

# 60 Years After *Brown*: Trends and Consequences of School Segregation

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Annu. Rev. Sociol. 2014. 40:199–218

First published online as a Review in Advance on June 16, 2014

The *Annual Review of Sociology* is online at [soc.annualreviews.org](http://soc.annualreviews.org)

This article's doi:  
10.1146/annurev-soc-071913-043152

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## Keywords

school segregation, race, income, *Brown v. Board of Education*, desegregation

## Abstract

Since the Supreme Court's 1954 *Brown v. Board of Education* decision, researchers and policy makers have paid close attention to trends in school segregation. Here we review the evidence regarding trends and consequences of both racial and economic school segregation since *Brown*. The evidence suggests that the most significant declines in black-white school segregation occurred in the late 1960s and early 1970s. There is disagreement about the direction of more recent trends in racial segregation, largely driven by how one defines and measures segregation. Depending on the definition used, segregation has either increased substantially or changed little, although there are important differences in the trends across regions, racial groups, and institutional levels. Limited evidence on school economic segregation makes documenting trends difficult, but students appear to be more segregated by income across schools and districts today than in 1990. We also discuss the role of desegregation litigation, demographic changes, and residential segregation in shaping trends in both racial and economic segregation. We develop a general conceptual model of how and why school segregation might affect students and review the relatively thin body of empirical evidence that explicitly assesses the consequences of school segregation. We conclude with a discussion of aspects of school segregation on which further research is needed.

## INTRODUCTION

In the 60 years since the Supreme Court's 1954 *Brown v. Board of Education* decision outlawing de jure racial school segregation in American public schools, patterns of residential and school segregation in the United States have changed dramatically. These changes in segregation patterns, however, have been inconsistent across time and place in both their pace and direction. Prior to *Brown*, black-white school segregation was absolute in the South and very high in many school districts in other parts of the country. Several forces have altered these patterns over the last six decades, including continuing changes in the legal and policy landscape, demographic changes, changes in residential segregation patterns, and changes in public attitudes regarding the value and feasibility of school integration.

In this article, we review the evidence regarding these trends and their consequences. We also examine evidence on trends in school economic segregation, which, although not the focus of *Brown*, shapes the school contexts and opportunities available to students. In particular, we begin with an extensive review of the empirical research describing trends in school segregation in the six decades since *Brown*. Because these trends differ depending on the type of segregation (black-white, Hispanic-white, multiracial, or socioeconomic, for example) and the level of aggregation (national, metropolitan, district, or school-level) of interest, there is no single answer to the question of how school segregation has changed over the last 60 years. Moreover, segregation can be measured in various ways, which further complicates simple descriptions of segregation trends and patterns. Our goal in this first section of the article is to review the evidence on segregation trends and patterns across these multiple dimensions.

Second, we discuss the causes of the trends in racial and socioeconomic school segregation. As we note, segregation patterns have changed for several reasons in the 60 years since *Brown*. A set of Supreme Court decisions has changed the legal landscape of desegregation efforts.

Demographic changes, particularly the rapid growth of the Hispanic population, have changed the composition of the school-age population. Declining residential racial segregation and rising income segregation have changed the spatial distribution of families and patterns of school segregation (Jargowsky 1996; Charles 2003; Logan et al. 2004; Watson 2009; Logan & Stults 2011; Reardon & Bischoff 2011a,b; Glaeser & Vigdor 2012; Iceland & Sharp 2013). Furthermore, public opinion polls indicate growing racial tolerance over time but increasing opposition to busing and other school desegregation practices (Orfield 1995), particularly race-based desegregation policies.

Third, we review the evidence regarding the consequences of school segregation for students. One reason that scholars, policy makers, and citizens are concerned with school segregation is that it is hypothesized to exacerbate racial or socioeconomic disparities in educational success. Our review of the literature suggests, however, that the mechanisms that would link segregation to disparate outcomes have often not been spelled out clearly or tested explicitly. Indeed, much of the research purporting to assess the links between segregation and student outcomes instead measures the association between school composition and student outcomes. Such research tests the effects of segregation in only a limited sense, under the assumption that segregation affects student outcomes primarily through school composition mechanisms, rather than through other possible mechanisms such as the unequal distribution of resources and disparities in school and teacher quality. Compositional studies often do not explicitly identify a conceptual model of how composition measures segregation or what aspect of segregation it captures. Thus, we begin our review on the consequences of segregation with a brief discussion and formalization of a general conceptual model of how and why school segregation might affect students. Following this, we review the empirical evidence that explicitly assesses the consequences of school segregation.

Despite the extensive body of research on trends and patterns of school segregation, and the somewhat thinner body of research on its effects, several questions remain. We conclude with a discussion of where further research would be valuable.

## TRENDS IN SCHOOL SEGREGATION

Trends in school segregation may differ depending on the groups of interest (racial/ethnic or socioeconomic groups) and the geographic scale and organizational units of interest (schools, districts, metropolitan areas, and the nation). Most segregation research in the United States has focused on black-white segregation between schools and within school districts. In part, the black-white focus is driven by the historical legacy of slavery, efforts to measure the effect of the *Brown* decision, and the continuing salience of black-white inequality. The within-district, between-school focus is driven by the fact that legal, policy, and practical constraints make it easier to affect between-school segregation within districts than segregation at larger (between-district) or smaller (within-school) institutional levels. Nonetheless, any complete accounting of segregation patterns and trends must take into account segregation among other racial/ethnic groups (including Hispanic-white segregation) and socioeconomic segregation patterns, as well as between-district segregation. We review segregation trends along each of these dimensions, to the extent there is available research. First, however, we digress briefly to discuss the measurement of segregation.

### Measures of Segregation

School segregation is typically measured using one of two types of segregation indices: measures of isolation or exposure and measures of unevenness (Massey & Denton 1988). These different indices often yield very different conclusions about the direction and magnitude of trends in segregation.

