

SEGREGATION, RACE, AND CHARTER SCHOOLS: WHAT DO WE KNOW?

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October 2016



ACKNOWLEDGMENTS

This report was supported by a grant from the Walton Family Foundation to study racial segregation in traditional and charter public schools.

We would like to thank Elizabeth Roberto for commenting on our section concerning her divergence index, and to Jonathan Rothwell for his suggestions.

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Executive Summary

School segregation has returned to the front burner of public and political debate. Against the backdrop of police shootings and civic unrest in many U.S. cities, concerns about the role of public education in terms of race relations and segregation have grown. President Obama has also highlighted and put forward policies to address various dimensions of economic and racial inequality, including a proposal in his 2017 budget for a new \$120 million grant program, “Stronger Together,” to support local efforts to integrate schools by income.

In that context, this report compares various measures of school segregation and reviews research findings on the extent of school segregation, trends in school segregation over time, and the relationship between academic achievement and segregation by income and race. The role of school quality in mediating and moderating the associations between school segregation and academic achievement is examined through observational and experimental research findings. Research on charter schools receives particular attention. Findings include:

- There are a number of ways of measuring segregation for different groups, and geographical scales. Scholars studying segregation often use different indices, define their groups in different ways, and use different areas as the basis for assessing schools. It is important to be clear which particular aspect of segregation is the focus of any inquiry. Policymakers in particular need to be very careful in the way they use and interpret empirical results.
- In terms of historical trends, school segregation within school districts declined sharply in the 1960s and 1970s, following civil rights legislation and court-ordered integration. A previously separate school system for black and white students became more integrated, especially in the South. But while the extent of racial segregation *within* school districts declined, segregation *between* school districts increased slightly over the same general period, in part because of “white flight” to suburban school districts.
- The diversification of schools in recent decades has been largely driven by an increase in the Hispanic and Asian American populations. Only half of the students currently enrolled in public schools are white, compared to four in five in 1968. There has inevitably been a steep drop in the number of majority-white schools, to just below 60 percent. This renders measures of segregation based on attendance at “majority-white” schools less instructive. Both black and white students have become much more likely to share classrooms with Hispanics, but, since the 1980s, only marginally more likely to share classrooms with each other. Segregation strongly reflects local demographics and housing patterns. For example, rural and suburban schools are more heterogeneous than urban schools.
- School segregation by family income (as distinct from race) is also at high levels and has increased since 1990, both within and between school districts. Race and economic status are of course correlated. Black students are four times as likely to be in a high-poverty

school as a low-poverty one; for whites, the ratio is the other way round.

- Charter schools, which are open enrollment public schools managed outside the framework of the traditional school district, are generally more racially and economically segregated than traditional public schools. In particular, charter schools often enroll more black and poor students than traditional public schools in the same areas, and are more likely to be at one extreme or the other of racial and economic composition than traditional public schools. But there is significant variation between different cities and school districts.
- It is difficult to disentangle the effects of race and poverty because they are correlated. Much of the research that examines the impact of school segregation on student outcomes confounds race and family income. But because most black families are not poor and most poor families are not black, and because government integration policies based on family income can pass legal muster whereas those based on race cannot, it is important to try to understand the effects of racial vs. economic school segregation on student outcomes.
- Differences among schools in racial composition are associated with small but still meaningful differences in student achievement. However, the effect of racial composition on student achievement is primarily expressed through the correlation of race and family socioeconomic status. Thus, considering only school-level variables, it is poverty rather than race *per se* that impacts the achievement of students attending a school.
- Interventions that involve providing low-income and minority students with greater access to schools that are higher performing and more diverse (through school choice or housing policy) demonstrate positive impacts that appear to be mediated by the quality of schools rather than their racial composition.
- Charter schools with a strong academic focus and “no-excuses” philosophy that serve poor black students in urban areas stand as contradictions to the general association between school-level poverty and academic achievement. These very high-poverty, high-minority schools produce achievement gains that are substantially greater than the traditional public schools in the same catchment areas. This is further evidence that school quality is a primary mediator of academic achievement rather than the racial or economic makeup of a school’s student body.

