by limiting all of our calculations at the county level to counties where students

[15] Although, by construction, the Coleman index is designed to be independent of the racial mix of the population being studied, our calculations, as well as those of Becker (1978) suggest that the Coleman index, over at least some ranges, in fact tends to be correlated with the percent minority. Becker (1978, p. 14) reports that calculated values of the Coleman index in applications to employment and higher education both showed a positive correlation with percent black. Likewise, in unpublished simulations we found strong associations between the Coleman index and county racial compositions, a correlation we did not observe with the dissimilarity index.

[16] Previous research has established that the dissimilarity index is subject to upward bias when the proportion of racial minority individuals is very low or when the units of grouping are small, and this bias applies as well to other widely-used measures of imbalance. As explained in studies such as Allen et al. (2015) and Mazza (2017), the problem arises because small enumeration units will simply by chance tend to differ in composition, a tendency that will be more pronounced with a very small racial minority group. Among the methods proposed to correct the bias are Monte Carlo simulations that allow actual distributions to be compared to those generated randomly. According to Mazza (2017, p. 31), "Most of the methods proposed use computation-intensive techniques that have the drawback of introducing complexity and substantial computational burdens." As an alternative, many studies have resorted to various rule-of-thumb remedies, such as excluding cities or districts with tiny proportions of the racial minority group of interest, an approach we adopt here. Another form of bias in measuring segregation in residential patterns, due to reliance on samples of the population discussed in Reardon et al. (2018), for example, is not relevant in the present case, since all student counts cover 100% of the relevant population.

in the specific non-White group made up at least 4% of the students attending public schools (including charter schools) in an initial year. Accordingly, we limit our analysis to the 62 counties in the state with at least 4% Black enrollment as of the first year of our data, 1998, and at least 4% Hispanic students as of 2006. Because very few counties in the state had sufficient shares of Hispanic students in 1998, we made no calculations of White/Hispanic segregation in that year.[17]

III. Measured Segregation at the Classroom Level

Figure 1 presents enrollment-weighted averages for segregation indices based on the dissimilarity index) across the 62 counties included in the analysis. The corresponding index values are shown in Tables 3a and 3b. Averages are shown for each of our five grade and subject combinations.

A. Role of Within-school Segregation

The figure illustrates the first of the paper's significant findings – namely that within-school segregation is an important component of total school segregation, especially in middle schools and high schools, as illustrated by our representative grades and subjects. In 10th grade math courses in 2017, for example, the average value of within-school segregation was nearly 40% the size of total White/Black segregation (0.20/0.52) and of White/Hispanic segregation (0.21/0.54), large shares that should be viewed as lower bounds because they are based on the dissimilarity index. Moreover, our calculations reveal how the between-school and within-school components of segregation

[17] Weighted averages of segregation indices for the state and the two urban and rural categories using this sample of 62 counties yielded identical or very similar values to those using slightly larger samples of 86 counties with at least 4% Black enrollments in 1998 for White/Black calculations and 67 counties with at least 4% Hispanic enrollments in 2006 for White/Hispanic calculations.

tend to vary in a complementary, or compensatory, manner: where between-school segregation is large, within-school segregation tends to be small, and vice-versa. This complementarity is evident first in comparisons of classroom segregation across grade levels. Where between-school segregation is the highest, namely in elementary school, the within-school portion of total segregation is of little consequence. But at the high school level, where schools cover bigger attendance zones and have more heterogeneous student bodies, the reverse is the case: low between-school segregation but high within-school segregation. This offsetting tendency is also evident in the patterns of segregation both for White and Black students and for White and Hispanic students.

This tendency for the two components to compensate for each other is also apparent in statewide changes over time. As shown in the top panels of Tables 3a (for White/Black segregation) and 3b (for White/Hispanic segregation), the increases in the between-school portion of segregation in grades 7 and 10 from 1998 to 2006 were partially offset by *reductions* in the within-school portion. This tendency for one component to offset the other suggests that if schools are allowed to become more racially distinct from each other (as a consequence of greater between-school segregation), the fact that they are then more internally homogeneous may weaken pressures to segregate students within the school. The data show that in North Carolina after 1998, the increase in between-school disparities was larger than the decrease in within-school segregation, resulting in a net increase in total White/Black segregation at the classroom level over the period 1998 to 2006.

B. Segregation Patterns Across the State

Tables 3a and 3b show in more detail some of the ways segregation patterns differed across the state. For each year and grade and subject combination, the tables present segregation indices for the five largest metropolitan counties and average indices for other urban counties and rural counties.[18] By way of context, Wake County, which contains the state's capital, Raleigh, has gained national attention for its efforts to balance schools by socioeconomic status. Mecklenburg is home to Charlotte, where a new school board, emboldened by a 4th Circuit Court of Appeals decision in 2000, overhauled school assignments to allow parents more options to attend nearby schools.[19]

Two features stand out. The first is the marked increases from 1998 to 2006 in between-school segregation in Mecklenburg, with its move to neighborhood schools. Only Forsyth, home to Winston-Salem, which was also moving to neighborhood schools, rivaled Mecklenburg in its increases in White/Black between-school segregation. The second noteworthy feature of the table is the comparatively low degree of between-school segregation in Wake County, a result of its policies aimed at balancing schools by socioeconomic status. In contrast to the general increases in these five counties, the changes in segregation in other urban counties and rural counties were modest or nonexistent. Table 3 also illustrates the complementarity between the two components of classroom segregation: as between-school segregation was increasing between 1998 and 2006 in grades 7 and 10, within-school segregation typically fell.

[18] Urban counties are those where more than half of the population in 2000 lived in urban areas, according to the 2000 Census of Population and Housing.

[19] *Belk v. Charlotte-Mecklenburg Bd of Educ.,* 211 F. 3d 853 (4th Cir 2000). See also Clotfelter, Ladd and Vigdor (2008, p. 50).

In one important respect, Table 3's results challenge conventional thinking about student assignment policies pursued by the two largest school districts in the state, at least as it applies to segregation between White and Black students. As noted above, Wake County has been widely praised for its efforts to balance schools socioeconomically (e.g., Kahlenberg 2012). In 2000 it responded to federal court rulings forbidding assignments by race, including the 2000 *Belk* decision, by basing its assignments instead on schools' percentages of low-scoring students and of students eligible for subsidized lunches (Clotfelter, Ladd and Vigdor 2008, p. 50; Domina et al. 2020, p. 5). In contrast, Mecklenburg County opted in 2002 for a neighborhood-based assignment plan. In our previous work, we contrasted the levels of White/non-White segregation in these two districts, with Mecklenburg's segregation jumping markedly after 2001 (Clotfelter, Ladd and Vigdor 2008, p. 68). But when one accounts for segregation that occurred within schools, Wake County looks remarkably less integrated. To illustrate this point, consider total White/Black segregation in the five largest counties in 2017. Although Mecklenburg County had by far the highest between-school segregation among the five, no county exceeded the within-school segregation levels of Wake County.

In the case of White/Hispanic segregation, Mecklenburg again showed the highest levels of total segregation across the board. The highest levels of within-school segregation were mostly in Cumberland and Wake, counties with lower between-school segregation.

C. White/Hispanic vs. White/Black Segregation

Figure 1 and Tables 3a and 3b also illustrate our second main conclusion, namely that White/Hispanic segregation at the classroom level is consistently more pronounced than segregation between Black and White students. This conclusion applies to 2006 and

2017 and to every one of our five grade and subject levels.[20] The racial imbalances that are chiefly responsible for this difference are those *within schools*, not those between schools. In every comparison, the degree of White/Hispanic within-school segregation exceeds that for White and Black students. One ready explanation for this difference is language. Roughly a quarter of Hispanic students in the state's public schools were classified as limited English proficient (LEP) in 2017, a factor likely to drive many class groupings.[21] One other noteworthy takeaway from the figure, however, is that the degree of within-school segregation for Hispanic students declined at every one of our five grade and subject levels between 2006 and 2017. The declines ranged from -0.02 in 4th grade to -0.11 in 10th grade English and math.

D. Comparisons using the Coleman Index

Turning now to our alternative index of segregation, we show in Figure 2 a corresponding bar graph depicting between-school and within-school segregation using the Coleman index of segregation. Recall that the Coleman index has the virtue of being easily decomposed into parts that exactly correspond to these two components of school segregation. Most readily evident in this figure is the larger relative importance of within-school segregation. For example, whereas the within-school portion is 12% of total White/Black segregation at the 4th grade in 2017 using the dissimilarity index (shown in Figure 1), the corresponding within-school portion using the Coleman index is 19%.[22] In 10th grade math, the corresponding comparison is 37% versus 53%. Much the same is true

[20] For the calculated values underlying Figure 2, see Appendix Table A3.
[21] The proportion was 24%; authors' calculations using unpublished data from the North Carolina Education Research Center.
[22] 12% is 0.06/0.50; 19% is 0.06/0.31. These values are contained in the detailed table based on the Coleman index presented in Appendix Table A1.

for the measures of White/Hispanic segregation: for every year and grade level, within-school segregation is a larger share of total measured segregation as measured by the Coleman index. Other than this difference in the magnitude of within-school segregation, the only difference between the two sets of calculations is in the change in White/Hispanic segregation between 2006 and 2017. Whereas the dissimilarity index shows declines, the Coleman index points to increases. Otherwise, the two indices yield similar patterns: an increase in White/Black segregation after 1998, higher within-school segregation in upper grades, and higher within-school segregation for White/Hispanic segregation. This comparison of indices yields one significant takeaway for our analysis: any conclusions we draw regarding the importance of within-school segregation using our basic calculations most likely represent understatements of the true importance of segregation within schools.

E. Segregation and the Racial Mix of Counties

Previous researchers have explored the extent to which segregation within schools is systematically related to a school's racial or ethnic diversity. For example, Lucas and Berends (2007), present evidence consistent with a positive correlation between higher shares of racial minorities and higher levels of within-school segregation. They suggest that such a positive relationship could reflect crowding-out, in which otherwise qualified Black students are effectively pushed out of the college-prep track in more racially diverse high schools, where their numbers would tend to be large. They offer two possible mechanisms for this outcome. One is that Black students, afraid of the "acting White" label, choose lower tracks. Alternatively, schools may simply be yielding to pressures by White parents to assign their children to the advanced track. Such use of tracking as a "segregative device"

is consistent, the authors argue, with the commonplace observation that "schools often operate to satisfy well-placed parents" (Lucas and Berends 2007, p. 183). The findings of Morgan and McPartland (1981) and Clotfelter, Ladd, and Vigdor (2003) are consistent with this positive correlation, but only for schools with majority White enrollments. We build on this previous research on within-school segregation to explore here how classroom-level segregation across counties varies with different racial mixes.

If the goal of local policy makers were to keep White exposure to Black or Hispanic students below some predetermined level, we might expect to find more segregated classrooms –whether created by between-school or within-school segregation -- in counties where Whites comprise a smaller share of all students. If so there would be a positive correlation between the racial/ethnic share of students of color within a county and the county's level of segregation.

Figure 3a for White/Black segregation and Figure 3b for White/Hispanic segregation show the patterns across counties, using data for 2017. The only clear regularity to emerge in the first of these is the higher segregation levels in counties having 40-50% Black shares of students – that is, relatively large proportions of Black students but still majority White. Otherwise, there is only a slight tendency for segregation to be higher in counties with higher percentages of Black students. For White/Hispanic segregation we see a somewhat less articulated peak in counties where Hispanic students made up between 20% and 30% of all students. Thus, we find little evidence that segregation across classrooms at the county level is strongly and positively associated with the share of a county's students who are Black or Hispanic.

IV. Course Enrollment Patterns by Race and Ethnicity

One principal reason to be concerned about segregated racial patterns within schools is that they permit – if not invite – disparities in both the quality of teachers and the rigor of courses available to different groups of students. After all, one reason why students in different racial/ethnic categories might find themselves in different classrooms is precisely because those students are enrolled in different courses. As we describe in section II, our method of matching students with the classes taught in a school allows for the 10th graders in one high school, for example, to be enrolled in one of a number of different math courses, depending on each student's level of advancement in that subject or other criteria employed in the school. It is this kind of differentiation that leads observers to worry that Black or Hispanic students are being systematically consigned to less challenging courses than their White peers.

Were Black, Hispanic, or White students disproportionately enrolled in certain courses that plausibly differ by their rigor? To see, we calculated, for each of our selected grades and subject areas, relative enrollment rates by race and ethnicity for the most commonly offered courses. These enrollment rates are calculated as the ratio of the share of students in the indicated racial/ethnic group who took the course to that group's share of all students in the grade and subject, all multiplied by 100. Rates above 100 indicate overrepresentation; those below 100 show underrepresentation.

Table 4 presents such relative enrollment rates for the most frequently taken English and math courses in 7th and 10th grade. Although almost all 7th graders took the same English course, this was not the case in math, for which large differences in relative enrollment rates are evident. While Black and Hispanic 7th graders were more likely to be enrolled in the standard *Math Grade 7* course, White 7th graders were more likely to be

taking one of two alternative courses, *Math Compacted Grade 7* or *NC Math I,* both of which are more advanced than *Math Grade 7.*[23] In *Math Compacted Grade 7,* for example, White students were enrolled at a 16% higher than average rate while Black and Hispanic students were enrolled at rates 26% and 21% lower than the average, respectively.