Indices of unevenness measure the extent to which a student population is unevenly distributed among schools. For example, the black-white dissimilarity index represents the proportion of the black (or white) population who would have to change schools to yield a pattern of school enrollment in which each school has identical racial proportions (Duncan & Duncan 1955, James & Taeuber 1985, Massey & Denton 1988). Other indices of unevenness include Theil's information theory index, the variance ratio index, and the Gini index of segregation (James & Taeuber 1985, Massey & Denton 1988). These measures generally are scaled from 0 to 1, with 0 indicating no segregation (every school has the same racial composition) and 1 indicating complete segregation (no child attends school with any child of a different race); values above 0.60 are considered indicative of high segregation (Massey & Denton 1989).

Indices of exposure or isolation, in contrast, measure the extent to which students are enrolled in schools with high or low proportions of a given racial group. For example, the black isolation index is defined as the average proportion of black students in black students' schools; likewise, the white-black exposure index is the average proportion of black students in white students' schools (Coleman et al. 1975, Lieberson & Carter 1982, Massey & Denton 1988). Additional measures of isolation that are sometimes used are the proportions of students who attend high-poverty or racially isolated schools, often defined as schools with a high proportion of poor or minority students, respectively (see, e.g., Orfield 2001). Massey & Denton (1989) describe isolation indices above 0.70 (or, equivalently, exposure indices below 0.30) as indicating high segregation.

The unevenness measures and the exposure/isolation measures capture different dimensions of segregation. To see this difference, consider a school district in which 90% of students are black. If all schools in the district had enrollments that were 90% black, we would have low unevenness but high black isolation (or, equivalently, low black-white exposure)

because the average black student would attend a predominantly black school. Conversely, in a school district with very few black students, isolation might be low even if students were very unevenly distributed by race. Put differently, exposure and isolation measures are sensitive to the overall racial composition of a school district, whereas the unevenness measures are not.

This distinction has implications for any assessment of trends in segregation because changing racial population composition may lead to increases in measured isolation, even if the extent to which students are evenly/unevenly distributed among schools does not change. However, there is no one correct measure of segregation. To the extent we think that segregation affects students through peer or compositional effects or mechanisms correlated with school composition, then exposure measures are an appropriate measure. To the extent we think that segregation operates by exposing students to different school environments, however, unevenness is the appropriate measure because if there is no unevenness, all students experience the same average school environments.

## Trends in Black-White Segregation

**Black-white segregation in the desegregation era, 1954–1980.** Black-white school segregation trends can be divided roughly into two periods: 1954 through the 1970s and the 1980s to the present. In the first period, black-white segregation declined dramatically, particularly in the South, though most of that decline happened after 1968. Immediately following the *Brown v. Board of Education* decision in 1954, states and school districts did little to reduce racial segregation. In the South, many school districts initially put into place so-called “freedom of choice” desegregation plans, which were designed largely to preserve racial segregation by putting the onus on black families to enroll their children in white schools, an option unappealing to most black families given the animosity of many white

families to integration (Coleman et al. 1975, Welch & Light 1987, Clotfelter 2004).

Not surprisingly, such plans achieved little desegregation: Clotfelter (2004) estimates that 81% of black students in the South and 72% of those in the border states still attended majority black schools as of 1968; likewise, Orfield (2001) estimates that in the South 99% of blacks in 1964 and 86% in 1967 attended majority black schools. Segregation was nearly as high in the rest of the country, by any measure. Nationally, 77% of black students attended majority black schools in 1968 (Orfield 2001); over half of black students attended schools where 90% or more of their classmates were black (Orfield 2001, Welch & Light 1987); and the average black student was enrolled in a school where only 22% of students were white, despite the fact that the public school student population was 79% white (Coleman et al. 1975). Studies using unevenness measures likewise report very high levels of segregation in 1968. The average within-district index of dissimilarity between black and white public school students was about 0.80 (Logan & Oakley 2004, Johnson 2011); the average within-district variance ratio segregation index was 0.63 (Coleman et al. 1975). All of these measures exceed Massey & Denton’s (1989) threshold values for high segregation.

The Supreme Court’s 1968 *Green v. County School Board of New Kent County* decision required school districts to adopt more effective plans to achieve integration. By the mid-1970s, hundreds of school districts were subject to court-ordered desegregation plans (Logan & Oakley 2004). As a result, school segregation levels declined substantially between 1968 and the mid-1970s. The average within-district variance ratio index dropped from 0.63 in 1968 to 0.37 in 1972; the black-white exposure index increased from 0.22 to 0.33 over the same time period (Coleman et al. 1975), with the largest declines in segregation occurring in the South (Coleman et al. 1975, Welch & Light 1987, Johnson 2011). The index of dissimilarity declined by about 0.30 over the same time period, again declining more in the South than

in the North (Logan & Oakley 2004, Welch & Light 1987). By 1980, only one-third of black students attended schools where 90% or more of their classmates were black—still a substantial proportion but much lower than in the late 1960s (Orfield 1983, Welch & Light 1987).

At the same time as within-district segregation was declining from 1968 to 1972, between-district segregation was increasing (Coleman et al. 1975). This was particularly true in the North where school districts are, on average, much smaller than districts in the South, where districts often encompass whole counties. Coleman et al. (1975) find that within-district segregation (defined by a measure of unevenness) declined in every region from 1968 to 1972, particularly in the South and Midwest, but that between-district segregation increased in every region. Particularly in the non-South, declines in segregation within school districts were offset by increases between districts.

**Resegregation or stalled progress? Black-white segregation since 1980.** The evidence is generally clear that school segregation between blacks and whites declined substantially from 1968 to the mid-1970s and continued to modestly decline into the 1980s; this is true whether one relies on measures of unevenness or exposure. The evidence on trends in segregation since the late 1980s, however, is less clear. On the one hand, Orfield and colleagues have argued that the period from 1988 to the present is characterized by a gradual trend of resegregation of black students (Orfield & Eaton 1997, Orfield 2001, Frankenberg & Lee 2002, Frankenberg et al. 2003, Orfield & Lee 2007). To support this argument, they generally rely on trends in exposure and isolation indices, reporting, for example, that the black-white exposure index was 0.27 in 2005, down substantially from its peak of 0.36 in 1988 and even lower than its level of 0.32 in 1970 (Orfield 2001, Frankenberg et al. 2003, Orfield & Lee 2007). Similarly, the proportion of black students attending predominantly minority schools rose from 63% in 1988 to 73% in 2005 (Orfield & Lee 2007).