Policymaking is always a balancing act, and requires a careful weighing of different objectives that may not always run easily together. Reducing school segregation and improving the quality of schools serving minority students are both important goals, but they are not necessarily the same. Policy should be based on a clear idea of what goals we are trying to achieve, and on the best evidence for how to reach them.

1. Introduction

After Michael Brown was shot and killed by police in Ferguson, Missouri in August 2014, his grief-stricken mother addressed the media. “Do you know how hard it was for me to get him to stay in school and graduate?” she cried. “You know how many black men graduate? Not many. Because you bring them down to this type of level where they feel like they don’t got nothing to live for anyway.” It was striking that, in a moment of such loss, Brown’s mother focused on her son’s education. He had been among the roughly 60 percent of students who managed to graduate from Normandy High School that year.¹ The proportion of the school’s students who are black is 98 percent.

More than half a century ago, in *Brown v. Board of Education*, the U.S. Supreme Court invalidated state laws creating systems of separate and unequally resourced public schools for black and white students. While de jure segregation ended, de facto school segregation by race and class remained, and remains today. High levels of segregation are seen by many policymakers and educators as a serious barrier to economic opportunity for minority and low-income children, and to the wider benefits of a diverse and integrated society.

School segregation, in particular, has returned to the forefront of public and political debate.² In part, this is because broader racial equity issues have been highlighted by recent police shootings, including Michael Brown in 2014 through to Terence Crutcher in Tulsa in September 2016. Subsequent protests in many U.S. cities and the rise of the Black Lives Matter movement have helped to keep issues of racial inequality in the media spotlight. In his second term, President Obama has increasingly advocated for policies to address various dimensions of economic and racial inequality, including a proposal in his 2017 budget for a new \$120 million grant program, “Stronger Together,” to support local efforts to integrate schools by income.³

The renewed focus on segregation in public schools is a reflection of these broader issues and their historical anchor in *Brown v. Board*. But there are specific reasons why public education is front and center in the current debate on race, justice, and inequality. One is that education policy offers a direct route to tackling segregation. Public schools are easier for policymakers to reach than housing or labor markets. After all, school districts have the power to tell parents which public school their child must attend.

In addition, administrative decisions taken by the school district, often in compliance with federal and state laws and regulations, impact schools in terms of their curriculum, class size, organization, location, staffing, available courses, academic tracking, transportation, resourcing, and more. For the goal of creating meaningful interactions across racial, ethnic, cultural, and socioeconomic divisions, perhaps nothing matches the power of public schooling to alter

patterns of human interaction, except perhaps a compulsory military draft. Further, there is a history of using these powers to positive effect for black students, through the court-ordered school desegregation plans put in place in many jurisdictions in the South following *Brown v. Board*.⁴

Another reason public schools dominate discussions of segregation is the influence of a newly-available tool: large-scale longitudinal databases of education records, sometimes linked at the level of individual students to later outcomes such as employment and crime. Reardon, for example, uses test scores in from every school district in the U.S. to examine which forms of school segregation are most strongly associated with student achievement.⁵ Chetty and his colleagues analyze IRS tax data on more than 40 million children and their parents, linked to Census and other administrative data, to identify features associated with the upward mobility of children, such as school quality and racial segregation.⁶ These and other studies that take advantage of “big data” on schools and students provide increasingly precise descriptions of the extent and nature of school segregation. They have also provided the foundation for new research aimed at identifying the causal impacts of school segregation on student outcomes.