In 10th grade, the standard *English II* course, which enrolled nearly nine-tenths of all 10th graders, tended to enroll a more than proportionate share of White students. *English III* did the opposite, possibly reflecting the prevalence of Black and Hispanic students who were repeating 10th grade but had passed *English II.* Among the next two English courses enrolling at least 1% of all 10th graders, *English Language Arts Local Elective* over-enrolled White students, while *English II (Occupational Course of Study)* over-enrolled Black students. More differences in enrollment propensities appear in 10th grade math. Black and Hispanic students were disproportionately enrolled in standard *NC Math II* and remedial *NC Math I* courses, while White students enrolled disproportionately in the more advanced *NC Math III* and *Pre-calculus.* Taken as a whole, differences such as these certainly invite the inference that Black and Hispanic students in North Carolina are exposed to a qualitatively different curriculum than are White students, with the latter being more likely to be in advanced courses. We note that this finding is directly in line with those of Dondero and Muller (2012, p. 494), who find that Hispanic 10th graders in "new destination" districts were less likely than White 10th graders to enroll in college-preparatory math courses above Algebra II, such as advanced math, pre-calculus, or calculus.

[23] For a description of North Carolina's courses, see North Carolina Department of Public Instruction, "Course Code Guidance," https://files.nc.gov/dpi/documents/course_information/Course_Code_Guidance.pdf 4-7-20.

As large as they are, however, the differences in enrollment rates evident in Table 4 understate the actual disparities in academic offerings by race and ethnicity. Because local districts have some discretion in how they configure their course offerings, the actual set of courses students across the state can take may differ from district to district if not from school to school. To illustrate the degree of local variation in courses offered, we present in Table 5 the titles of 10th grade math courses offered in two smaller counties, each one enrolling somewhat less than 20,000 students. Each had six schools containing a 10th grade. Surry County, in the state's northwest, offered a total of 15 different math courses to 10th graders across its three school districts. Wilson County, in the east, offered 14 different math courses in its one county-wide district. The variety of courses illustrated by just these two counties is noteworthy. Eleven courses were offered in both counties, and another seven were offered in just one of the counties. If course names mean anything, the variety shown by these two counties suggests that students were exposed to a potentially wide range of math instruction in the 10th grade.

We show in Table 5 the relative enrollment in specific courses. These calculations indicate, as in Table 4, that courses carrying the honors designation exhibit higher White relative enrollment rates than the non-honors versions. For Surry County the table tells us that Black and Hispanic students were disproportionately found in the largest course by enrollment, *NC Math II*. White students showed up in disproportionate numbers in eight courses, two of which were designated as "honors." In Wilson County Black students were relatively more likely to be found in four of the six top courses by enrollment, but were markedly less often found in *NC Math III Honors.* Hispanic students in Wilson were disproportionately more likely to be taking *NC Math II Honors* and *Foundations of NC Math*

III. In contrast to these patterns, White students were over-represented in *Math II Honors* and *Pre-calculus Honors,* among other courses.

For larger districts, the variety of courses is even wider: public schools in Mecklenburg County, for example, offered 10th grade math courses carrying more than 75 different titles and some 26 unique state course numbers. To be sure, it is impossible to know from such course titles exactly how much difference actually exists in the material covered in *Math II* and *Math II Honors,* for example, but there is good reason to suspect that differences in course names, especially those that occur within the same school, do signify differences in content or rigor. And differences such as these are a reminder that, not only do students in the classrooms across a county sit in classrooms with different sets of classmates, these students are also exposed to distinctly different academic offerings.

V. Conclusion

Like scores of prior empirical studies of school segregation, in this study we aim to measure the degree of racial and ethnic imbalance in public schools. Our primary contribution is measuring racial imbalances across classrooms *within* schools at the county level in North Carolina. Such imbalances are impossible to discern simply by observing the racial and ethnic makeup of students who stream out of schools at the end of the school day. They are evident only from close examination of detailed administrative data that reveals important details about the inner workings of schools. How diverse are individual classes? Who ends up taking which courses? Careful analysis of administrative data of the sort we have used is needed to answer such questions.

With such data for North Carolina, we are able to observe the racial and ethnic composition of every section of every course in every school in the state. We focus on 4th

graders and on 7th and 10th graders in their English and math courses. Our data cover charter schools and traditional public schools for the school years ending in 1998, 2006, and 2017. As a "new destination" state, North Carolina has witnessed an astounding increase in the number of Hispanic students in its schools, their share increasing from 3% in 1998 to 17% in 2017. This development leads us to compare patterns of White/Black segregation with those between White and Hispanic students.

Our principal finding is that segregation within schools exists and that it is substantial. To ignore this aspect of segregation – which researchers are compelled to do when they lack information on classroom-level enrollments – can be misleading. For example, our analysis shows that Wake County, lauded for its efforts to balance schools by socioeconomic status, actually had some of the most segregated 7th and 10th grade classrooms in the state of North Carolina. Within-school segregation plays a sizable role in overall school segregation, especially in middle schools and high schools. Moreover, it exhibits a complementary relationship with respect to between-school segregation: when one is low, the other tends to be high. This offsetting tendency is evident over time and across grades. Over time, it can be seen in some districts' response to federal courts' race-blind decisions. When between-school White/Black segregation in Mecklenburg and Forsyth's middle and high schools increased after 1998 in the wake of this shift in judicial doctrine, within-school segregation in those schools generally went down. Larger schools tend to be more heterogeneous schools, however, which invites pressures to create distinctions among classrooms within them.

Our second finding is that segregation at the classroom level was consistently higher between White and Hispanic students than between White and Black students. This

inequality was mostly due to the high degree of within-school segregation of Hispanic students. This finding in itself is surprising and noteworthy, given the decades of discrimination and segregation directed toward Black students, which plagued schools in the South. Rather than easy assimilation, Hispanic students appear to be facing segregation at the classroom level every bit as robust as that confronting Black students. Across counties, we find that counties whose overall share of Black students was just under 50% exhibited the highest levels of White/Black segregation and those whose overall share of Hispanic students was 20-30% exhibited the highest levels of White/Hispanic segregation.

Our third finding relates to patterns of course-taking. We find that Black and Hispanic students were less likely to be enrolled in advanced courses in 7th and 10th grade, particularly math courses. Not only were Black and Hispanic students often in separate classrooms, but they tended to take less rigorous courses than their White peers. This finding underlines a major reason why it is worth paying attention to within-school segregation.

We believe the patterns we report here are compelling and policy-relevant. The complementary relationship between the two types of segregation – between and within-school – indicates that policies designed to reduce segregation across schools are far from sufficient to promote interracial contact. Instead, it would behoove policy makers to focus more attention than in the past on within-school segregation, in addition to the ongoing and deserved attention to segregation between schools.

At the same time, the limitations of our study are worth highlighting, limitations that call out for additional research. Among them is our admittedly descriptive, atheoretical approach. Rather than postulate and test formal hypotheses, we have opted instead to

focus primarily on the analysis of basic empirical issues related to segregation in public schools. We might have hypothesized, for example, that, owing to the history of slavery and Jim Crow segregation, White/Black segregation today would be more intense than White/Hispanic segregation. Instead, we chose to focus this paper on the detailed empirical analysis that can and should serve as the basis for developing and testing hypotheses going forward. An important area for future research would be an analysis of the mechanisms that generate the patterns we report in this paper. That type of analysis will require not only more years of data, but also hypotheses related to the specific characteristics of the differing North Carolina counties. A second limitation results from our inability to examine segregation by social and economic background. The absence of student-specific data on economic status prevented us from pursuing that approach for this research, although a full understanding of the causes and implications of racial and ethnic segregation surely requires more attention to the interactions between race and other student characteristics. This limitation clearly points to a fruitful area for future research, provided the necessary data become available.

In addition, to supplement the evidence presented here on how within-school segregation enables different groups of students to experience courses of differential rigor, one logical next step would be explore in some detail its implications for differences in the quality of teachers and other resources to which racial or ethnic subgroups are exposed. We have done some initial exploration of teacher quality gaps in prior research (Clotfelter et al., 2005) and are currently building on the classroom level data used in this study to examine them in far greater detail. Finally, we would encourage ethnographic researchers

to investigate in some detail the various underlying pressures, attitudes, and behaviors that lead to the types of segregation that we have documented in this study.

Despite the limitations of the research reported in this study, however, our results clearly add to the evidence that within-school segregation serves as a handmaiden of unequal education.

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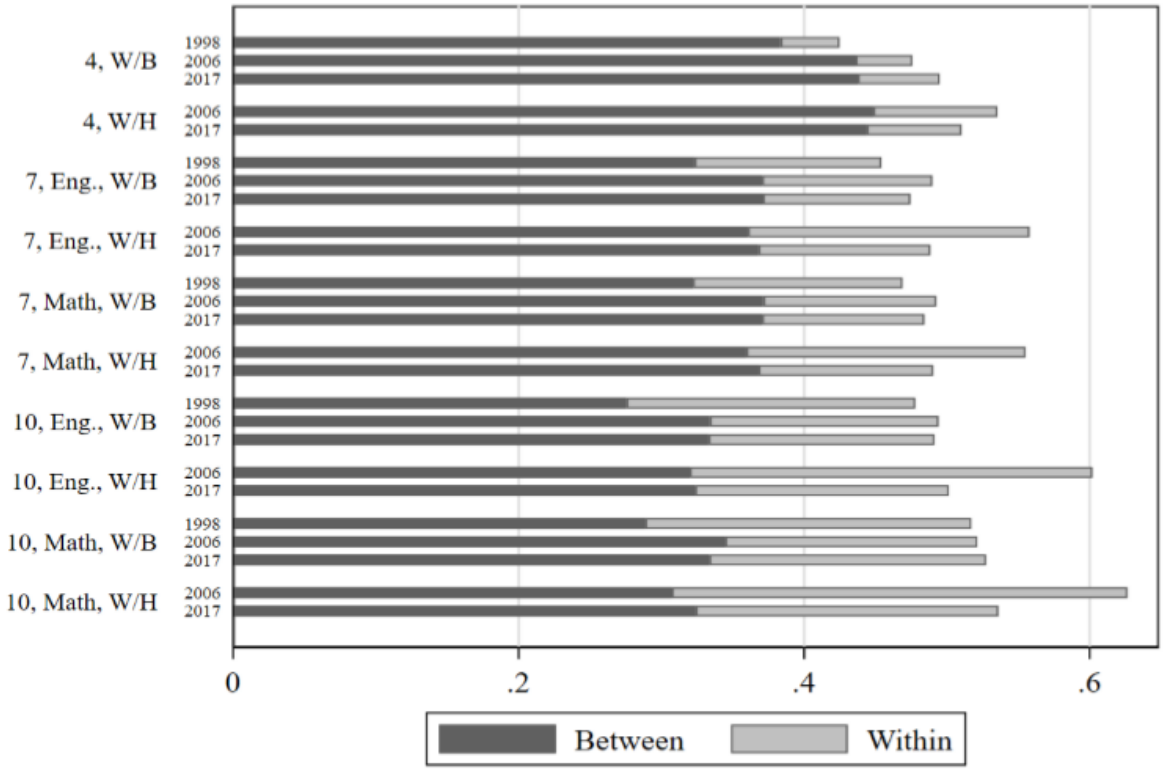
Figure 1. White/Black and White/Hispanic Segregation (Dissimilarity) Between and Within Public Schools in North Carolina, Five Grade and Subject Levels, in 62 Counties, 1998, 2006, and 2017

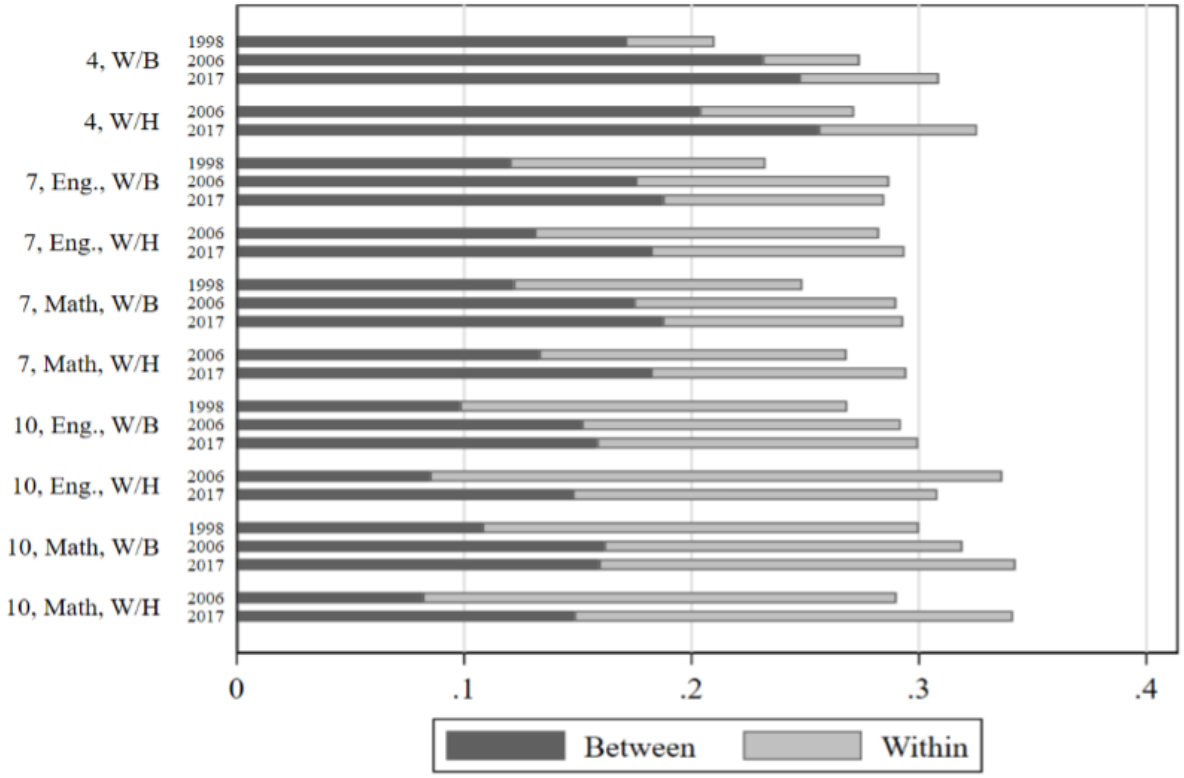


crc_Figure1and3.do (5/15/2020)

Source: North Carolina Public Schools, School Activity Reports and Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Note: Bars show enrollment-weighted averages of between- and within-school segregation, calculated for the 62 counties where Black students account for at least 4% of the population in 1998 and Hispanic students account for at least 4% of the population in 2006.