In contrast, other scholars have argued that segregation has not risen significantly in the last two decades. Using measures of unevenness, Logan and colleagues find a very small increase in black-white between-school segregation during the 1990s (Logan et al. 2002, 2008; Logan 2004; Logan & Oakley 2004). Similarly, Stroub & Richards (2013) find that black-white segregation in metropolitan areas rose very modestly from 1993 to 1998, but then declined from 1998 to 2009, for a net decrease in average between-school metropolitan area segregation over the period from 1993 to 2009. Black-white segregation between school districts also increased slightly during the 1990s and remained higher than segregation within school districts (Clotfelter 1999, Reardon et al. 2000, Logan & Oakley 2004, Logan et al. 2008). During the 2000s, however, between-district racial segregation declined, but remains high today (Stroub & Richards 2013).

Researchers have paid special attention to segregation trends in the South, given the historically high levels of segregation and the focus of desegregation litigation on the region. Orfield and colleagues argue that the resegregation of black students since 1988 is particularly pronounced in the South and in the border states. By most measures, the South was the least segregated region of the country from the early 1970s through the 1980s, but it moved rapidly back to 1968 segregation levels (as measured by black-white exposure) beginning in the late 1980s (Orfield & Lee 2007). Several studies find that black-white segregation in the South increased during the 1990s, whether measured using the exposure index or Theil's entropy index, an unevenness measure that assesses segregation while taking demographic changes into account (Yun & Reardon 2002, Reardon & Yun 2003, Stroub & Richards 2013). The increase, however, is not large and reversed following 1998 (Stroub & Richards 2013).

The debate about whether the last two decades can be characterized as a period of resegregation largely hinges on whether one uses exposure or unevenness measures of segregation. The trends noted by Orfield and

colleagues are due in part to changes in the racial composition of the US public school student population, which is substantially less white than it was 25 years ago. Because of this, measures of black-white exposure would be expected to decline, even if the reduction in white enrollments happened uniformly across all schools so that unevenness measures did not change (Logan 2004, Fiel 2013). Thus, it seems fair to say that the last 25 years have been characterized by largely stable patterns of sorting of students among schools (unevenness), whereas the racial/ethnic composition of the student population has changed substantially, a pair of trends that yields declining black-white exposure measures but no significant change in unevenness measures of segregation. Whether this represents resegregation or stagnation depends on one's theory of how and why segregation matters.

### **Trends in Hispanic-White, Asian-White, and Multiracial Segregation**

Given the historical context of the *Brown* case and its focus on black-white segregation, research has focused less on segregation among students of other races. Changing racial classifications, particularly with regard to Hispanics, also limits the documentation of long-term trends in segregation of other groups. As the student population has become more multiracial, new efforts have been made to document segregation among all groups. Orfield and colleagues, again relying on exposure measures, argue that Hispanic students have experienced continually increasing segregation from whites since 1968, as Hispanic students' exposure to white students has steadily fallen since the late 1960s and representation in majority-minority schools has steadily risen (Orfield 2001, Frankenberg & Lee 2002, Frankenberg et al. 2003, Orfield & Lee 2007). Unevenness measures of segregation show only a very slight increase in Hispanic-white and Asian-white segregation during the 1990s and 2000s,

however (Logan et al. 2002, Stroub & Richards 2013). The discrepancy between these findings, again, is due to the difference in segregation measures used.

Three studies assess the trends in multiracial segregation in the last two decades: Reardon et al. (2000), Stroub & Richards (2013), and Fiel (2013). Each uses an index (Theil's *H*) that assesses how unevenly white, black, Hispanic, and Asian students are distributed among schools. All three studies conclude that segregation between whites and nonwhites was stable or increased very slightly during the 1990s, whereas segregation among minority groups declined during this time. However, from 1998 to 2009, segregation between whites and minorities declined modestly, while segregation among minority groups continued to decline; as a result, multiracial segregation was 10% lower in 2009 than in 1993 (Stroub & Richards 2013).

### **Trends in Economic Segregation**

Many scholars have documented the high levels of poverty in majority-minority schools, arguing that school segregation concentrates minority students in high-poverty schools, which tend to have fewer resources and lower student achievement (Orfield 2001; Frankenberg et al. 2003; Orfield & Lee 2005, 2007; Saporito & Sohoni 2007; Logan et al. 2012). Orfield & Lee (2007) show that in 2005 the average black or Latino student attended a school in which 60% of students were poor; the average white student attended a school in which only one-third of students were poor. Although researchers note the link between racial and economic school composition, there is surprisingly little research explicitly measuring economic segregation among schools. This is in part due to the focus on race in the *Brown* decision and in part due to data limitations, as we describe below. However, examining economic segregation between schools is important because many of the mechanisms through which racial segregation is thought to operate are driven by socioeconomic inequalities



between schools attended by students of different races.

Studies of residential income segregation show that neighborhood income segregation grew considerably between 1970 and 2009 (Jargowsky 1996; Watson 2009; Reardon & Bischoff 2011a,b). Much of the growth in income segregation was due to the increasing segregation of the rich from all other families. These trends would suggest that economic school segregation may have increased as well over the last 40 years given that most children attend school relatively near their neighborhood. Studies of school segregation are limited, however, by the fact that there is no systematic source of detailed family income data at the school level. Instead, studies of school segregation measure income using free lunch eligibility, a very coarse measure of income that may obscure patterns of segregation at the high or low ends of the income distribution. Nonetheless, studies using these data show that economic segregation increased modestly in the 1990s, particularly in elementary grades and in large school districts (Rusk 2002, Owens et al. 2012), but economic segregation did not change appreciably in the 2000s (Owens et al. 2012). These patterns do not match the reported neighborhood segregation trends (Reardon & Bischoff 2011a,b), though it is not clear whether that is because of their reliance on the coarser measure of income or because school enrollment patterns have not mirrored neighborhood segregation patterns closely. One study, Altonji & Mansfield (2011), provides suggestive evidence that segregation by family income between schools did indeed follow the neighborhood segregation trends: The proportion of variance in family income between schools rose in the 1970s and 1980s (but declined in the 1990s, when income segregation between neighborhoods was fairly stable).