Also important to the segregation discussion is the body of research on the impact of public charter schools. Whereas overall, charter schools across the nation perform only slightly better than regular public schools,⁷ the story is different for a subset of charter schools serving overwhelmingly black and poor students in large cities with a so-called “no excuses” education model. Students in these schools have dramatically higher levels of achievement than comparable students attending regular public schools.⁸ Studies providing the strongest evidence for the effectiveness of this particular type of charter school take advantage of the requirement that oversubscribed charters use a lottery to determine who among the applicants receives an offer of admission. Comparisons of state test scores, high school graduation rates, and college-going of students who win vs. lose their lottery for admission are, effectively, gold-standard randomized experiments on the impact of these charter schools on student outcomes.

But these very same charter schools showing such results are often more segregated than traditional public schools serving the same general areas.⁹ This creates a hot spot for public discussion and policy debate. Peter Cunningham, who served as assistant secretary of education for communication and outreach during the first term of the Obama administration, highlights the issue in a recent op-ed in *U.S. News and World Report*, entitled “Is School Integration Necessary?” He writes:

Maybe the fight's not worth it. It's a good thing; we all think integration is good. But it's been a long fight, we've had middling success. At the same time, we have lots and lots of schools filled with kids of one race, one background, that are doing great. [Is school integration necessary?] It's a good question.¹⁰

This report provides an empirical background for thinking about Cunningham’s question. First, we undertake a critical review of some of the various indices used to measure segregation at the school, district, metro, and national level. Different metrics capture different facets or expressions of segregation, so it is important to be clear at the outset about the specific purpose of any inquiry. The selection of a particular measure will depend on which particular aspect of segregation is of most concern. Used in the wrong context, some measures can provide an answer that is at best incomplete and at worst misleading. As the philosopher Bernard Williams warned us, we must always be careful not to “smuggle our answer into our question.”

Armed with a working knowledge of the most common metrics, we next address trends and current levels of school segregation and how these differ by school sector and geography. With respect to process and causal influence, we go on to evidence on the question of whether efforts to create more integrated schools are likely to raise student achievement and close achievement gaps. In particular, we examine the relationship between student learning and achievement of the demographic composition of the student body of schools. We also examine what we know about and can learn from experimental studies of the impact on the achievement of students from low-income and minority backgrounds of enrollment in high-performing traditional and charter public schools that are highly segregated.

Needless to say, there is much more on the table with respect to school integration than our focus in this report on student achievement. For example, the degree to which a school is diverse with respect to race and income could have an impact on the development of student soft skills and civic virtues, the ability of the school to attract and retain qualified teachers, the attraction of the neighborhood surrounding the school to a diverse population of residents, and so on—without necessarily having an impact on student achievement. Our report offers evidence relevant to decisionmaking on the specific value of integrating schools in terms of student achievement, but not with respect to these other values and outcomes.

We do not offer policy conclusions with respect to efforts to integrate schools with the aim of narrowing education achievement gaps, in part because the evidence is not definitive. Our goal is more modest: to summarize important research and statistical knowledge on the extent of school segregation and its impact on student achievement. We do this in a way that might allow those who wish to advocate for or against particular school integration policies to engage among themselves and with policymakers and the general public with evidence as a constraint and a guide.

Should charter schools be expected to further integration? Or should they be expected to serve the demographics present in nearby traditional public schools or neighborhoods—which are themselves often segregated from centuries of discriminatory laws and exclusionary zoning? Or should the racial composition of a school’s student body be left to individual charter schools

and charter school networks, as long as it is a result of parental choice and not due to directly discriminatory policies or practices by the school? These are many of the questions being debated. We do not answer them, but we hope to improve the quality of the debate.