Figure 2. White/Black and White/Hispanic Segregation (Coleman) Between and Within Public Schools in North Carolina, Five Grade and Subject Levels, in 62 Counties, 1998, 2006, and 2017



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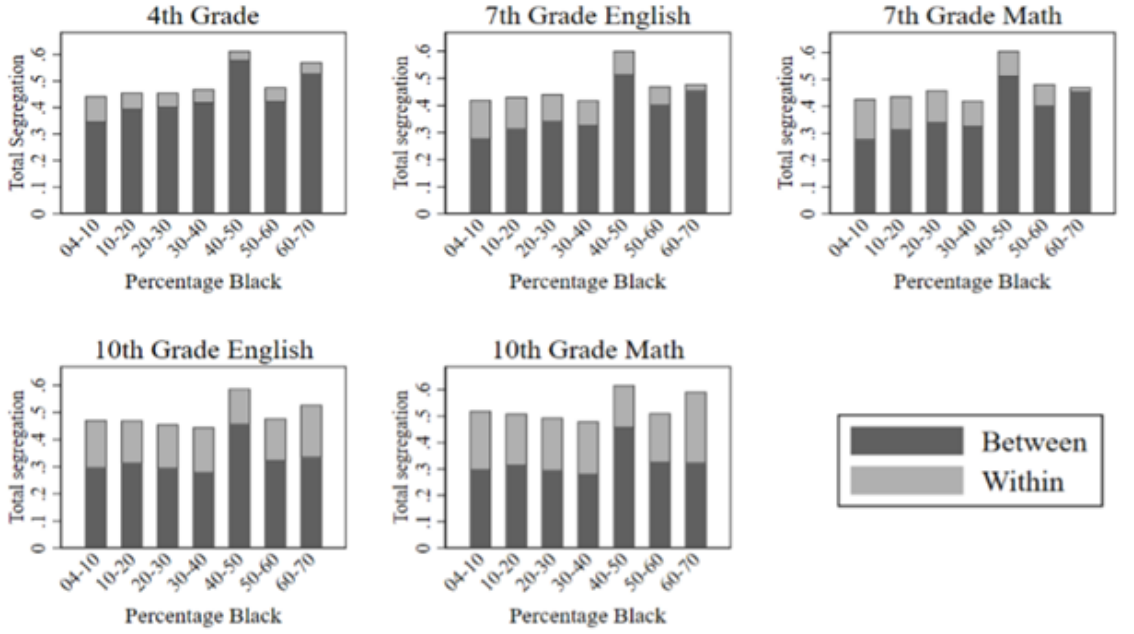
Source: North Carolina Public Schools, School Activity Reports and Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Note: Bars show enrollment-weighted averages of between- and within-school segregation, calculated for the 62 counties where Black students account for at least 4% of the population in 1998 and Hispanic students account for at least 4% of the population in 2006.

Figure 3a. White/Black Segregation (Dissimilarity) Between and Within Public Schools, by Percentage Black among County's Public School Students, 2017



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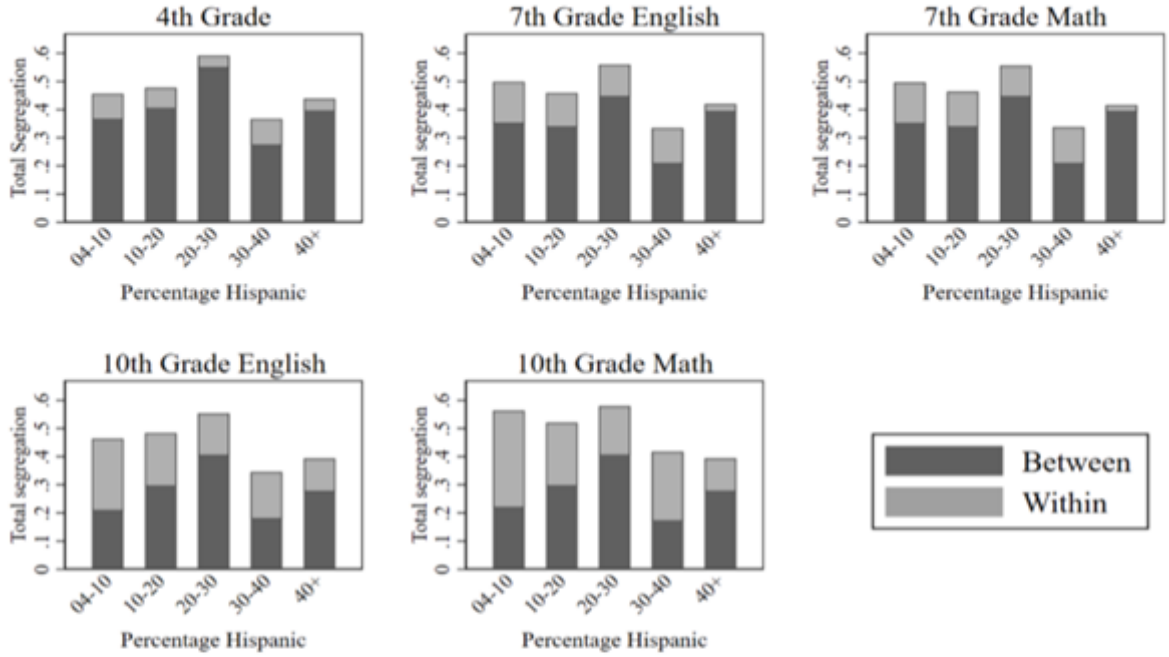
Source: North Carolina Public Schools, Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Note: Bars show enrollment-weighted averages for between- and within-school segregation indices, where counties are divided by racial composition. Groups on the categorical axis include lower bound.

Figure 3b. White/Hispanic Segregation (Dissimilarity) Between and Within Public Schools, by Percentage Hispanic among County's Public School Students, 2017



crc_Figure4.do (5/15/2020)

Source: North Carolina Public Schools, Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Note: Bars show enrollment-weighted averages for between- and within-school segregation indices, where counties are divided by racial composition. Groups on the categorical axis include lower bound.

Table 1. Most Commonly Offered Courses in North Carolina, Selected Grades and Subjects, 2017

Grade/ subject	Course title	State course number	Pct. of students in course (%)
Grade 7 - English			
	ELA Grade 7	1057	98.7
Grade 7 - Math			
	Math Grade 7	2007	83.1
	Math Compacted Grade 7	2012	12.5
	NC Math I	2109	2.5
	Math Local Elective	2800	1.4
Grade 10- English			
	English II	1022	45.4
	English II Honors	1022	43.0
	English III	1023	3.5
	English III Honors	1023	1.8
	English II (OCS)	9211	1.7
	ELA Local Elective	1025	1.2
Grade 10 - Math			
	NC Math II	2209	47.9
	NC Math III Honors	2309	21.0
	NC Math II Honors	2209	11.5
	NC Math III	2309	6.6
	NC Math I	2109	4.6
	Pre-Calculus Honors	2403	3.2

crc-Table1and4.do (5/15/2020)

Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools, *NC Course Code Guidance, 2018.*

Notes: Courses accounting for at least 1.0% of all students in the grade and subject are shown. Course names shown are defined at the state level; local districts and schools often use variants for the same course number. See Table 5 for examples. "ELA" denotes English-Language Arts and "OCS" denotes Occupational Course of Study.

Table 2. Measures of Segregation Used in This Paper

DISSIMILARITY INDEX

Classroom-level School Segregation for a County

Between-school segregation: dissimilarity index, summed across the public schools of a county.

$$D_{btw} = 0.5 * \sum_{j} \left| \frac{X_j}{X} - \frac{W_j}{W} \right| \quad (1)$$

Total classroom-level segregation: dissimilarity index, summed across all the classrooms in a county.

$$D_{tot} = 0.5 * \sum_{i} \left| \frac{X_i}{X} - \frac{W_i}{W} \right| \quad (2)$$

Within-school segregation: the difference between a county's total classroom-level segregation and its between-school segregation.

$$D_{w/in} = D_{tot} - D_{btw} \quad (3)$$

Individual School Segregation

Dissimilarity index, summed for all classrooms in a school.

$$D_j = 0.5 * \sum_{i} \left| \frac{X_{ij}}{X_j} - \frac{W_{ij}}{W_j} \right| \quad (4)$$

COLEMAN INDEX

Total segregation: the proportional difference between exposure of white students to students in group X (E_{wx}) and the proportion of X students in the county (P).

$$S_{wx} = (P - E_{wx})/P \quad (5)$$

This can be decomposed into the sum of between-school and within-school segregation:

$$(P - E^*_{wx})/P + (E^*_{wx} - E_{wx})/P \quad (6)$$

Where P_j is the proportion of school j's students in group X and W_j is the number of white students in school j, the exposure rate calculated at the school level is:

$$E_{wx}^* = [\sum_j W_j P_j]/W \quad (7)$$

Where P_{ij} is the proportion of students in classroom i in school j who belong to group X and W_{ij} is the number of white students in classroom i in school j, the exposure rate for the county calculated at the classroom level is:

$$E_{wx} = [\Sigma_j \Sigma_j W_{ij} P_{ij}]/W \quad (8)$$

Note: Schools are denoted j. Classrooms are denoted i. Calculations based on two racial/ethnic groups at one time: X and W. Numbers enrolled in county: X,W; numbers in each school: X_j and W_j; numbers in each classroom: X_i and W_i.

Table 3a. White/Black Segregation (Dissimilarity) Between and Within Public Schools, Selected Grades and Subjects, State, Largest Counties and County Groups, 1998, 2006, 2017

	4th Grade			7th Grade						10th Grade					
				English			Math			English			Math		
	1998	2006	2017	1998	2006	2017	1998	2006	2017	1998	2006	2017	1998	2006	2017
White/Black segregation															
State of North Carolina															
Between	0.38	0.44	0.44	0.32	0.37	0.37	0.32	0.37	0.37	0.28	0.33	0.33	0.29	0.34	0.33
Within	0.04	0.04	0.06	0.13	0.12	0.10	0.15	0.12	0.11	0.20	0.16	0.16	0.23	0.18	0.19
Five largest counties															
Wake															
Between	0.24	0.38	0.43	0.25	0.31	0.33	0.27	0.33	0.33	0.22	0.32	0.32	0.21	0.33	0.32
Within	0.05	0.03	0.05	0.23	0.17	0.11	0.23	0.18	0.16	0.28	0.17	0.16	0.36	0.18	0.22
Mecklenburg															
Between	0.35	0.58	0.64	0.30	0.55	0.62	0.28	0.54	0.62	0.25	0.54	0.57	0.31	0.54	0.57
Within	0.02	0.02	0.04	0.13	0.09	0.05	0.19	0.09	0.05	0.22	0.09	0.09	0.14	0.06	0.10
Guilford															
Between	0.45	0.54	0.54	0.43	0.41	0.45	0.44	0.41	0.45	0.44	0.39	0.40	0.44	0.42	0.40
Within	0.02	0.02	0.04	0.10	0.11	0.10	0.14	0.13	0.09	0.17	0.19	0.14	0.20	0.17	0.19
Cumberland															
Between	0.35	0.41	0.42	0.34	0.37	0.40	0.32	0.39	0.40	0.29	0.36	0.31	0.30	0.37	0.32
Within	0.03	0.04	0.05	0.07	0.07	0.05	0.08	0.06	0.05	0.15	0.13	0.14	0.16	0.13	0.17
Forsyth															
Between	0.41	0.55	0.56	0.20	0.42	0.37	0.16	0.43	0.37	0.25	0.43	0.38	0.42	0.49	0.38
Within	0.03	0.03	0.03	0.20	0.13	0.11	0.23	0.10	0.12	0.19	0.12	0.15	0.11	0.10	0.19
Other urban counties (25)															
Between	0.41	0.42	0.41	0.33	0.35	0.34	0.34	0.35	0.34	0.29	0.31	0.30	0.29	0.32	0.30
Within	0.04	0.04	0.06	0.13	0.13	0.11	0.14	0.13	0.12	0.19	0.17	0.17	0.23	0.19	0.21
Rural counties (32)															
Between	0.39	0.39	0.35	0.34	0.34	0.30	0.33	0.34	0.30	0.25	0.26	0.26	0.25	0.26	0.26
Within	0.06	0.06	0.08	0.11	0.11	0.12	0.12	0.11	0.12	0.21	0.18	0.18	0.25	0.22	0.21

crc-Table3a.do (5/15/2020)

Source: North Carolina Public Schools, School Activity Reports and Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Notes: Figures are enrollment-weighted averages calculated by county. Based on 62 counties where Black students account for at least 4% of the population in 1998 and Hispanic students account for at least 4% of the population in 2006.