Although it is difficult to measure trends in income segregation between schools, it is possible to estimate levels of between-district segregation using Census data that tabulates

the number of school-age children, by family income, enrolled in public school in each school district in the United States. Using these data, Owens and colleagues (Owens et al. 2012, Owens 2014) find that between-district economic segregation among public school students increased during the 1990s and the 2000s in three-quarters of the 100 largest metropolitan areas. This increase was largely driven by rising segregation among middle- and high-income families. Owens et al. (2012) also find that between-district economic segregation of families, regardless of whether they send children to public schools, also increased in the 1970s and 1980s, consistent with Corcoran & Evans (2010), who find that between-district income inequality also grew from 1970 to 2000. Taken as a whole, the trends in income segregation suggest that students have grown more segregated between districts, but segregation between schools has increased only slightly over the last 20 years.

## Factors Shaping Trends in School Segregation

Court-ordered desegregation was the single most important factor shaping the rapid declines in racial segregation in the 1960s and 1970s. Segregation declined sharply in school districts in the years immediately following court orders and implementation of desegregation plans (Guryan 2004, Reber 2005, Johnson 2011, Lutz 2011). However, other factors mattered as well. Logan & Oakley (2004) note that desegregation also occurred in many districts that did not have desegregation plans in place. For example, in the South, the black-white dissimilarity index fell from 0.72 to 0.30 in districts not covered by desegregation plans and from 0.87 to 0.47 in districts that were subject to desegregation plans from 1968 to 2000. Therefore, declines in segregation during this time occurred in response to federal government actions aimed at equal rights and racial equality other than desegregation plans, in districts preemptively undertaking voluntary desegregation

plans before legislation occurred, and in districts whose leaders found desegregation to be a worthy social and educational goal (see also Cascio et al. 2010). Even if districts were not subject to desegregation legislation, the shift in the legal and social environment and enforcement by political leaders contributed to declining segregation in nearly all districts.

Because court-ordered desegregation generally dealt solely with patterns of within-district, between-school segregation, legal desegregation efforts were largely ineffective at reducing between-district segregation. In 1974, the Supreme Court's *Milliken v. Bradley* decision ruled out court-ordered interdistrict desegregation plans unless plaintiffs could show that the state was responsible for between-district segregation patterns, a burden of proof difficult to meet. This ruling is one reason that today between-district racial segregation is higher—and accounts for a greater share of overall between-school segregation—than within-district segregation (Reardon et al. 2000, Fiel 2013, Stroub & Richards 2013).

Some evidence suggests that racial desegregation efforts also contributed to increasing between-district segregation as a result of so-called white flight: the movement of white families to districts with fewer blacks to avoid racially integrated schools (Coleman et al. 1975, Rossell 1976, Farley et al. 1980, Wilson 1985). Although some of the decline in white enrollments in desegregating districts can be attributed to declining white birth rates and ongoing suburbanization trends, several studies suggest that white flight in response to desegregation did play a substantial role (Welch & Light 1987, Reber 2005). Reber (2005) shows that white enrollment losses reduced the effects of desegregation plans by about one-third.

In addition to white flight to other districts, whites also left the public school system. In response to desegregation in the 1960s and 1970s, white enrollment in private schools increased, particularly in majority black school districts (Clotfelter 1976, 2004). Reardon & Yun (2003) find that this pattern continued

into the 1990s in the South; furthermore, they find that between-district public school segregation was about 40% higher than residential segregation as a result of whites' high rates of private school attendance in majority black districts. Saporito and colleagues (Saporito 2003, Saporito & Sohoni 2007) also find that white families living in predominantly black school attendance zones are less likely to enroll their children in neighborhood public schools than are white families living in predominantly white neighborhoods. Similarly, nonpoor families are less likely to enroll their children in public neighborhood schools when in high-poverty neighborhoods than when in low-poverty neighborhoods. These patterns tend to increase racial and economic segregation among public neighborhood schools. In contrast, Logan et al. (2008) find mixed evidence that the availability of private schooling was associated with racial segregation from 1970 to 2000.

Since the 1980s, several countervailing trends have operated to keep racial segregation levels relatively stable. The changing legal context led to increases in segregation levels in some districts. Between 1990 and 2010, hundreds of districts that had court-ordered desegregation plans were released from court oversight (Reardon et al. 2012). As a result, these districts became, on average, increasingly segregated (Clotfelter et al. 2006a, US Comm. Civ. Rights 2007, An & Gamoran 2009, Lutz 2011, Reardon et al. 2012). In addition, the Supreme Court's 2007 decision in *Parents Involved in Community Schools v. Seattle School District No. 1* outlawed the use of students' race in voluntarily adopted school assignment plans, making it harder for districts to voluntarily desegregate.

One potential countervailing force to this changing legal climate is the increased use of socioeconomic-based student assignment plans (SBSAs), which attempt to create socioeconomic integration in schools. Although there are some successful examples (Kahlenberg 2002, 2006), most SBSAs have done little to reduce either socioeconomic or racial segregation (Flinspach et al. 2003, Reardon et al.



2006, Reardon & Rhodes 2011). The student assignment plans in place today, then, are much weaker than desegregation plans of the 1960s and 1970s that substantially integrated schools.

A more powerful countervailing force to the retreat from desegregation efforts is the gradual decline in racial residential segregation. Black-white racial segregation has declined slowly and steadily from 1980 to 2010; segregation between non-Hispanic whites and Hispanics and non-Hispanic whites and Asians has remained fairly stable (and lower than black-white segregation) during this time (Farley & Frey 1994, Logan et al. 2004, Logan & Stults 2011, Iceland & Sharp 2013). Because residential patterns partly determine school segregation patterns, this decline in residential segregation has likely partially offset some of the increasing segregation due to the decline in desegregation efforts. Nonetheless, although residential patterns are important, they are not determinative of student body composition for several reasons. First, neighborhood and school attendance zones map onto one another imperfectly. Second, many districts do not operate neighborhood schools, instead offering assignment and choice plans through which students can attend school outside their neighborhood. Third, some parents opt to send their child to private school. Reardon & Yun (2003) provide evidence that residential and school segregation do not necessarily follow one another: In the South, black-white neighborhood segregation declined in the 1990s, whereas school segregation increased slightly in many Southern states and metro areas.