Our principal findings, developed in the body of the report, are that:

- School segregation by race within school districts declined sharply in the 1960s and 1970s, following civil rights legislation and court-ordered integration. A previously separate school system for black and white students become more integrated, especially in the South.¹¹
- While the extent of racial segregation within school districts declined, segregation between school districts increased slightly over the same general period, partly because of “white flight” to suburban school districts.¹²
- Since the 1980s, the picture has become more complex. Overall levels of racial segregation have been strongly influenced by the increase in the number of Hispanic students.¹³ The rise in the Hispanic share of student enrollment prompted a steep drop in the number of majority-white schools, from 80 percent of all public schools in 1988 to just below 60 percent in 2013.¹⁴ The share of white students at majority-white schools dropped from just over 90 percent in 1995 to 82 percent in 2013.¹⁵ This shift in the demographic composition of school students has rendered some measures of segregation, such as “the proportion of black students in majority white schools” less useful.¹⁶
- School segregation by family income, as distinct from race, is at high levels and has increased since 1990, both within and between school districts.¹⁷
- Charter schools, which are open enrollment public schools managed outside the framework of the traditional school district, are generally more racially and economically segregated than traditional public schools. In particular, charter schools enroll more black and poor students than traditional public schools in the same areas, and are more likely to be at one extreme or the other of the racial and economic demographic spectrum than traditional public schools.
- Segregation strongly reflects local demographics and housing patterns. For example, rural and suburban schools are substantially more heterogeneous than urban schools. The population of students enrolled in many large urban public school districts is so overwhelmingly minority and poor that the opportunities for school integration by race and economics are limited if the policy option is intra-district transfers of students among schools. For example, 91 percent of students attending the Chicago Public Schools are minority and 84 percent are poor.¹⁸ Policies to enhance the economic and racial integration

of schools depend on local conditions for details of design and prospect for success. They are most likely to be feasible when the catchment area served by a school district has sufficient demographic diversity to afford the opportunity for more school diversity and where there is a political will to put policies in place to achieve those ends.

- Much of the research that examines the impact of school segregation on student outcomes confounds race and family income. It is difficult to disentangle the effects of race and poverty because they are correlated. But because most black families are not poor and most poor families are not black, and because government integration policies based on family income can pass legal muster whereas those based on race cannot, it is important to try to understand the effects of racial vs. economic school segregation on student outcomes.¹⁹
- Differences among schools in racial composition are associated with small but still meaningful differences in student achievement. However, the effect of racial composition on student achievement is primarily expressed through the correlation of race and family socioeconomic status. Thus, considering only school-level variables, it is poverty rather than race *per se* that impacts the achievement of students attending a school.
- Interventions that involve providing low-income and minority students with greater access to schools that are higher performing and more diverse (through school choice or housing policy) demonstrate positive impacts that appear to be mediated by the quality of schools rather than their racial composition.
- Charter schools with a strong academic focus and “no-excuses” philosophy that serve poor black students in urban areas stand as contradictions to the general association between school-level poverty and academic achievement. These very high-poverty, high-minority schools produce achievement gains that are substantially greater than the traditional public schools in the same catchment areas. The greater success of the “no-excuses” charters in raising student achievement and their disproportionately large impact on low-income, high-minority student populations provide further evidence that school quality is a primary mediator of academic achievement rather than the racial or economic makeup of a school’s student body.

Our explicit focus in this report is the relationship between school segregation by race and differences in educational achievement by race. There are, of course, countless other issues at stake here, including health disparities, housing market discrimination, and broader race relations. Even if it were possible to create schools that were separate but equal, with students educated in schools of the same quality, but alongside peers exclusively of their own race, most Americans would probably not feel content with such a school system. For these citizens, integration is an end in itself as well as a means to other ends—including potentially narrowing

the gap in educational achievement. But being clear about the ends being sought is not a pedantic exercise. Policy decisions have to be guided by explicit goals and clear success measures.