Table 3b. White/Hispanic Segregation (Dissimilarity) Between and Within Public Schools, Selected Grades and Subjects, State, Largest Counties and County Groups, 2006, 2017

	4th Grade		7th Grade				10th Grade			
			English		Math		English		Math	
	2006	2017	2006	2017	2006	2017	2006	2017	2006	2017
White/Hispanic segregation										
State of North Carolina										
Between	0.45	0.44	0.36	0.37	0.36	0.37	0.32	0.32	0.31	0.32
Within	0.09	0.07	0.20	0.12	0.20	0.12	0.28	0.18	0.32	0.21
Five largest counties										
Wake										
Between	0.36	0.44	0.35	0.34	0.35	0.34	0.30	0.29	0.25	0.29
Within	0.08	0.06	0.21	0.13	0.21	0.19	0.27	0.21	0.34	0.26
Mecklenburg										
Between	0.62	0.67	0.53	0.59	0.55	0.59	0.48	0.52	0.45	0.52
Within	0.04	0.04	0.13	0.09	0.12	0.08	0.18	0.14	0.10	0.16
Guilford										
Between	0.51	0.55	0.45	0.49	0.42	0.49	0.36	0.47	0.35	0.47
Within	0.07	0.05	0.17	0.08	0.20	0.07	0.31	0.13	0.34	0.17
Cumberland										
Between	0.36	0.35	0.34	0.27	0.32	0.27	0.29	0.21	0.31	0.21
Within	0.14	0.11	0.22	0.14	0.20	0.12	0.28	0.22	0.32	0.30
Forsyth										
Between	0.55	0.64	0.45	0.40	0.44	0.40	0.32	0.44	0.35	0.44
Within	0.05	0.04	0.20	0.14	0.21	0.15	0.26	0.12	0.26	0.14
Other urban counties (25)										
Between	0.44	0.41	0.31	0.33	0.32	0.33	0.30	0.29	0.30	0.29
Within	0.10	0.07	0.22	0.13	0.22	0.13	0.31	0.19	0.35	0.22
Rural counties (32)										
Between	0.42	0.35	0.34	0.32	0.33	0.32	0.29	0.26	0.27	0.26
Within	0.09	0.08	0.18	0.12	0.19	0.11	0.29	0.18	0.35	0.21

crc-Table3b.do (5/15/2020)

Source: North Carolina Public Schools, School Activity Reports and Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Notes: Figures are enrollment-weighted averages calculated by county. Based on 62 counties where Black students account for at least 4% of the population in 1998 and Hispanic students account for at least 4% of the population in 2006.

Table 4. Most Commonly Offered Courses in North Carolina, Selected Grades and Subjects, 2017

Grade/ subject	Course title	State course number	Pct. of students in course	Relative enrollment rate		
				Black	Hispanic	White
Grade 7 - English						
	ELA Grade 7	1057	98.7	100	100	100
Grade 7 - Math						
	Math Grade 7	2007	83.1	106	105	97
	Math Compacted Grade 7	2012	12.5	74	79	116
	NC Math I	2109	2.5	42	36	126
	Math Local Elective	2800	1.4	115	108	88
Grade 10- English						
	English II	1022	45.4	117	121	86
	English II Honors	1022	43.0	76	75	119
	English III	1023	3.5	158	132	58
	English III Honors	1023	1.8	89	96	108
	English II (OCS)	9211	1.7	150	75	82
	ELA Local Elective	1025	1.2	116	126	82
Grade 10 - Math						
	NC Math II	2209	47.9	117	115	88
	NC Math III Honors	2309	21.0	56	63	134
	NC Math II Honors	2209	11.5	95	106	100
	NC Math III	2309	6.6	101	98	102
	NC Math I	2109	4.6	150	159	58
	Pre-Calculus Honors	2403	3.2	50	49	129

crc-Table1and4.do (5/15/2020)

Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools, *NC Course Code Guidance, 2018.*

Notes: Courses accounting for at least 1.0% of all students in the grade and subject are shown. Relative enrollment rate is the percentage of students in the indicated category who took the course divided by the percentage of students in that category among all students, all multiplied by 100. Course names shown are defined at the state level; local districts and schools often use variants for the same course number. See Table 5 for examples. "ELA" denotes English-Language Arts and "OCS" denotes Occupational Course of Study.

Table 5. 10th Grade Math Courses, Two Illustrative Counties, with Relative Enrollment Rates by Race and Ethnicity, 2017

Course title	Course number	Percentage of enrollments	Relative enrollment rate		
			Black	Hispanic	White
Surry County					
NC Math II	2209	51.5	122	117	93
NC Math III Honors	2309	21.7	74	59	114
NC Math II Honors	2209	14.6	66	109	100
NC Math III	2309	5.7	57	85	110
NC Math I	2109	2.2	150	173	74
Pre-Calculus Honors	2403	1.4	0	0	141
Introduction To Mathematics I (OCS)	9220	0.7	237	0	118
NC Math I (OCS)	9225	0.7	0	235	71
NC Math I B (ECS)	9325	0.5	356	117	71
NC Math I A (ECS)	9324	0.3	0	0	141
Advanced Functions and Modeling	2400	0.2	0	0	141
Foundations of NC Math I	2090	0.2	0	0	141
Introductory Mathematics	2020	0.1	1424	0	0
AP Calculus AB	2500	0.1	0	0	141
VPS - Locally Developed Math Elective	2800	0.1	0	470	0
Wilson County					
NC Math II	2209	44.6	118	97	78
NC Math III Honors	2309	20.4	51	105	160
NC Math III	2309	11.0	92	84	121
NC Math I	2109	8.6	118	114	72
NC Math II Honors	2209	6.4	102	144	79
Foundations of NC Math II	2091	2.3	138	75	64
Foundations of NC Math III	2092	2.2	77	131	121
Foundations of NC Math I	2090	1.9	155	61	47
Pre-Calculus I Honors	2403	1.0	21	58	237
Intro to Mathematics I (OCS)	9220	0.5	127	115	0
Advanced Functions and Modeling	2400	0.4	158	0	74
Financial Management (OCS)	9222	0.3	211	0	0
NC Math I A (ECS)	9324	0.2	211	0	0
NC Math I (OCS)	9225	0.1	0	0	296

crc-Table5.do (5/15/2020)

Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools, *NC Course Code Guidance, 2018* .

Notes: Includes all courses present in each county. Relative enrollment rate is the percentage of students in the indicated category who took the course divided by the percentage of students in that category among all students, all multiplied by 100. "ECS" denotes Extended Content Standards, "ELA" denotes English-Language Arts, and "OCS" denotes Occupational Course of Study.

Appendix Table A1a. White/Black Segregation (Coleman) Between and Within Public Schools, Selected Grades and Subjects, State, Largest Counties and County Groups, 1998, 2006, 2017

	4th Grade			7th Grade						10th Grade					
				English			Math			English			Math		
	1998	2006	2017	1998	2006	2017	1998	2006	2017	1998	2006	2017	1998	2006	2017
White/Black segregation															
State of North Carolina															
Between	0.17	0.23	0.25	0.12	0.18	0.19	0.12	0.17	0.19	0.10	0.15	0.16	0.11	0.16	0.16
Within	0.04	0.04	0.06	0.11	0.11	0.10	0.13	0.12	0.11	0.17	0.14	0.14	0.19	0.16	0.18
Five largest counties															
Wake															
Between	0.08	0.20	0.26	0.08	0.15	0.16	0.09	0.15	0.16	0.06	0.13	0.14	0.06	0.15	0.14
Within	0.05	0.04	0.06	0.21	0.16	0.12	0.21	0.18	0.16	0.24	0.17	0.16	0.32	0.19	0.23
Mecklenburg															
Between	0.20	0.42	0.47	0.15	0.37	0.43	0.12	0.37	0.43	0.10	0.34	0.38	0.14	0.36	0.38
Within	0.02	0.04	0.05	0.11	0.12	0.09	0.17	0.10	0.10	0.20	0.12	0.13	0.13	0.09	0.15
Guilford															
Between	0.28	0.38	0.37	0.26	0.27	0.27	0.27	0.26	0.27	0.29	0.27	0.25	0.29	0.29	0.25
Within	0.03	0.03	0.05	0.11	0.11	0.11	0.15	0.13	0.11	0.18	0.16	0.13	0.21	0.16	0.20
Cumberland															
Between	0.17	0.21	0.21	0.14	0.17	0.18	0.12	0.18	0.18	0.11	0.17	0.13	0.11	0.18	0.13
Within	0.04	0.05	0.07	0.09	0.09	0.09	0.11	0.09	0.08	0.17	0.14	0.13	0.19	0.17	0.17
Forsyth															
Between	0.24	0.38	0.38	0.06	0.25	0.19	0.04	0.26	0.19	0.09	0.26	0.22	0.19	0.32	0.22
Within	0.05	0.05	0.05	0.17	0.15	0.13	0.18	0.14	0.13	0.16	0.12	0.16	0.15	0.11	0.21
Other urban counties (25)															
Between	0.18	0.21	0.21	0.11	0.14	0.15	0.12	0.14	0.15	0.10	0.12	0.12	0.10	0.13	0.12
Within	0.04	0.04	0.06	0.11	0.11	0.10	0.12	0.12	0.10	0.16	0.15	0.15	0.19	0.17	0.19
Rural counties (32)															
Between	0.15	0.16	0.15	0.11	0.13	0.12	0.11	0.12	0.12	0.07	0.09	0.09	0.08	0.09	0.09
Within	0.04	0.05	0.07	0.08	0.09	0.09	0.09	0.09	0.09	0.15	0.13	0.13	0.18	0.16	0.16

crc-TableA1a.do (5/15/2020)

Source: North Carolina Public Schools, School Activity Reports and Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Notes: Figures are enrollment-weighted averages calculated by county. Based on 62 counties where Black students account for at least 4% of the population in 1998 and Hispanic students account for at least 4% of the population in 2006.

Appendix Table A1b. White/Hispanic Segregation (Coleman) Between and Within Public Schools, Selected Grades and Subjects, State, Largest Counties and County Groups, 2006, 2017

	4th Grade		7th Grade				10th Grade			
			English		Math		English		Math	
	2006	2017	2006	2017	2006	2017	2006	2017	2006	2017
White/Hispanic segregation										
State of North Carolina										
Between	0.20	0.26	0.13	0.18	0.13	0.18	0.08	0.15	0.08	0.15
Within	0.07	0.07	0.15	0.11	0.14	0.11	0.25	0.16	0.21	0.19
Five largest counties										
Wake										
Between	0.13	0.26	0.09	0.14	0.08	0.14	0.04	0.10	0.03	0.10
Within	0.06	0.07	0.19	0.13	0.17	0.18	0.24	0.21	0.22	0.26
Mecklenburg										
Between	0.41	0.52	0.28	0.41	0.34	0.41	0.24	0.35	0.20	0.36
Within	0.07	0.06	0.17	0.13	0.14	0.12	0.25	0.17	0.13	0.18
Guilford										
Between	0.28	0.36	0.25	0.29	0.22	0.28	0.15	0.27	0.16	0.27
Within	0.07	0.08	0.16	0.11	0.13	0.10	0.32	0.17	0.27	0.20
Cumberland										
Between	0.12	0.15	0.11	0.09	0.11	0.09	0.10	0.07	0.10	0.06
Within	0.10	0.14	0.15	0.14	0.14	0.14	0.24	0.18	0.27	0.27
Forsyth										
Between	0.37	0.48	0.29	0.24	0.27	0.24	0.09	0.26	0.11	0.27
Within	0.06	0.06	0.22	0.14	0.22	0.15	0.18	0.15	0.15	0.18
Other urban counties (25)										
Between	0.17	0.21	0.08	0.14	0.09	0.14	0.06	0.11	0.06	0.11
Within	0.07	0.06	0.14	0.11	0.13	0.10	0.27	0.16	0.21	0.18
Rural counties (32)										
Between	0.17	0.16	0.11	0.14	0.11	0.14	0.06	0.10	0.06	0.10
Within	0.07	0.07	0.13	0.09	0.11	0.08	0.23	0.13	0.21	0.17

crc-TableA1b.do (5/15/2020)

Source: North Carolina Public Schools, School Activity Reports and Course Membership file; North Carolina Education Research Data Center; authors' calculations.

Notes: Figures are enrollment-weighted averages calculated by county. Based on 62 counties where Black students account for at least 4% of the population in 1998 and Hispanic students account for at least 4% of the population in 2006.