Finally, one reason that between-district segregation may have increased in recent decades is that residential segregation patterns at a large geographic scale (e.g., segregation between cities and suburbs), which particularly affect segregation between school districts, rose in the 1990s (Lee et al. 2008, Reardon et al. 2009). Consistent with this trend, between-district racial segregation rose through the 1990s (Rivkin 1994, Reardon et al. 2000, Clotfelter 2001, Stroub & Richards 2013).

## CONSEQUENCES OF SCHOOL SEGREGATION

### A Stylized Model of Segregation Effects on Students

Before we review the evidence on the consequences of segregation, we consider the mechanisms through which school segregation may affect student outcomes. Longshore & Prager (1985), in an early review of the effects of segregation, highlight the need for theoretical and conceptual clarity regarding the contexts and processes through which segregation operates. Here we lay out a very general model for thinking about how segregation might affect students. This model, or parts of it, is implicit in much of the research we review; we hope that making it explicit both clarifies the holes in existing research and stimulates future research on the key elements of the model.

We can think of each school as having a set of resources that are beneficial to their enrolled students. These resources may include the physical facilities of the school, the skills of the teachers and staff, the school climate and curriculum, the social capital of the parents of the enrolled students, or other resources. To the extent that a student's peers' characteristics—such as their academic skills, socioeconomic status, and race—affect his or her academic or social outcomes (including attitudes, beliefs, and friendship patterns), we can consider aggregate student characteristics as a potential school resource as well. Suppose a student outcome  $Y$  is affected by the availability of various school resources (denoted  $R_1, \dots, R_k$ ) and by other factors. Then we can write (assuming an additive linear relationship between resources and outcomes):

$$Y = \sum_k a_k R_{ks} + e. \quad 1.$$

Here  $s$  indexes schools and  $a_k$  is the effect of school resource  $k$  on student outcome  $Y$ . The model is, of course, oversimplified by its linear nature and assumption that resources have the same effects on all students, but it is a useful stylized model for our purposes here.

Schools will, in general, differ in the degree to which they have access to various types of resources, in part because some of the potential resources (such as family resources, parent involvement, and student achievement and expectations) are correlated with or mechanically linked to the student composition and in part because school districts and governments may differentially allocate some resources among schools (they may determine who teaches in which schools or how financial resources are distributed among schools). Moreover, the total amount of such resources within a school system need not be fixed—states may allocate more or less money to schools; districts may be more or less successful at recruiting skilled teachers; parents with resources and social capital may move into or out of the district; and so on. In a general sense, then, segregation may affect both the total quantity of a given resource within an educational system and the allocation of the resource among schools. A stylized model of the association between the availability of resource  $k$  in school  $s$  could be written

$$R_{ks} = b_k V_d + c_k P_s + u_{ks}, \quad 2.$$

where  $P_s$  is the proportion black (or proportion poor, or some other measure of school composition) in school  $s$  and  $V_d$  is the variance ratio measure of segregation (a measure of unevenness; see Coleman et al. 1975) in the school district. We use the variance ratio for simplicity here, as it makes the derivations below straightforward.

It is useful to consider, in concrete terms, what the coefficients in Equation 2 represent. The coefficient  $b_k$  indicates the relationship between the segregation level of the district and the total quantity of resource  $R_k$  available in the district. For example, in the South, prior to the *Brown* and *Green* decisions, states spent very little on black schools relative to what they spent on white schools. Desegregation led to rapid increases in state spending on education, driven by white-controlled legislatures' desire to ensure that white students' school quality did not decline with integration (Johnson 2011). In this case, the state invested fewer total re-

sources in the segregated school system than in the desegregated system, implying that  $b_k < 0$  when  $R_k$  measures financial resources. However, segregation might also lead to higher total available resources. For example, if segregation between schools causes more high-income families to remain in a school district, and if we think of such families as a resource to the schools their children attend (perhaps because they have more political power, on average, or because they serve as role models for their children and their children's classmates, or because they are more likely to have time to volunteer or be otherwise involved in the school), then segregation may lead to greater total resources in the district. In this case,  $b_k > 0$  when  $R_k$  measures parental social and economic capital.

A second way that segregation may affect students is by affecting how the district's available resources are distributed among students. This is described by the coefficient  $c_k$  in Equation 2, the association between school racial or socioeconomic composition and the availability of resource  $R_k$  in a school. For example, suppose that, within a district, skilled teachers are more likely to teach in low-poverty schools than in high-poverty schools (perhaps because higher-income parents are able to persuade district leaders to assign certain teachers to their children's schools, or because high-poverty schools are less able to attract and retain the most skilled teachers). If this is true, then segregation may heighten the disparity in the average quality of teachers available to poor and nonpoor students within a district, implying  $c_k < 0$  if  $P_s$  measures the proportion of poor students in school  $s$  and  $R_k$  measures teacher quality. Similarly, if peers affect one another's academic or social outcomes, then segregation may lead to a more unequal distribution of peer resources among schools: Poor students will have less exposure to higher-achieving classmates (given the correlation between income and academic skills prior to school entry) than will nonpoor students, again implying  $c_k < 0$  when  $R_k$  measures average student academic skills. Conversely, if districts react to socioeconomic segregation among schools by allocating more

of their resources to high-poverty schools, then segregation may (in principle) lead to a positive disparity (more resources in the school of the average poor student than the average nonpoor student). In this case,  $c_k > 0$ .

Note that in the above discussion, our point is not to make claims regarding whether and how specific resources affect student outcomes nor to assess how the quantity or allocation of resources is affected by segregation. Rather, our point here is to suggest two general classes of mechanisms through which segregation may affect student outcomes: by affecting the total pool of available resources in a school district (in which case  $b_k \neq 0$ ), and/or by affecting the distribution of available resources among schools (in which case  $c_k \neq 0$ ). There is little consensus on which features of schools matter and how they matter, and our aim in developing this conceptual model is to provide a framework within which future research can make progress on specifying which school resources matter, how they matter for students' outcomes, and how they are affected by segregation.