The leaders of charter schools are aware of these issues, and of the need to balance a number of goals. A few charters have made it an explicit part of their mission to integrate communities.²⁰ There is a National Coalition of Diverse Charter Schools focused on integration.²¹ Kahlenberg and Potter, in *A Smarter Charter*, discuss some of these schools, such as Blackstone Valley Prep Academy in Rhode Island, offering case studies in charters that try to lessen segregation.²²

A natural reaction, expressed by advocacy groups critical of charter schools, such as the NAACP, is that racial segregation of schools is simply bad. For those who agree, it is important to be as clear as possible about *why*, in order to evaluate possible remedies. If segregation stands in the way of all children being educated in a diverse environment that supports civic virtues and personal opportunity, then the fact of separateness alone is cause for decisive action. The concern might be, however, that segregation results in an uneven quality of education. This could be because students learn more in diverse classrooms. It could also be because segregated schools often put poor and minority children “out of sight and out of mind” from wealthier families and people in power, which leaves the poor and minority students with under-resourced schools.

At every level of policymaking, from individual schools to the federal government, it is helpful to make the motivation for integration more explicit. Is it simply an inherent good, promoting a more harmonious and tolerant society? Is it a practical way to ensure equal access to quality schools? Both? Neither? Being clear about *why* lessening segregation is a goal supports better decisionmaking on *how* to respond with policy.

This is not to say that choices are necessarily binary. We may well support greater racial integration of our schools for a variety of reasons. Policymaking is always a balancing act. Tradeoffs frequently have to be made between competing goals and competing demands.

There are also necessary limits to how far any single policy lever can bring about change. The U.S. remains a deeply segregated nation in terms of housing, schooling, health, and economic opportunity. While we focus in this report on educational achievement gaps and on schools, we are acutely aware that these are a subset of a whole range of inequalities by race.

Education policy nonetheless has an important role to play. It is now clear that good schools can provide a high-quality education to students of all races from very disadvantaged social and economic backgrounds. It is simply not true that schools don’t matter in such communities: if anything, they matter there most of all. On the other hand, it is unreasonable to expect that the school system can single-handedly counteract profound inequalities of wealth, family

background, social capital, housing, discrimination, and so on. Even on the specific question of school integration, success is frequently dependent on efforts that are outside of the education system's control, including housing policies, public transportation, and employment opportunities. Absent more integration in the nation's housing markets, for example, there is only so much a school district can do to create integrated classrooms. When it comes to the role of public schools in combating inequality, there is a pragmatic middle course between fatalism and utopianism, which is that schools matter a lot but cannot be expected to carry the full load.

2. How to measure school segregation: A critical review of indices

“How segregated are schools?” It seems a simple question, and one that ought to be easily answered using empirical yardsticks. But there are, in fact, a variety of measures in common use by scholars in this field, each aiming to illuminate a different aspect of segregation. The choice of measure is not trivial. Particular indices can often yield not just different trends, but opposing ones.

Before selecting one measure over another, it is important to be clear which particular aspect of segregation is most pertinent to the investigation (and why). Used in isolation, any of the measures can provide only one piece of the picture. The choice of measure is often based on a normative sense of *why* segregation is important in the first place, even if that choice is not made explicit. Policymakers operating with different levers at different levels—schools vs. city, education vs. housing—will want to use the index and approach that is most appropriate to their specific circumstances.

The first decision that must be made before segregation can be measured is which groups should be considered, i.e., who is segregated from whom? Again, this sounds like a simple choice. But there are many different options, each potentially generating different results and conclusions. For instance, segregation can be measured between different economic groups, such as those with low incomes or those with high incomes vs. everyone else. Segregation of students who are English language learners (ELL) and non-ELL, or those with disabilities, or immigrant status, and so on could also be examined.²³ Last but not least is segregation by race—which is the focus of this paper. In each case, decisions also have to be made about how exactly to define each group.

Our focus is on racial segregation in schools, but it is worth noting the related and substantial research literature on economic segregation.²⁴ Here, too, there are methodological challenges, including the waning usefulness of eligibility for federal free and reduced price lunch program as a marker of poverty, especially in terms of measuring trends.²⁵

DEFINITIONS

The most common focus of research on segregation is race. “How racially segregated are schools?” This seems like yet another straightforward question. But there are a number of complexities here, even before we turn to the choice of specific index.