Appendix Table A2a. White/Black Segregation (Dissimilarity) Between and Within Schools, Selected Grades and Subjects by County, 2017

County	Rural/ urban	Percent Black	Grade 4		Grade 7 - English		Grade 7 - Math		Grade 10 - English		Grade 10 - Math	
			Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Alamance	Urban	0.26	0.49	0.04	0.50	0.08	0.50	0.06	0.41	0.10	0.41	0.15
Alexander	Rural	0.08	0.39	0.05	0.12	0.26	0.12	0.26	0.00	0.48	0.00	0.33
Alleghany	Rural	0.03	0.25	0.46	0.12	0.45	0.12	0.25	0.00	0.75	0.00	0.75
Anson	Rural	0.60	0.35	0.10	0.00	0.47	0.00	0.45	0.22	0.24	0.22	0.29
Ashe	Rural	0.02	0.27	0.40	0.00	0.61	0.00	0.66	0.00	0.78	0.00	0.79
Avery	Rural	0.03	0.36	0.13	0.15	0.58	0.15	0.62	0.52	0.29	0.53	0.19
Beaufort	Rural	0.35	0.29	0.07	0.25	0.19	0.25	0.19	0.25	0.21	0.25	0.24
Bertie	Rural	0.83	0.20	0.11	0.00	0.21	0.00	0.19	0.37	0.18	0.37	0.18
Bladen	Rural	0.43	0.42	0.04	0.33	0.10	0.33	0.10	0.27	0.17	0.28	0.16
Brunswick	Rural	0.19	0.21	0.12	0.14	0.15	0.14	0.16	0.20	0.21	0.20	0.17
Buncombe	Urban	0.14	0.45	0.04	0.34	0.11	0.34	0.10	0.28	0.17	0.28	0.24
Burke	Urban	0.10	0.33	0.03	0.28	0.12	0.28	0.10	0.30	0.18	0.30	0.19
Cabarrus	Urban	0.27	0.29	0.05	0.24	0.11	0.24	0.12	0.20	0.19	0.20	0.24
Caldwell	Urban	0.10	0.40	0.02	0.42	0.04	0.42	0.04	0.42	0.05	0.43	0.16
Camden	Rural	0.16	0.00	0.26	0.00	0.23	0.00	0.23	0.01	0.18	0.06	0.20
Carteret	Urban	0.12	0.31	0.09	0.23	0.11	0.22	0.12	0.08	0.28	0.07	0.31
Caswell	Rural	0.41	0.28	0.00	0.00	0.22	0.00	0.19	0.00	0.20	0.00	0.26
Catawba	Urban	0.15	0.43	0.05	0.28	0.14	0.28	0.14	0.30	0.14	0.30	0.19
Chatham	Rural	0.16	0.40	0.04	0.31	0.08	0.31	0.07	0.16	0.27	0.16	0.34
Cherokee	Rural	0.05	0.24	0.17	0.32	0.26	0.32	0.12	0.22	0.27	0.23	0.46
Chowan	Rural	0.49	0.00	0.04	0.00	0.16	0.00	0.12	0.00	0.34	0.00	0.45
Clay	Rural	0.03	0.00	0.75	0.00	0.49	0.00	0.51	0.00	0.42	0.00	0.48
Cleveland	Rural	0.32	0.34	0.06	0.27	0.15	0.27	0.15	0.24	0.11	0.24	0.17
Columbus	Rural	0.37	0.37	0.06	0.35	0.08	0.35	0.09	0.22	0.19	0.26	0.19
Craven	Urban	0.34	0.32	0.03	0.24	0.06	0.24	0.06	0.05	0.29	0.05	0.29
Cumberland	Urban	0.53	0.42	0.05	0.40	0.05	0.40	0.05	0.31	0.14	0.32	0.17
Currituck	Rural	0.13	0.19	0.21	0.13	0.21	0.13	0.15	0.00	0.37	0.01	0.45
Dare	Urban	0.06	0.25	0.15	0.17	0.20	0.17	0.34	0.47	0.14	0.47	0.28
Davidson	Rural	0.14	0.58	0.05	0.58	0.09	0.58	0.08	0.59	0.05	0.59	0.04
Davie	Rural	0.11	0.27	0.13	0.17	0.20	0.17	0.20	0.05	0.37	0.05	0.48
Duplin	Rural	0.25	0.44	0.04	0.47	0.06	0.47	0.06	0.42	0.05	0.42	0.09
Durham	Urban	0.47	0.59	0.02	0.39	0.20	0.39	0.22	0.40	0.21	0.40	0.26
Edgecombe	Urban	0.57	0.33	0.01	0.30	0.08	0.30	0.07	0.35	0.11	0.35	0.12
Forsyth	Urban	0.33	0.56	0.03	0.37	0.11	0.37	0.12	0.38	0.15	0.38	0.19
Franklin	Rural	0.33	0.20	0.09	0.15	0.09	0.15	0.11	0.07	0.24	0.08	0.26
Gaston	Urban	0.26	0.34	0.06	0.35	0.08	0.35	0.08	0.34	0.10	0.33	0.13
Gates	Rural	0.38	0.17	0.02	0.00	0.27	0.00	0.32	0.00	0.30	0.00	0.28
Graham	Rural	0.01	0.00	0.56	0.00	0.83	0.00	0.84	0.00	0.77	0.00	1.00
Granville	Rural	0.35	0.52	0.04	0.38	0.02	0.37	0.02	0.31	0.09	0.29	0.18
Greene	Rural	0.38	0.02	0.25	0.00	0.19	0.00	0.19	0.05	0.25	0.05	0.32
Guilford	Urban	0.45	0.54	0.04	0.45	0.10	0.45	0.09	0.40	0.14	0.40	0.19
Halifax	Rural	0.63	0.72	0.01	0.80	0.00	0.80	0.00	0.72	0.03	0.71	0.02
Harnett	Rural	0.30	0.25	0.09	0.21	0.10	0.21	0.09	0.14	0.20	0.14	0.24
Haywood	Urban	0.04	0.32	0.17	0.34	0.28	0.34	0.24	0.13	0.48	0.14	0.46
Henderson	Urban	0.08	0.32	0.13	0.23	0.22	0.23	0.20	0.17	0.23	0.16	0.28
Hertford	Rural	0.80	0.10	0.27	0.00	0.31	0.00	0.46	0.21	0.24	0.20	0.22
Hoke	Rural	0.42	0.22	0.09	0.24	0.15	0.24	0.15	0.08	0.21	0.06	0.28
Hyde	Rural	0.23	0.35	0.00	0.47	0.00	0.47	0.00	0.44	0.03	0.42	0.12
Iredell	Urban	0.17	0.37	0.08	0.36	0.11	0.36	0.10	0.39	0.13	0.39	0.17

Jackson	Rural	0.04	0.16	0.20	0.12	0.23	0.12	0.18	0.23	0.42	0.23	0.39
Johnston	Rural	0.19	0.32	0.05	0.22	0.13	0.22	0.15	0.24	0.14	0.24	0.19
Jones	Rural	0.43	0.28	0.00	0.00	0.40	0.00	0.40	0.00	0.32	0.00	0.25
Lee	Urban	0.24	0.22	0.16	0.16	0.20	0.16	0.17	0.12	0.30	0.12	0.34
Lenoir	Urban	0.51	0.52	0.11	0.51	0.05	0.51	0.05	0.51	0.09	0.53	0.10
Lincoln	Rural	0.10	0.35	0.11	0.26	0.15	0.26	0.12	0.34	0.12	0.34	0.15
Macon	Rural	0.03	0.17	0.38	0.11	0.43	0.11	0.37	0.10	0.41	0.11	0.48
Madison	Rural	0.01	0.44	0.11	0.00	0.89	0.00	0.89	0.29	0.71	0.29	0.60
Martin	Rural	0.48	0.40	0.00	0.43	0.20	0.43	0.21	0.39	0.19	0.39	0.25
McDowell	Rural	0.07	0.20	0.19	0.21	0.20	0.21	0.24	0.04	0.46	0.07	0.52
Mecklenburg	Urban	0.41	0.64	0.04	0.62	0.05	0.62	0.05	0.57	0.09	0.57	0.10
Mitchell	Rural	0.02	0.32	0.21	0.00	0.00	0.00	0.00	0.16	0.67	0.11	0.75
Montgomery	Rural	0.23	0.19	0.12	0.09	0.26	0.09	0.19	0.07	0.29	0.07	0.22
Moore	Rural	0.20	0.38	0.03	0.29	0.11	0.29	0.13	0.18	0.25	0.17	0.27
Nash	Urban	0.56	0.49	0.06	0.41	0.11	0.41	0.11	0.29	0.18	0.29	0.22
New Hanover	Urban	0.24	0.56	0.03	0.41	0.11	0.41	0.11	0.24	0.24	0.26	0.27
Northampton	Rural	0.82	0.17	0.08	0.14	0.08	0.14	0.08	0.18	0.23	0.23	0.16
Onslow	Urban	0.28	0.30	0.07	0.27	0.07	0.27	0.08	0.27	0.13	0.27	0.13
Orange	Urban	0.18	0.23	0.12	0.06	0.22	0.06	0.29	0.04	0.31	0.04	0.42
Pamlico	Rural	0.24	0.21	0.10	0.17	0.09	0.17	0.11	0.21	0.35	0.20	0.21
Pasquotank	Urban	0.48	0.34	0.05	0.18	0.13	0.18	0.14	0.11	0.20	0.10	0.23
Pender	Rural	0.18	0.48	0.01	0.49	0.02	0.48	0.03	0.44	0.08	0.43	0.07
Perquimans	Rural	0.30	0.01	0.14	0.00	0.18	0.00	0.23	0.00	0.46	0.00	0.36
Person	Rural	0.35	0.44	0.01	0.37	0.04	0.36	0.03	0.29	0.09	0.29	0.14
Pitt	Urban	0.51	0.36	0.06	0.36	0.10	0.37	0.16	0.28	0.22	0.28	0.26
Polk	Rural	0.10	0.24	0.18	0.00	0.35	0.00	0.27	0.13	0.38	0.13	0.43
Randolph	Rural	0.10	0.39	0.09	0.29	0.13	0.29	0.14	0.37	0.10	0.38	0.18
Richmond	Urban	0.41	0.13	0.11	0.04	0.27	0.04	0.27	0.03	0.29	0.03	0.34
Robeson	Rural	0.28	0.31	0.10	0.36	0.12	0.36	0.10	0.14	0.29	0.15	0.25
Rockingham	Rural	0.24	0.36	0.07	0.33	0.09	0.33	0.10	0.29	0.11	0.29	0.13
Rowan	Urban	0.23	0.56	0.05	0.51	0.02	0.51	0.03	0.43	0.11	0.43	0.11
Rutherford	Rural	0.18	0.38	0.07	0.22	0.10	0.22	0.11	0.22	0.21	0.21	0.21
Sampson	Rural	0.27	0.26	0.10	0.23	0.13	0.23	0.14	0.31	0.08	0.32	0.18
Scotland	Rural	0.50	0.38	0.05	0.14	0.23	0.14	0.23	0.03	0.25	0.03	0.28
Stanly	Rural	0.17	0.42	0.07	0.38	0.07	0.38	0.11	0.44	0.15	0.43	0.21
Stokes	Rural	0.06	0.33	0.21	0.17	0.11	0.17	0.17	0.19	0.27	0.19	0.26
Surry	Rural	0.06	0.27	0.14	0.26	0.17	0.25	0.21	0.25	0.19	0.25	0.20
Swain	Rural	0.06	0.07	0.19	0.17	0.12	0.17	0.27	0.00	0.73	0.00	0.74
Transylvania	Rural	0.09	0.29	0.17	0.43	0.08	0.43	0.14	0.27	0.24	0.27	0.24
Tyrrell	Rural	0.40	0.00	0.16	0.00	0.04	0.00	0.04	0.00	0.16	0.00	0.38
Union	Urban	0.16	0.44	0.05	0.34	0.10	0.34	0.10	0.37	0.13	0.37	0.14
Vance	Rural	0.62	0.53	0.05	0.45	0.03	0.45	0.02	0.33	0.20	0.32	0.27
Wake	Urban	0.27	0.43	0.05	0.33	0.11	0.33	0.16	0.32	0.16	0.32	0.22
Warren	Rural	0.66	0.41	0.06	0.24	0.11	0.24	0.20	0.49	0.08	0.48	0.10
Washington	Rural	0.68	0.59	0.00	0.62	0.00	0.62	0.00	0.71	0.01	0.72	0.01
Watauga	Rural	0.04	0.23	0.20	0.43	0.25	0.43	0.29	0.04	0.65	0.04	0.65
Wayne	Urban	0.39	0.43	0.06	0.49	0.06	0.49	0.06	0.42	0.08	0.42	0.10
Wilkes	Rural	0.08	0.42	0.14	0.41	0.08	0.41	0.08	0.38	0.15	0.38	0.14
Wilson	Urban	0.49	0.55	0.02	0.47	0.07	0.47	0.07	0.13	0.22	0.14	0.28
Yadkin	Rural	0.06	0.35	0.13	0.17	0.14	0.17	0.19	0.18	0.28	0.18	0.42
Yancey	Rural	0.02	0.73	0.09	0.47	0.08	0.47	0.17	0.00	0.69	0.00	0.77

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Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools.