From the model above, we can derive several useful relationships. First, note that Equations 1 and 2 imply that the average outcome in the district will be

$$\begin{aligned} E[Y|d] &= \sum_k a_k E[R_{ks}|d] + E[e|d] \\ &= \sum_k a_k (b_k V_d + c_k E[P_s|d]) \\ &= \sum_k a_k b_k V_d + a_k c_k P_d \\ &= V_d \sum_k a_k b_k + P_d \sum_k a_k c_k \\ &= b^* V_d + c^* P_d, \end{aligned} \quad 3.$$

where  $P_d$  is the proportion poor (or black) in the district as a whole and  $b^* = \sum_k a_k b_k$  and  $c^* = \sum_k a_k c_k$ . Note that in this stylized model, the average outcome  $Y$  in a district will be a function of its segregation level. For simplicity here, assume that the racial composition of a district is held constant while its segregation level is altered; then  $b^*$  is the total effect of segregation on student outcomes. This total effect is the sum of the effects of each resource  $k$  that

both is affected by segregation (i.e.,  $b_k \neq 0$ ) and affects student outcome  $Y$  (i.e.,  $a_k \neq 0$ ). If segregation increases the availability of some resources and decreases the availability of others, then some pathways through which segregation affects outcomes may partially cancel each other out; that is,  $b^* = 0$  does not imply that segregation has no effect on resources or that resources do not affect achievement. The key insight provided by this model is that we can think of the total effect of segregation as the sum of a set of mechanisms. Understanding if and how segregation affects student outcomes depends in part on knowing how segregation affects school district resources and how school resources affect students.

Equation 3 describes the relationship between segregation and average student outcomes. Next we consider how segregation affects disparities in school resources and student outcomes. Equation 2 implies that the difference in school resources in the schools of black and white students will be

$$\begin{aligned} E[R_{ks}|black] - E[R_{ks}|white] &= (b_k V_d + c_k E[P_s|black]) \\ &\quad - (b_k V_d + c_k E[P_s|white]) \\ &= c_k (\bar{P}_s^{black} - \bar{P}_s^{white}) \\ &= c_k V_d, \end{aligned} \quad 4.$$

where  $\bar{P}_s^{black}$  and  $\bar{P}_s^{white}$  are the average proportion black in the schools of black and white students, respectively (these are exposure indices). Conveniently, the difference  $\bar{P}_s^{black} - \bar{P}_s^{white}$  is equal to the variance ratio index measure of segregation  $V_d$  (at least in the situation where there are only two racial groups in the population; although the formulation of Equation 4 would differ when there are multiple groups, the principle would be the same). Therefore, the difference in the exposure of black and white students to school resource  $R_k$  is determined by the segregation level of the district and the extent to which school racial composition affects the allocation of  $R_k$  among schools ( $c_k$ ).

Finally, note that Equation 1 implies that the black-white difference in average student

outcome  $Y$  will be

$$\begin{aligned}
 E[Y | black] - E[Y | white] &= \sum_k a_k (E[R_{ks} | black] - E[R_{ks} | white]) \\
 &= \sum_k a_k (c_k V_d) \\
 &= V_d \sum_k a_k c_k \\
 &= c^* V_d.
 \end{aligned} \tag{5}$$

Equation 5 makes clear that segregation will affect racial disparities in student outcomes if  $c^* = \sum_k a_k c_k \neq 0$ . That is, if school racial composition affects the allocation of resources among schools, and if those resources affect students, then segregation will lead to disparities in student outcomes.

This stylized model formalizes the two mechanisms through which segregation may affect student outcomes that we described above. First, if segregation changes the total pool of resources available to a school district, it will affect average student outcomes (as long as those resources affect student outcomes). Second, if school resources are allocated among schools in ways correlated with school racial composition, then segregation will lead to racial disparities in the outcome  $Y$  (again, as long as those resources affect student outcomes). Of course, this stylized model is overly simple—it assumes homogeneous, linear, additive effects of segregation and racial composition on school resources and of school resources on student outcomes—but it is nonetheless useful for clarifying the parameters of interest in understanding the effects of segregation. Although this model focuses on the effects of segregation between schools within a district, the model could easily be generalized to apply to segregation between districts, following the same logic: Segregation between districts may affect student outcomes by shaping both the total level of resources available in the system and the distribution of those resources among districts.

### Evidence on the Consequences of School Segregation

As is evident in the stylized model of segregation effects above, there are several parameters

relevant to understanding the effects of segregation. The total effects of segregation on average outcomes and on disparities in outcomes are captured by the parameters  $b^*$  and  $c^*$ . It is useful to estimate these parameters because they describe the total effects of segregation on average outcomes and outcome disparities, respectively. The individual  $a_k$ ,  $b_k$ , and  $c_k$  parameters are also of interest, of course, because they describe the specific pathways through which segregation affects outcomes; knowing these parameters is useful from the perspectives of both sociological theory and social policy. Direct estimation of any of these parameters is complicated, however, by the fact that school resources, segregation levels, and school racial composition levels are rarely ignorably assigned. There are, however, a small number of studies that provide credible estimates of some of these parameters. Several studies estimate the impacts of school segregation by examining how black and white students' outcomes changed during the era of school desegregation. Although our general model can be applied to any student outcome, we focus on educational achievement and attainment and, to a lesser extent, occupational and other adult outcomes, as these are the outcomes for which past research provides the best causal evidence.

Several past reviews have found generally positive impacts of desegregation on minority achievement but noted the methodological limitations of many studies in estimating causal effects (Bradley & Bradley 1977, Crain & Mahard 1983, Cook et al. 1984). More recent studies use the exogenous variation in timing of desegregation court orders or implementation to estimate the causal effects of desegregation on students' outcomes and disparities in those outcomes (i.e., they estimate  $b^*$  and/or  $c^*$ ). Guryan (2004) finds that desegregation led to a decline in black dropout rates during the 1970s of 2 to 3 points, accounting for about half the decline in the black dropout rate during this time. Johnson (2011) finds that blacks' high school graduation rate increased by about 1 percentage point and their educational attainment increased by about 1/10 of a year for every

additional year they were exposed to a school desegregation order. Neither study finds significant effects on the educational attainment of whites, suggesting that school desegregation was not harmful for whites. In other words, they suggest that desegregation had a positive effect on average attainment and reduced racial attainment disparities. Other studies also find a positive relationship between school desegregation and educational outcomes for blacks (Boozer et al. 1992, Reber 2010).