First, categories based on race have a social as well as biological dimension.²⁶ Second, there is a rapidly growing minority of Americans who define themselves as mixed race. There are, for

instance, almost 2 million U.S. citizens who identify as both black and white. Fifteen percent of black children under five years of age are identified by their parents as also being white. The Census separates the question on Hispanic heritage from the one on race: there are therefore “black Hispanics” and “white Hispanics.”

Third, when segregation is measured in a binary manner, i.e., between two groups, the decision of which categories to use is very important. Historically, many scholars have focused on segregation between black and white students. But with the rise in Hispanic and Asian American student enrollment over the last few decades, measuring segregation has become a more complex endeavor. Some scholars simply divide students into “white” and “minority” groups. But lumping together all “non-whites” in this way necessarily obscures important differences among minority groups. Another option is to compare a “white and Asian” group with a “Hispanic, black, and other” group: but again, is it important to be clear why this is the “right” categorization. Some indices allow for measurement of segregation between multiple groups, but these tend to be harder to interpret.

It is also possible to combine race and economic status in a measure of segregation or integration. For example, we might choose to look at the segregation of poor black students from non-poor students.

Once these important initial decisions have been made—“segregation on what dimension” and “segregation of whom”—we can turn to the selection of a particular measure. Below we describe five indices of segregation (or, from the other side of the coin, of integration): exposure, isolation, dissimilarity, divergence, and Theil.²⁷ In each case, we demonstrate how the index would apply in a fictional school district we call PresidentTown (see Appendix A). For the sake of simplicity in describing the indices, we also restrict the example to a two-group scenario of black and white students. We highlight their strengths and weaknesses and point to the specific value of each index for different users.²⁸

Exposure index

The exposure index provides an answer to the following question: “how white is the average black student’s school?” or, conversely, “how black is the average white student’s school?” More specifically, it measures the percentage of white students in the average black student’s school or vice versa.

For example, our fictional PresidentTown school district has 200 students, 75 black and 125 white, and two schools, each with 100 students: Hamilton High and Jefferson High. At Hamilton High there are 5 black students and 95 white students. Jefferson, meanwhile, has 70 black students and 30 white students. Black-to white-exposure in Hamilton is 95 percent; in Jefferson

it is 30 percent.²⁹ Averaging the experiences of the black students across the two schools, weighting by their population in each school, we find that the average black student attends a school that is 34 percent white. This, then, is the black-to-white exposure index for the district as a whole. Meanwhile, the white-to-black exposure index is 21 percent—the average white student in this district attends a school that is 21 percent black.

Isolation index

The isolation index is the inverse of the exposure index, measuring how clustered students from one group are among people like themselves. The question being posed here is “how white is the average white student’s school?” Or, “how black is the average black student’s school?”³⁰

In PresidentTown, the average white student attends a school that is 79 percent white, despite the fact that the district is only 63 percent white. (Note that this is simply 100 minus 21 percent, where 21 percent was the white to black exposure index.) The average black student attends a school that is 66 percent black.

The exposure index and the isolation index shed light on a particular aspect of school segregation: the extent to which students in a particular demographic subgroup are exposed to, or isolated from, students in other demographic subgroups when attending a particular school or category of schools.

These two indices can only be meaningfully interpreted with reference to the racial composition of the areas in which the schools are located. In themselves, these indices are effectively “blind” to the question of how the composition of a specific school, or group of schools, is shaped by the composition of the surrounding area. (How to define “surrounding area” is a hugely important question, as we discuss below). Students are clearly more likely to attend majority-white schools in majority-white areas. The next three indices aim to address this issue, by comparing the population of the schools to the population they serve.