Appendix Table A2b. White/Hispanic Segregation (Dissimilarity) Between and Within Schools, Selected Grades and Subjects by County, 2017

County	Rural/ urban	Percent Hispanic	Grade 4		Grade 7 - English		Grade 7 - Math		Grade 10 - English		Grade 10 - Math	
			Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Alamance	Urban	0.25	0.52	0.03	0.49	0.06	0.49	0.06	0.45	0.08	0.46	0.11
Alexander	Rural	0.10	0.45	0.05	0.25	0.07	0.25	0.07	0.00	0.47	0.00	0.60
Alleghany	Rural	0.23	0.40	0.00	0.12	0.05	0.12	0.05	0.00	0.43	0.00	0.55
Anson	Rural	0.04	0.42	0.44	0.00	0.66	0.00	0.71	0.17	0.54	0.17	0.48
Ashe	Rural	0.11	0.30	0.09	0.00	0.49	0.00	0.38	0.00	0.43	0.00	0.73
Avery	Rural	0.11	0.47	0.04	0.48	0.18	0.48	0.14	0.27	0.28	0.16	0.14
Beaufort	Rural	0.16	0.25	0.09	0.16	0.22	0.16	0.20	0.27	0.13	0.27	0.26
Bertie	Rural	0.02	0.38	0.38	0.00	0.55	0.00	0.55	0.00	0.00	0.00	0.00
Bladen	Rural	0.18	0.22	0.05	0.45	0.02	0.45	0.03	0.05	0.30	0.02	0.35
Brunswick	Rural	0.12	0.28	0.14	0.29	0.14	0.29	0.15	0.23	0.23	0.23	0.22
Buncombe	Urban	0.14	0.33	0.10	0.25	0.15	0.25	0.11	0.23	0.22	0.23	0.21
Burke	Urban	0.15	0.60	0.03	0.39	0.06	0.39	0.05	0.24	0.13	0.24	0.17
Cabarrus	Urban	0.18	0.37	0.05	0.36	0.10	0.36	0.08	0.31	0.18	0.31	0.19
Caldwell	Urban	0.11	0.29	0.12	0.23	0.18	0.23	0.17	0.22	0.14	0.23	0.24
Camden	Rural	0.03	0.00	0.24	0.00	0.58	0.00	0.42	0.04	0.26	0.04	0.57
Carteret	Urban	0.09	0.34	0.09	0.21	0.24	0.22	0.20	0.18	0.25	0.17	0.35
Caswell	Rural	0.07	0.12	0.10	0.00	0.29	0.00	0.30	0.00	0.24	0.00	0.38
Catawba	Urban	0.19	0.37	0.09	0.33	0.15	0.33	0.14	0.33	0.14	0.33	0.16
Chatham	Rural	0.28	0.61	0.05	0.50	0.08	0.50	0.06	0.50	0.10	0.50	0.11
Cherokee	Rural	0.05	0.37	0.05	0.32	0.16	0.32	0.19	0.49	0.21	0.48	0.09
Chowan	Rural	0.07	0.00	0.52	0.00	0.51	0.00	0.52	0.00	0.58	0.00	0.57
Clay	Rural	0.08	0.00	0.11	0.00	0.49	0.00	0.51	0.00	0.55	0.00	0.61
Cleveland	Rural	0.06	0.27	0.11	0.16	0.24	0.16	0.27	0.17	0.26	0.17	0.32
Columbus	Rural	0.10	0.34	0.09	0.46	0.15	0.46	0.15	0.17	0.24	0.20	0.26
Craven	Urban	0.10	0.33	0.10	0.14	0.17	0.14	0.16	0.14	0.25	0.14	0.33
Cumberland	Urban	0.13	0.35	0.11	0.27	0.14	0.27	0.12	0.21	0.22	0.21	0.30
Currituck	Rural	0.06	0.26	0.27	0.19	0.20	0.19	0.15	0.10	0.45	0.10	0.66
Dare	Urban	0.16	0.28	0.20	0.24	0.16	0.24	0.11	0.21	0.17	0.27	0.26
Davidson	Rural	0.15	0.44	0.06	0.50	0.04	0.50	0.04	0.45	0.05	0.45	0.10
Davie	Rural	0.14	0.33	0.07	0.19	0.15	0.19	0.14	0.17	0.31	0.18	0.31
Duplin	Rural	0.41	0.39	0.05	0.39	0.03	0.39	0.03	0.27	0.12	0.27	0.12
Durham	Urban	0.27	0.59	0.03	0.41	0.23	0.41	0.24	0.36	0.26	0.36	0.31
Edgecombe	Urban	0.10	0.31	0.09	0.25	0.16	0.25	0.16	0.28	0.20	0.28	0.22
Forsyth	Urban	0.26	0.64	0.04	0.40	0.14	0.40	0.15	0.44	0.12	0.44	0.14
Franklin	Rural	0.18	0.23	0.09	0.16	0.18	0.16	0.13	0.11	0.28	0.11	0.24
Gaston	Urban	0.12	0.41	0.08	0.39	0.06	0.39	0.06	0.31	0.16	0.31	0.18
Gates	Rural	0.02	0.35	0.17	0.00	0.91	0.00	0.87	0.00	0.77	0.00	0.74
Graham	Rural	0.04	0.00	0.56	0.00	0.27	0.00	0.51	0.00	0.42	0.00	0.86
Granville	Rural	0.15	0.50	0.06	0.40	0.06	0.40	0.04	0.36	0.12	0.35	0.21
Greene	Rural	0.31	0.00	0.32	0.00	0.30	0.00	0.29	0.03	0.18	0.04	0.27
Guilford	Urban	0.15	0.55	0.05	0.49	0.08	0.49	0.07	0.47	0.13	0.47	0.17
Halifax	Rural	0.05	0.39	0.02	0.53	0.03	0.51	0.04	0.28	0.22	0.28	0.44
Harnett	Rural	0.20	0.23	0.10	0.09	0.21	0.09	0.21	0.10	0.27	0.10	0.28
Haywood	Urban	0.08	0.14	0.12	0.15	0.22	0.15	0.20	0.10	0.43	0.09	0.40
Henderson	Urban	0.23	0.38	0.03	0.22	0.16	0.22	0.20	0.31	0.10	0.29	0.12
Hertford	Rural	0.04	0.08	0.52	0.00	0.65	0.00	0.70	0.50	0.33	0.50	0.36
Hoke	Rural	0.22	0.27	0.13	0.24	0.16	0.24	0.16	0.02	0.30	0.01	0.39
Hyde	Rural	0.20	0.09	0.10	0.20	0.00	0.20	0.00	0.11	0.08	0.08	0.08
Iredell	Urban	0.12	0.39	0.07	0.29	0.15	0.29	0.16	0.29	0.19	0.29	0.21
Jackson	Rural	0.14	0.24	0.13	0.40	0.06	0.40	0.02	0.05	0.30	0.07	0.40
Johnston	Rural	0.23	0.34	0.06	0.32	0.12	0.32	0.10	0.24	0.17	0.24	0.20
Jones	Rural	0.09	0.15	0.09	0.00	0.26	0.00	0.26	0.00	0.22	0.00	0.25
Lee	Urban	0.35	0.28	0.09	0.14	0.14	0.14	0.15	0.06	0.25	0.05	0.37
Lenoir	Urban	0.13	0.38	0.06	0.25	0.12	0.25	0.14	0.09	0.32	0.08	0.29

Lincoln	Rural	0.11	0.31	0.14	0.28	0.14	0.28	0.12	0.32	0.12	0.33	0.16
Macon	Rural	0.18	0.27	0.11	0.05	0.27	0.05	0.23	0.16	0.27	0.17	0.33
Madison	Rural	0.04	0.16	0.44	0.00	0.70	0.00	0.61	0.04	0.68	0.04	0.59
Martin	Rural	0.08	0.12	0.26	0.35	0.26	0.35	0.21	0.39	0.40	0.39	0.46
McDowell	Rural	0.13	0.34	0.15	0.13	0.31	0.13	0.29	0.08	0.35	0.06	0.41
Mecklenburg	Urban	0.22	0.67	0.04	0.59	0.09	0.59	0.08	0.52	0.14	0.52	0.16
Mitchell	Rural	0.10	0.31	0.04	0.41	0.07	0.41	0.05	0.27	0.04	0.27	0.24
Montgomery	Rural	0.34	0.46	0.03	0.43	0.01	0.43	0.00	0.45	0.05	0.45	0.03
Moore	Rural	0.13	0.38	0.04	0.34	0.11	0.34	0.09	0.29	0.13	0.29	0.18
Nash	Urban	0.12	0.44	0.06	0.36	0.10	0.36	0.10	0.30	0.19	0.30	0.21
New Hanover	Urban	0.13	0.42	0.05	0.24	0.22	0.24	0.21	0.16	0.26	0.18	0.30
Northampton	Rural	0.04	0.34	0.10	0.43	0.16	0.43	0.16	0.15	0.63	0.15	0.60
Onslow	Urban	0.14	0.17	0.12	0.23	0.13	0.23	0.12	0.23	0.15	0.23	0.21
Orange	Urban	0.18	0.33	0.08	0.21	0.20	0.21	0.25	0.17	0.33	0.16	0.34
Pamlico	Rural	0.08	0.10	0.20	0.05	0.07	0.05	0.06	0.22	0.32	0.23	0.29
Pasquotank	Urban	0.08	0.27	0.19	0.12	0.15	0.12	0.20	0.13	0.27	0.10	0.35
Pender	Rural	0.14	0.41	0.04	0.50	0.04	0.50	0.03	0.35	0.08	0.35	0.12
Perquimans	Rural	0.03	0.01	0.31	0.00	0.66	0.00	0.62	0.00	0.66	0.00	0.68
Person	Rural	0.08	0.44	0.09	0.10	0.31	0.10	0.32	0.29	0.16	0.29	0.29
Pitt	Urban	0.12	0.36	0.09	0.38	0.12	0.38	0.13	0.36	0.25	0.37	0.26
Polk	Rural	0.13	0.23	0.14	0.00	0.24	0.00	0.26	0.02	0.34	0.03	0.40
Randolph	Rural	0.23	0.44	0.04	0.38	0.06	0.38	0.05	0.37	0.09	0.37	0.09
Richmond	Urban	0.12	0.23	0.13	0.43	0.05	0.43	0.08	0.08	0.41	0.01	0.52
Robeson	Rural	0.16	0.47	0.05	0.48	0.10	0.48	0.08	0.41	0.15	0.41	0.13
Rockingham	Rural	0.13	0.30	0.06	0.24	0.11	0.24	0.14	0.19	0.27	0.19	0.26
Rowan	Urban	0.17	0.46	0.11	0.28	0.12	0.28	0.12	0.30	0.16	0.30	0.20
Rutherford	Rural	0.07	0.37	0.10	0.19	0.22	0.19	0.20	0.16	0.42	0.16	0.41
Sampson	Rural	0.36	0.27	0.07	0.24	0.11	0.24	0.12	0.23	0.14	0.21	0.21
Scotland	Rural	0.03	0.38	0.20	0.23	0.23	0.23	0.23	0.08	0.57	0.08	0.66
Stanly	Rural	0.08	0.35	0.12	0.29	0.20	0.29	0.19	0.35	0.16	0.36	0.29
Stokes	Rural	0.04	0.35	0.29	0.11	0.33	0.11	0.33	0.13	0.33	0.13	0.33
Surry	Rural	0.21	0.28	0.05	0.27	0.05	0.27	0.04	0.25	0.15	0.25	0.17
Swain	Rural	0.04	0.20	0.18	0.13	0.18	0.13	0.26	0.00	0.55	0.00	0.54
Transylvania	Rural	0.07	0.29	0.12	0.14	0.25	0.14	0.22	0.11	0.46	0.10	0.56
Tyrrell	Rural	0.18	0.00	0.17	0.00	0.63	0.00	0.63	0.00	0.82	0.00	0.41
Union	Urban	0.17	0.52	0.04	0.46	0.06	0.46	0.06	0.47	0.10	0.47	0.11
Vance	Rural	0.14	0.46	0.05	0.39	0.15	0.39	0.15	0.22	0.33	0.24	0.41
Wake	Urban	0.17	0.44	0.06	0.34	0.13	0.34	0.19	0.29	0.21	0.29	0.26
Warren	Rural	0.07	0.52	0.07	0.06	0.35	0.06	0.47	0.33	0.13	0.33	0.35
Washington	Rural	0.09	0.10	0.31	0.30	0.12	0.30	0.12	0.15	0.33	0.16	0.44
Watauga	Rural	0.09	0.32	0.16	0.28	0.13	0.28	0.16	0.14	0.51	0.16	0.46
Wayne	Urban	0.21	0.50	0.03	0.47	0.04	0.47	0.03	0.43	0.07	0.42	0.12
Wilkes	Rural	0.14	0.29	0.16	0.20	0.23	0.20	0.18	0.22	0.16	0.22	0.19
Wilson	Urban	0.20	0.43	0.03	0.28	0.14	0.28	0.13	0.16	0.20	0.16	0.29
Yadkin	Rural	0.24	0.25	0.06	0.17	0.17	0.17	0.10	0.10	0.17	0.10	0.28
Yancey	Rural	0.13	0.35	0.11	0.20	0.17	0.20	0.23	0.00	0.52	0.00	0.48

crc-TableA2b.do (5/15/2020)

Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools.