In addition to educational attainment, scholars have examined the impacts of desegregation on later life outcomes (see Wells & Crain 1994 for a review). Several studies show that increased exposure to school desegregation improved black adult males' earnings, reduced the odds of poverty, and increased the odds of working white-collar jobs (Crain & Strauss 1985, Boozer et al. 1992, Ashenfelter et al. 2006, Johnson 2011).

Other studies find effects of desegregation on social outcomes such as criminality and health. Exposure to desegregation orders reduces the probability of men's deviant behavior, homicide victimization, arrests, and incarceration (Weiner et al. 2009, Johnson 2011) and improves adult health (Johnson 2011). Taking a multi-generational view, Johnson (2012) finds that school desegregation affects not only those exposed to it but also their children and grandchildren. Exposure to school desegregation positively affects the reading and math test scores, educational attainment, college quality, and racial diversity at college of the "children and grandchildren of *Brown*," with parent and grandparent educational attainment serving as a key mechanism.

Another way to assess the impact of school desegregation on student outcomes is to examine what happens once court orders have been dismissed. Lutz (2011) finds that the dismissal of court-ordered desegregation plans increased black dropout rates outside the South, and Saatcioglu (2010) finds that the end of desegregation policy in Cleveland led to higher dropout rates among black and Hispanic students. Vigdor (2011), however, finds that the

black-white test score gap did not widen among elementary schools following the end of busing in Charlotte-Mecklenburg. It could be the case that desegregation affects test scores and dropout differently, as little research has examined test scores using variation in desegregation orders, owing to data limitations.

Finally, a few studies have examined the relationship between city or metro area segregation levels and test score gaps. Card & Rothstein (2007) examine the association between neighborhood and school segregation and the black-white test score gap and find that the black-white test score gap is higher in more segregated cities but that school segregation has no independent association with the black-white gap when neighborhood segregation is accounted for. Mayer (2002) finds that neighborhood economic segregation, which may be correlated with school economic segregation, increases educational attainment for high-income students but slightly reduces low-income children's attainment, with little net effect overall.

The studies reviewed here often try to test mechanisms that explain why desegregation improved black students' outcomes. Most focus on how segregation shapes the distribution of resources rather than the overall level available in the district (that is, they test whether  $\epsilon_k = 0$ ). Generally, they find that desegregation in the South equalized the length of school year, student-teacher ratios, teacher quality, and per-pupil expenditures that the average black and white student experienced (Card & Krueger 1992, Guryan 2004, Ashenfelter et al. 2006, Reber 2010, Johnson 2011). Several studies also consider peer effects, arguing that exposure to white peers may benefit blacks because white students tended to come from higher-income families and to be higher achieving than black students (Guryan 2004, Ashenfelter et al. 2006, Reber 2010, Saatcioglu 2010).

Finally, researchers acknowledge that the act of desegregation itself may have helped black students feel more enfranchised, optimistic about their futures, and dedicated to

their studies, perhaps also increasing parental involvement, all of which could improve their educational outcomes (Guryan 2004, Ashenfelter et al. 2006). Desegregation may also increase the expectations of parents, teachers, and other adults who interact with black children (Johnson 2011).

### Evidence on the Consequences of School Composition

Several studies have tried to estimate the effect of school racial composition on student outcomes as a way of understanding the effects of segregation (see Hallinan 1998, Vigdor & Ludwig 2008, Mickelson & Bottia 2009 for reviews). This can be problematic, however, because racial composition may not directly affect student outcomes, but rather may operate through its effect on other resources. To see this, consider the result of substituting Equation 2 into Equation 1 above:

$$\begin{aligned} Y &= \sum_k a_k (b_k V_d + c_k P_s + u_{ks}) + e \\ &= b^* V_d + c^* P_s + e^*, \end{aligned} \quad 6.$$

where  $e^* = \sum_k a_k u_{ks} + e$ . Regressing  $Y$  on school racial composition ( $P_s$ ), holding segregation constant, will yield an estimate of  $c^*$ , the association of racial composition with student outcomes, which is identical to the association of segregation with racial disparities in outcomes. However, because schools are rarely assigned to have different racial compositions, the estimation of  $c^*$  from Equation 6 will generally lead to biased estimates of the true effect of racial composition on outcomes, unless the regression model includes adequate control variables or a quasi-experimental design is used to identify  $c^*$ .

Studies that include control variables in Equation 6 run the risk of increasing the bias in the estimates of  $c^*$ , however, if the covariates are affected by racial composition. To see this, consider the regression model below, where  $j$  indexes various school covariates (the  $X_j$ 's), some of which may be resources that affect student

outcomes included in Equation 1:

$$Y = b' V_d + c' P_s + \sum_j a'_j X_{js} + e'. \quad 7.$$

Allowing each  $X_j$  to be a function of district segregation, school racial composition, and some other factors uncorrelated with school composition, we can rewrite Equation 7 in the same form as Equation 6:

$$\begin{aligned} Y &= b' V_d + c' P_s \\ &\quad + \sum_j a'_j (b_j V_d + c_j P_s + u_{js}) + e' \\ &= \left( b' + \sum_j a'_j b_j \right) V_d \\ &\quad + \left( c' + \sum_j a'_j c_j \right) P_s + e'^* \\ &= b^* V_d + c^* P_s + e^*. \end{aligned} \quad 8.$$

Equation 8 shows that the coefficient on racial composition in Equation 7 will be equal to

$$c' = c^* - \sum_j a'_j c_j. \quad 9.$$

Thus, fitting Equation 7 will not yield an unbiased estimate of  $c^*$  unless none of the school covariates included in Equation 7 are affected by school racial composition (i.e.,  $c_j = 0$  for all  $X_j$ 's in the model). Put differently, controlling for downstream mediators of school composition will lead to biased estimates of the effects of school composition. Because it is not always clear which variables should be considered correlates of composition (which should be controlled for) and which should be considered downstream mediators of the effects of school composition (which should not be controlled for), there is an inherent ambiguity in regression-based estimates of the effects of school composition. In most cases, neither estimates of  $c^*$  from Equation 6 nor estimates of  $c'$  from Equation 7 can be considered to have a strong causal warrant and should not be used to infer the effects of segregation.