Appendix Table A3a. White/Black Segregation (Coleman) Between and Within Schools, Selected Grades and Subjects by County, 2017

County	Rural/ urban	Percent Black	Grade 4		Grade 7 - English		Grade 7 - Math		Grade 10 - English		Grade 10 - Math	
			Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Alamance	Urban	0.26	0.30	0.05	0.30	0.10	0.30	0.09	0.21	0.11	0.22	0.18
Alexander	Rural	0.08	0.09	0.04	0.00	0.07	0.00	0.07	0.00	0.13	0.00	0.10
Alleghany	Rural	0.03	0.01	0.05	0.01	0.06	0.01	0.02	0.00	0.11	0.00	0.12
Anson	Rural	0.60	0.13	0.11	0.00	0.23	0.00	0.27	0.06	0.21	0.06	0.30
Ashe	Rural	0.02	0.01	0.04	0.00	0.05	0.00	0.06	0.00	0.05	0.00	0.05
Avery	Rural	0.03	0.05	0.02	0.00	0.18	0.00	0.19	0.18	0.09	0.20	0.21
Beaufort	Rural	0.35	0.14	0.08	0.14	0.12	0.14	0.12	0.10	0.20	0.10	0.25
Bertie	Rural	0.83	0.04	0.03	0.00	0.03	0.00	0.02	0.09	0.11	0.09	0.20
Bladen	Rural	0.43	0.21	0.06	0.14	0.14	0.14	0.12	0.08	0.20	0.08	0.18
Brunswick	Rural	0.19	0.04	0.10	0.02	0.07	0.02	0.08	0.04	0.15	0.04	0.12
Buncombe	Urban	0.14	0.14	0.05	0.07	0.09	0.08	0.10	0.05	0.15	0.05	0.19
Burke	Urban	0.10	0.09	0.02	0.06	0.07	0.06	0.06	0.05	0.13	0.05	0.16
Cabarrus	Urban	0.27	0.11	0.06	0.08	0.10	0.08	0.10	0.07	0.15	0.07	0.19
Caldwell	Urban	0.10	0.11	0.03	0.08	0.06	0.08	0.05	0.07	0.07	0.07	0.12
Camden	Rural	0.16	0.00	0.04	0.00	0.05	0.00	0.05	0.00	0.10	0.00	0.05
Carteret	Urban	0.12	0.06	0.07	0.04	0.08	0.04	0.07	0.01	0.15	0.01	0.13
Caswell	Rural	0.41	0.11	0.01	0.00	0.09	0.00	0.06	0.00	0.09	0.00	0.12
Catawba	Urban	0.15	0.18	0.05	0.07	0.09	0.07	0.09	0.08	0.12	0.08	0.18
Chatham	Rural	0.16	0.21	0.04	0.13	0.11	0.13	0.10	0.04	0.19	0.04	0.24
Cherokee	Rural	0.05	0.02	0.05	0.02	0.05	0.02	0.02	0.01	0.11	0.01	0.19
Chowan	Rural	0.49	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.17	0.00	0.25
Clay	Rural	0.03	0.00	0.04	0.00	0.03	0.00	0.04	0.00	0.22	0.00	0.21
Cleveland	Rural	0.32	0.19	0.07	0.11	0.13	0.11	0.12	0.08	0.11	0.08	0.16
Columbus	Rural	0.37	0.16	0.10	0.16	0.08	0.16	0.09	0.06	0.17	0.13	0.18
Craven	Urban	0.34	0.16	0.02	0.08	0.05	0.08	0.04	0.01	0.17	0.01	0.20
Cumberland	Urban	0.53	0.21	0.07	0.18	0.09	0.18	0.08	0.13	0.13	0.13	0.17
Currituck	Rural	0.13	0.03	0.05	0.01	0.08	0.01	0.06	0.00	0.08	0.00	0.17
Dare	Urban	0.06	0.03	0.05	0.01	0.09	0.01	0.07	0.07	0.14	0.07	0.32
Davidson	Rural	0.14	0.33	0.07	0.35	0.08	0.35	0.08	0.37	0.06	0.37	0.08
Davie	Rural	0.11	0.04	0.08	0.02	0.07	0.02	0.08	0.00	0.11	0.00	0.18
Duplin	Rural	0.25	0.22	0.07	0.24	0.09	0.24	0.09	0.19	0.11	0.19	0.16
Durham	Urban	0.47	0.36	0.03	0.22	0.17	0.21	0.21	0.21	0.18	0.21	0.27
Edgecombe	Urban	0.57	0.13	0.02	0.13	0.05	0.13	0.04	0.15	0.11	0.15	0.14
Forsyth	Urban	0.33	0.38	0.05	0.19	0.13	0.19	0.13	0.22	0.16	0.22	0.21
Franklin	Rural	0.33	0.07	0.08	0.03	0.06	0.03	0.07	0.01	0.14	0.01	0.17
Gaston	Urban	0.26	0.16	0.07	0.17	0.07	0.17	0.07	0.14	0.12	0.14	0.15
Gates	Rural	0.38	0.04	0.02	0.00	0.09	0.00	0.14	0.00	0.12	0.00	0.14
Graham	Rural	0.01	0.00	0.04	0.00	0.06	0.00	0.07	0.00	0.05	0.00	1.00
Granville	Rural	0.35	0.33	0.06	0.17	0.06	0.17	0.05	0.14	0.09	0.13	0.18
Greene	Rural	0.38	0.01	0.09	0.00	0.06	0.00	0.06	0.01	0.14	0.00	0.19
Guilford	Urban	0.45	0.37	0.05	0.27	0.11	0.27	0.11	0.25	0.13	0.25	0.20
Halifax	Rural	0.63	0.48	0.02	0.60	0.04	0.60	0.04	0.47	0.09	0.47	0.12
Harnett	Rural	0.30	0.09	0.08	0.06	0.09	0.06	0.08	0.02	0.14	0.02	0.19
Haywood	Urban	0.04	0.02	0.04	0.01	0.05	0.01	0.04	0.01	0.11	0.01	0.19
Henderson	Urban	0.08	0.09	0.09	0.03	0.11	0.03	0.09	0.02	0.10	0.02	0.13
Hertford	Rural	0.80	0.01	0.12	0.00	0.08	0.00	0.14	0.06	0.15	0.06	0.20
Hoke	Rural	0.42	0.05	0.10	0.08	0.10	0.08	0.10	0.03	0.12	0.02	0.15
Hyde	Rural	0.23	0.14	0.01	0.19	0.09	0.19	0.09	0.16	0.12	0.14	0.22
Iredell	Urban	0.17	0.18	0.06	0.17	0.08	0.17	0.07	0.21	0.11	0.21	0.15
Jackson	Rural	0.04	0.03	0.10	0.01	0.04	0.01	0.03	0.01	0.10	0.01	0.08
Johnston	Rural	0.19	0.17	0.06	0.11	0.08	0.11	0.08	0.07	0.13	0.07	0.16
Jones	Rural	0.43	0.10	0.02	0.00	0.20	0.00	0.20	0.00	0.13	0.00	0.10
Lee	Urban	0.24	0.07	0.16	0.03	0.15	0.03	0.14	0.02	0.21	0.02	0.26
Lenoir	Urban	0.51	0.36	0.15	0.39	0.04	0.39	0.03	0.33	0.12	0.34	0.13

Lincoln	Rural	0.10	0.08	0.08	0.06	0.08	0.06	0.08	0.09	0.11	0.08	0.12
Macon	Rural	0.03	0.01	0.18	0.01	0.08	0.01	0.07	0.01	0.06	0.01	0.17
Madison	Rural	0.01	0.02	0.01	0.00	0.05	0.00	0.04	0.00	0.74	0.00	0.26
Martin	Rural	0.48	0.21	0.02	0.29	0.18	0.29	0.18	0.24	0.17	0.24	0.25
McDowell	Rural	0.07	0.02	0.05	0.01	0.09	0.01	0.10	0.00	0.11	0.00	0.11
Mecklenburg	Urban	0.41	0.47	0.05	0.43	0.09	0.43	0.10	0.38	0.13	0.38	0.15
Mitchell	Rural	0.02	0.02	0.07					0.00	0.07	0.00	0.52
Montgomery	Rural	0.23	0.04	0.09	0.01	0.13	0.01	0.08	0.04	0.17	0.04	0.11
Moore	Rural	0.20	0.18	0.05	0.10	0.10	0.10	0.12	0.03	0.19	0.03	0.19
Nash	Urban	0.56	0.28	0.06	0.18	0.16	0.18	0.16	0.10	0.17	0.10	0.23
New Hanover	Urban	0.24	0.38	0.05	0.23	0.11	0.23	0.11	0.07	0.23	0.08	0.26
Northampton	Rural	0.82	0.02	0.02	0.01	0.04	0.01	0.04	0.01	0.15	0.02	0.08
Onslow	Urban	0.28	0.12	0.07	0.10	0.07	0.10	0.08	0.09	0.12	0.09	0.13
Orange	Urban	0.18	0.07	0.07	0.00	0.11	0.00	0.13	0.01	0.16	0.02	0.23
Pamlico	Rural	0.24	0.04	0.07	0.03	0.03	0.03	0.05	0.04	0.24	0.04	0.16
Pasquotank	Urban	0.48	0.13	0.05	0.06	0.08	0.06	0.09	0.05	0.11	0.04	0.14
Pender	Rural	0.18	0.20	0.03	0.20	0.04	0.19	0.05	0.14	0.15	0.14	0.13
Perquimans	Rural	0.30	0.00	0.03	0.00	0.05	0.00	0.12	0.00	0.26	0.00	0.17
Person	Rural	0.35	0.23	0.03	0.15	0.06	0.15	0.04	0.11	0.09	0.11	0.16
Pitt	Urban	0.51	0.20	0.05	0.18	0.12	0.18	0.18	0.11	0.21	0.11	0.27
Polk	Rural	0.10	0.03	0.14	0.00	0.07	0.00	0.05	0.02	0.19	0.02	0.28
Randolph	Rural	0.10	0.14	0.08	0.08	0.08	0.08	0.08	0.10	0.09	0.10	0.17
Richmond	Urban	0.41	0.03	0.07	0.02	0.13	0.02	0.13	0.01	0.15	0.01	0.18
Robeson	Rural	0.28	0.13	0.10	0.17	0.14	0.17	0.12	0.04	0.21	0.04	0.20
Rockingham	Rural	0.24	0.18	0.04	0.16	0.08	0.16	0.07	0.10	0.10	0.11	0.13
Rowan	Urban	0.23	0.37	0.07	0.29	0.06	0.29	0.06	0.21	0.16	0.21	0.18
Rutherford	Rural	0.18	0.14	0.05	0.03	0.09	0.03	0.09	0.04	0.13	0.03	0.14
Sampson	Rural	0.27	0.09	0.09	0.06	0.13	0.06	0.15	0.12	0.12	0.12	0.22
Scotland	Rural	0.50	0.17	0.09	0.02	0.16	0.02	0.16	0.01	0.12	0.01	0.16
Stanly	Rural	0.17	0.22	0.11	0.17	0.08	0.18	0.09	0.20	0.10	0.20	0.17
Stokes	Rural	0.06	0.03	0.11	0.01	0.02	0.01	0.03	0.02	0.11	0.02	0.12
Surry	Rural	0.06	0.05	0.06	0.03	0.06	0.02	0.07	0.03	0.10	0.03	0.11
Swain	Rural	0.06	0.00	0.02	0.02	0.02	0.02	0.07	0.00	0.19	0.00	0.36
Transylvania	Rural	0.09	0.03	0.05	0.07	0.06	0.07	0.11	0.04	0.17	0.04	0.21
Tyrrell	Rural	0.40	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.21
Union	Urban	0.16	0.25	0.06	0.18	0.07	0.18	0.07	0.19	0.11	0.19	0.12
Vance	Rural	0.62	0.35	0.05	0.32	0.02	0.32	0.02	0.11	0.19	0.11	0.30
Wake	Urban	0.27	0.26	0.06	0.16	0.12	0.16	0.16	0.14	0.16	0.14	0.23
Warren	Rural	0.66	0.14	0.02	0.07	0.04	0.07	0.09	0.17	0.14	0.17	0.13
Washington	Rural	0.68	0.35	0.01	0.37	0.04	0.37	0.04	0.50	0.07	0.52	0.09
Watauga	Rural	0.04	0.02	0.04	0.03	0.13	0.03	0.08	0.00	0.24	0.00	0.17
Wayne	Urban	0.39	0.26	0.06	0.28	0.09	0.28	0.09	0.22	0.12	0.22	0.16
Wilkes	Rural	0.08	0.09	0.07	0.08	0.09	0.08	0.09	0.06	0.09	0.06	0.10
Wilson	Urban	0.49	0.37	0.03	0.26	0.09	0.26	0.10	0.03	0.16	0.03	0.22
Yadkin	Rural	0.06	0.06	0.05	0.01	0.05	0.01	0.12	0.01	0.11	0.01	0.13
Yancey	Rural	0.02	0.07	0.09	0.03	0.02	0.03	0.04	0.00	0.07	0.00	0.43

crc-TableA3a.do (5/15/2020)

Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools.