As a result of these challenges, there are relatively few studies that provide compelling



estimates of the effects of school composition. Several studies use research designs that provide some plausible exogeneity in the sorting of students into schools, however. First, two studies use data from the Texas School Project and take advantage of plausibly random variation in cohort demographics over time (i.e., idiosyncratic compositional differences between cohorts that were not driven by time-varying racial differences in families' decisions to enroll their children in public schools). They find that having fewer black students in a grade increases reading and math test scores for black students and does not harm whites' test scores (Hoxby 2000, Hanushek et al. 2009). Second, several studies take advantage of random assignment of children to schools or neighborhoods to examine how changing school composition may affect educational outcomes. Sanbonmatsu et al. (2006) find no significant effects on test scores among children whose families received housing vouchers to be used in low-poverty neighborhoods. Few children whose families moved to such neighborhoods changed schools, however, so the study was not able to test the impacts of exogenous changes in school environments on educational achievement. Schwartz (2010) takes advantage of the fact that Montgomery County randomly assigns students in public housing to different schools and compares the performance of those who attended the district's most- and least-advantaged schools. She finds that by their fifth year of elementary school, students from public housing in low-poverty elementary schools had significantly higher scores in math and reading than equally poor students assigned to high-poverty schools. These positive impacts accumulate over time; by the seventh year of school, low-income students in low-poverty schools outperformed their peers at high-poverty schools by 0.4 standard deviations in math and 0.2 standard deviations in reading. This study provides the best experimental evidence that school economic composition, or factors associated with it, affects test scores.

## CONCLUSION

Although the 1954 *Brown* decision is rightly hailed as the most significant Supreme Court decision concerning schools in US history, it had little immediate impact on school segregation. Indeed, the most significant changes in school segregation in the United States did not begin until 1968, following the *Green* decision, after which black-white school segregation declined sharply over a period of 5–10 years. Over the last 25 years, however, and despite claims of resegregation on the one hand (Orfield 2001, Orfield & Lee 2007) and “the end of the segregated century” on the other (Glaeser & Vigdor 2012), school racial segregation has changed little. There have been significant decreases in the exposure of minorities to whites, but these have been driven primarily by demographic changes in the school-age population (Fiel 2013, Logan 2004). Segregation measured as unevenness has been largely stable, with some evidence of a modest decline in some places over the last two decades.

One of the conclusions evident from a review of the research on trends in segregation is that we know a great deal about trends in racial segregation among K-12 public schools but relatively little about trends in other dimensions of segregation. Because our focus here is on trends in segregation, we have said little about some of these other dimensions, although more research in several areas would be useful. First, owing to data limitations, we know relatively little about trends in economic segregation in the last two decades and virtually nothing about economic segregation prior to 1990. Second, few studies consider trends in segregation in postsecondary education (two recent exceptions are Hinrichs 2012, Carnevale & Strohl 2013) or in preschool settings. Third, few studies examine trends in segregation between private and public schools or among private schools (but see Reardon & Yun 2002, Fiel 2013). And fourth, we have relatively little research on patterns and trends of within-school segregation, though studies of tracking (e.g., Oakes 1985, Lucas 1999, Tyson

2011), teacher assignment (Clotfelter et al. 2006b, Kalogrides & Loeb 2013), and students' friendship networks (Tatum 1997, Moody 2001, Grewal 2010, Flashman 2013, Fletcher et al. 2013) suggest high levels of within-school segregation. We know very little about how these patterns have changed over time (though see Conger 2005 for within-school segregation trends in New York City). In each of these areas, research to identify the key patterns and trends would be very useful for understanding the extent to which schools have become more or less segregated along many dimensions.

Research on patterns and trends in segregation are generally motivated by a concern that segregation leads to racial and socioeconomic disparities in educational outcomes. Surprisingly, however, the sociological literature appears to lack a detailed and comprehensive theoretical model (or models) of exactly how segregation might affect educational and social outcomes. As a result, many studies estimate different parameters, all under the rubric of understanding the effects of segregation. Given the theoretical confusion in the literature, one of our aims in this review was to articulate a very general and stylized model for understanding how segregation might affect student outcomes and to characterize the types of parameters of interest in the issue. Although our model is certainly incomplete and oversimplified, it may provide a useful framework for future theoretical specification.

Our model suggests that two types of parameters are of particular interest in the study of segregation: (a) estimates of the effect of segregation per se on educational outcomes (what economists call "reduced form" estimates and what sociologists think of as "total effects"), and (b) estimates of the parameters defining the mechanisms through which segregation operates. To date, the research literature has been more successful at providing the first type of estimates, particularly in relationship to the effects of the segregation/desegregation in the 1960s and 1970s. Studies of this type show that desegregation led to improvements in the

educational outcomes of black students while not harming those of white students. Studies of more recent segregation, however, provide weak and mixed evidence on the degree to which segregation is linked to achievement gaps today. Part of the reason for this disparity may be that some of the component mechanisms connecting segregation to educational outcomes have changed. Johnson (2011) and others argue that pre-1968 segregation was linked to substantial black-white inequality in school resources (inequalities that were substantially reduced by desegregation). Segregation today is not as strongly linked to school resource inequality (in terms of financial resources). If segregation in the pre-*Green* era operated primarily through its effects on the inequality of school funding, it may be less consequential in the modern era of smaller funding disparities.

This last point indicates the need for much more theoretical and empirical understanding of the mechanisms through which segregation affects student outcomes. To this end, our conceptual model suggests that future research should focus on three types of questions to clarify the mechanisms through which segregation operates. First, how does the segregation of a schooling system affect the total quantity of available resources in the system? The list of resources of interest here should include not only financial resources but also a wide range of other resources, including human capital, social capital, peer characteristics, access to social networks, and neighborhood conditions. Second, how are resources distributed among schools in relation to schools' racial and socioeconomic composition? And third, how do these school resources affect students' educational outcomes? These are not simple questions to answer, of course. Nonetheless, identifying and understanding the mechanisms through which segregation affects (or does not affect) students will likely do much more than will additional measurement of trends and patterns to advance our understanding of why and how segregation matters.

## DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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