Appendix Table A3b. White/Hispanic Segregation (Coleman) Betweeen and Within Schools, Selected Grades and Subjects by County, 2017

			Grade 4		Grade 7 - English		Grade 7 - Math		Grade 10 - English		Grade 10 - Math	
County	Rural/ urban	Percent Hispanic	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Alamance	Urban	0.25	0.34	0.05	0.31	0.08	0.31	0.08	0.25	0.12	0.25	0.15
Alexander	Rural	0.10	0.10	0.04	0.02	0.04	0.02	0.04	0.00	0.16	0.00	0.21
Alleghany	Rural	0.23	0.14	0.01	0.04	0.02	0.04	0.02	0.00	0.17	0.00	0.27
Anson	Rural	0.04	0.26	0.28	0.00	0.41	0.00	0.33	0.01	0.32	0.01	0.27
Ashe	Rural	0.11	0.06	0.05	0.00	0.11	0.00	0.07	0.00	0.12	0.00	0.25
Avery	Rural	0.11	0.11	0.07	0.11	0.32	0.11	0.14	0.02	0.15	0.01	0.03
Beaufort	Rural	0.16	0.06	0.07	0.02	0.16	0.02	0.12	0.07	0.13	0.07	0.23
Bertie	Rural	0.02	0.12	0.28	0.00	0.20	0.00	0.20				
Bladen	Rural	0.18	0.08	0.05	0.18	0.08	0.18	0.08	0.00	0.18	0.00	0.20
Brunswick	Rural	0.12	0.09	0.07	0.05	0.09	0.05	0.10	0.02	0.12	0.03	0.16
Buncombe	Urban	0.14	0.13	0.07	0.05	0.08	0.05	0.07	0.04	0.14	0.04	0.13
Burke	Urban	0.15	0.42	0.03	0.15	0.07	0.15	0.06	0.03	0.13	0.03	0.19
Cabarrus	Urban	0.18	0.13	0.06	0.13	0.11	0.13	0.08	0.09	0.17	0.09	0.20
Caldwell	Urban	0.11	0.09	0.06	0.03	0.07	0.03	0.07	0.03	0.08	0.03	0.13
Camden	Rural	0.03	0.00	0.02	0.00	0.05	0.00	0.03	0.00	0.06	0.00	0.11
Carteret	Urban	0.09	0.07	0.08	0.02	0.10	0.02	0.09	0.02	0.09	0.01	0.14
Caswell	Rural	0.07	0.01	0.04	0.00	0.08	0.00	0.08	0.00	0.05	0.00	0.14
Catawba	Urban	0.19	0.16	0.06	0.10	0.15	0.10	0.15	0.09	0.16	0.09	0.16
Chatham	Rural	0.28	0.45	0.07	0.35	0.10	0.35	0.07	0.27	0.16	0.27	0.18
Cherokee	Rural	0.05	0.07	0.02	0.03	0.02	0.03	0.02	0.06	0.22	0.06	0.10
Chowan	Rural	0.07	0.00	0.15	0.00	0.07	0.00	0.08	0.00	0.26	0.00	0.26
Clay	Rural	0.08	0.00	0.01	0.00	0.06	0.00	0.07	0.00	0.14	0.00	0.14
Cleveland	Rural	0.06	0.04	0.07	0.02	0.11	0.02	0.10	0.01	0.12	0.01	0.15
Columbus	Rural	0.10	0.10	0.08	0.17	0.16	0.17	0.17	0.02	0.14	0.03	0.20
Craven	Urban	0.10	0.12	0.07	0.02	0.07	0.02	0.06	0.01	0.14	0.02	0.20
Cumberland	Urban	0.13	0.15	0.14	0.09	0.14	0.09	0.14	0.07	0.18	0.06	0.27
Currituck	Rural	0.06	0.05	0.11	0.02	0.10	0.02	0.06	0.00	0.18	0.00	0.18
Dare	Urban	0.16	0.07	0.15	0.03	0.07	0.03	0.05	0.02	0.16	0.04	0.26
Davidson	Rural	0.15	0.21	0.06	0.29	0.06	0.29	0.06	0.25	0.07	0.25	0.11
Davie	Rural	0.14	0.09	0.06	0.02	0.08	0.02	0.07	0.05	0.14	0.05	0.17
Duplin	Rural	0.41	0.21	0.06	0.19	0.04	0.19	0.05	0.09	0.15	0.09	0.16
Durham	Urban	0.27	0.40	0.05	0.27	0.24	0.27	0.23	0.24	0.23	0.24	0.30
Edgecombe	Urban	0.10	0.14	0.08	0.10	0.10	0.10	0.09	0.11	0.20	0.12	0.23
Forsyth	Urban	0.26	0.48	0.06	0.24	0.14	0.24	0.15	0.26	0.15	0.27	0.18
Franklin	Rural	0.18	0.08	0.09	0.03	0.10	0.03	0.07	0.01	0.15	0.01	0.17
Gaston	Urban	0.12	0.17	0.08	0.14	0.06	0.14	0.06	0.09	0.11	0.09	0.15
Gates	Rural	0.02	0.03	0.02	0.00	0.13	0.00	0.09	0.00	0.10	0.00	0.37
Graham	Rural	0.04	0.00	0.04	0.00	0.04	0.00	0.08	0.00	0.02	0.00	0.54
Granville	Rural	0.15	0.27	0.08	0.16	0.09	0.16	0.08	0.11	0.09	0.11	0.19
Greene	Rural	0.31	0.00	0.12	0.00	0.15	0.00	0.12	0.00	0.10	0.00	0.18
Guilford	Urban	0.15	0.36	0.08	0.29	0.11	0.28	0.10	0.27	0.17	0.27	0.20
Halifax	Rural	0.05	0.24	0.05	0.33	0.16	0.31	0.17	0.16	0.14	0.16	0.26
Harnett	Rural	0.20	0.08	0.07	0.01	0.09	0.01	0.09	0.01	0.17	0.01	0.17
Haywood	Urban	0.08	0.01	0.03	0.01	0.05	0.01	0.05	0.00	0.13	0.00	0.13
Henderson	Urban	0.23	0.15	0.05	0.04	0.13	0.04	0.13	0.07	0.13	0.06	0.12
Hertford	Rural	0.04	0.01	0.27	0.00	0.35	0.00	0.58	0.49	0.06	0.49	0.07
Hoke	Rural	0.22	0.10	0.12	0.09	0.14	0.09	0.14	0.00	0.17	0.00	0.26
Hyde	Rural	0.20	0.01	0.05	0.03	0.00	0.03	0.00	0.01	0.03	0.00	0.03
Iredell	Urban	0.12	0.13	0.05	0.09	0.08	0.09	0.09	0.08	0.13	0.08	0.13
Jackson	Rural	0.14	0.06	0.04	0.09	0.05	0.09	0.03	0.00	0.09	0.00	0.17
Johnston	Rural	0.23	0.18	0.06	0.18	0.10	0.18	0.07	0.10	0.13	0.10	0.15
Jones	Rural	0.09	0.03	0.03	0.00	0.03	0.00	0.03	0.00	0.04	0.00	0.11
Lee	Urban	0.35	0.11	0.10	0.03	0.11	0.03	0.11	0.01	0.13	0.01	0.25
Lenoir	Urban	0.13	0.16	0.11	0.06	0.09	0.06	0.10	0.02	0.23	0.01	0.17

Lincoln	Rural	0.11	0.09	0.09	0.06	0.08	0.06	0.05	0.09	0.09	0.09	0.14
Macon	Rural	0.18	0.06	0.14	0.01	0.08	0.01	0.07	0.03	0.15	0.03	0.18
Madison	Rural	0.04	0.01	0.08	0.00	0.15	0.00	0.06	0.00	0.28	0.00	0.03
Martin	Rural	0.08	0.03	0.12	0.14	0.21	0.14	0.14	0.03	0.21	0.03	0.23
McDowell	Rural	0.13	0.09	0.11	0.01	0.08	0.01	0.06	0.01	0.13	0.01	0.16
Mecklenburg	Urban	0.22	0.52	0.06	0.41	0.13	0.41	0.12	0.35	0.17	0.36	0.18
Mitchell	Rural	0.10	0.06	0.06	0.05	0.05	0.05	0.04	0.05	0.02	0.06	0.24
Montgomery	Rural	0.34	0.26	0.05	0.20	0.08	0.20	0.04	0.23	0.12	0.22	0.07
Moore	Rural	0.13	0.16	0.03	0.16	0.06	0.16	0.06	0.07	0.09	0.07	0.14
Nash	Urban	0.12	0.22	0.07	0.11	0.14	0.11	0.13	0.08	0.19	0.08	0.21
New Hanover	Urban	0.13	0.21	0.05	0.08	0.14	0.08	0.13	0.02	0.18	0.02	0.20
Northampton	Rural	0.04	0.11	0.15	0.15	0.37	0.15	0.37	0.03	0.57	0.03	0.61
Onslow	Urban	0.14	0.04	0.06	0.06	0.08	0.06	0.08	0.03	0.12	0.03	0.16
Orange	Urban	0.18	0.11	0.09	0.06	0.15	0.06	0.19	0.03	0.27	0.03	0.26
Pamlico	Rural	0.08	0.00	0.05	0.00	0.01	0.00	0.01	0.02	0.11	0.02	0.07
Pasquotank	Urban	0.08	0.07	0.15	0.01	0.06	0.01	0.08	0.02	0.12	0.01	0.19
Pender	Rural	0.14	0.15	0.05	0.17	0.06	0.17	0.06	0.09	0.11	0.09	0.15
Perquimans	Rural	0.03	0.00	0.03	0.00	0.11	0.00	0.08	0.00	0.07	0.00	0.09
Person	Rural	0.08	0.16	0.07	0.01	0.11	0.01	0.12	0.03	0.16	0.03	0.26
Pitt	Urban	0.12	0.23	0.08	0.23	0.08	0.23	0.10	0.15	0.22	0.16	0.20
Polk	Rural	0.13	0.03	0.05	0.00	0.04	0.00	0.06	0.00	0.11	0.00	0.21
Randolph	Rural	0.23	0.23	0.06	0.20	0.05	0.20	0.05	0.17	0.09	0.17	0.11
Richmond	Urban	0.12	0.06	0.10	0.17	0.10	0.17	0.10	0.01	0.21	0.00	0.23
Robeson	Rural	0.16	0.27	0.09	0.30	0.15	0.30	0.14	0.20	0.22	0.20	0.20
Rockingham	Rural	0.13	0.09	0.03	0.06	0.08	0.06	0.08	0.04	0.16	0.04	0.15
Rowan	Urban	0.17	0.24	0.09	0.09	0.11	0.09	0.10	0.09	0.16	0.09	0.18
Rutherford	Rural	0.07	0.08	0.04	0.02	0.07	0.02	0.06	0.01	0.14	0.01	0.15
Sampson	Rural	0.36	0.10	0.09	0.07	0.10	0.07	0.12	0.07	0.14	0.06	0.21
Scotland	Rural	0.03	0.11	0.15	0.02	0.08	0.02	0.08	0.02	0.17	0.02	0.27
Stanly	Rural	0.08	0.07	0.11	0.07	0.07	0.07	0.06	0.07	0.08	0.07	0.20
Stokes	Rural	0.04	0.03	0.12	0.01	0.09	0.01	0.07	0.00	0.11	0.00	0.12
Surry	Rural	0.21	0.10	0.02	0.07	0.04	0.07	0.03	0.06	0.13	0.06	0.14
Swain	Rural	0.04	0.01	0.08	0.01	0.04	0.01	0.05	0.00	0.14	0.00	0.10
Transylvania	Rural	0.07	0.05	0.05	0.01	0.07	0.01	0.06	0.00	0.07	0.00	0.11
Tyrrell	Rural	0.18	0.00	0.06	0.00	0.21	0.00	0.21	0.00	0.58	0.00	0.18
Union	Urban	0.17	0.37	0.05	0.28	0.06	0.28	0.06	0.30	0.08	0.29	0.10
Vance	Rural	0.14	0.29	0.07	0.19	0.13	0.19	0.14	0.15	0.28	0.16	0.35
Wake	Urban	0.17	0.26	0.07	0.14	0.13	0.14	0.18	0.10	0.21	0.10	0.26
Warren	Rural	0.07	0.28	0.13	0.00	0.25	0.00	0.37	0.10	0.21	0.10	0.46
Washington	Rural	0.09	0.01	0.28	0.09	0.19	0.09	0.19	0.02	0.21	0.02	0.43
Watauga	Rural	0.09	0.04	0.07	0.05	0.13	0.05	0.09	0.01	0.20	0.01	0.20
Wayne	Urban	0.21	0.30	0.06	0.24	0.07	0.24	0.08	0.18	0.14	0.17	0.18
Wilkes	Rural	0.14	0.07	0.10	0.03	0.10	0.03	0.08	0.03	0.13	0.03	0.13
Wilson	Urban	0.20	0.28	0.04	0.15	0.13	0.15	0.12	0.04	0.15	0.05	0.24
Yadkin	Rural	0.24	0.07	0.05	0.02	0.09	0.02	0.06	0.02	0.08	0.02	0.17
Yancey	Rural	0.13	0.10	0.06	0.02	0.06	0.02	0.09	0.00	0.15	0.00	0.15

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Source: North Carolina Education Research Data Center; authors' calculations; NC Public Schools.