Dissimilarity index

The dissimilarity index provides a numerical answer to the question, “Do the students in the schools in a particular place look like the population of that place?” It is a measure of how closely schools reflect their community (i.e., how similar or dissimilar they are). Unlike the exposure and isolation indices, the dissimilarity index therefore attempts to take into account the proportions of each group in the larger geographic area when judging the extent of segregation in schools. The dissimilarity index ranges between 0 and 1, where lower numbers denote less segregation.

If the schools in a particular community have roughly the same proportion of black and white students as the community (typically defined as the school district), the black-white dissimilarity index will be low (i.e., the schools are not too dissimilar to the broader population). The dissimilarity index has an intuitive interpretation: it shows the proportion of students who would have to move schools in order for the schools to perfectly match the surrounding community.

In the PresidentTown school district the dissimilarity index is 0.69, or 69 percent. So we would need to move 69 percent of black or white students between Hamilton and Jefferson to ensure that both schools matched the district proportions of black and white students (about 62 percent white and 38 percent black). To provide a real example, St. Paul, Minnesota, had a white-black dissimilarity index of 0.30 in 2004. This means 30 percent of either black or white students would need to move schools in order to eliminate the discrepancy between the race-group proportions within each school and their proportions within St. Paul district as a whole.³¹

Note that when a student in the numerical minority group moves, this has a bigger downward impact on the dissimilarity index than when one from the numerical majority does. It is almost always more “efficient” to move students in the minority group, if the goal is to bring down the dissimilarity index while moving the lowest possible number of students.

Divergence index

The divergence index was developed by Roberto as a measure of inequality and segregation.³² We use the divergence index to measure how much the school-level proportions of each student group differ from their proportions in the larger area as a whole.³³ Like the dissimilarity index, the divergence index describes the level of segregation in the schools given the proportions of each group in the larger area.

But while the classic dissimilarity index can only be calculated for two groups,³⁴ the divergence index can be calculated for three or more groups. The divergence index can also be decomposed for geographic sub-units.³⁵ This means, for example, that we could calculate the share of total segregation within a metro that is due to segregation between the metro’s school districts, as opposed to segregation *within* each district.³⁶

The maximum value of the divergence index depends on the proportions of each group in the overall population being considered, but its minimum value is always zero. The lower the index value, the more closely the school-level proportions of each group mirror the proportions in the entire population. In PresidentTown, the district divergence index is 0.26.

Theil index

The Theil index is a technically complex segregation measure, which is better thought of as

capturing school diversity as much as integration or segregation. It has been described by one scholar as “the difference between the diversity (entropy) of the system and the weighted average diversity of individual units, expressed as a fraction of the total diversity of the system.”³⁷

The Theil ranges between 0 and 1, where lower numbers denote less segregation.³⁸ Like the divergence index, it can be used with 3 or more groups. In theory, the Theil reaches its minimum when each group is represented in equal shares within each school. In practice, however, it reaches its minimum when the school compositions approximate the populations in the larger area.³⁹

The Theil index for PresidentTown is 0.39, indicating a moderate level of segregation. (By way of comparison, Philadelphia has a Theil of 0.60.)⁴⁰ The Theil is used to measure inequality in a range of domains; but in the context of this paper, it is used to measure levels of segregation at the school district level or higher.

WHAT’S THE RIGHT GEOGRAPHICAL SCALE?

The segregation indices which allow us to compare either an individual school or groups of schools to their surrounding populations have benefits over the simple exposure and isolation measures in that they incorporate information relevant to what might be possible under a different set of policies. But they pose their own challenges. Most importantly, the selection of the geographical area for comparison makes a big difference to the result. When looking at the level of segregation in a school, to which population should it be compared? The world? The nation? Region? State? Metro area? School district? Neighborhood? Too large an area can produce results that are nonsensical; relative to the world’s population of students, almost any school or school district inevitably has a very high dissimilarity index. But even a national scale is likely too big for most analyses. The U.S. is a very large geographical area that differs greatly by region and area in terms of demographic diversity. Comparisons of schools or school districts to the national population are therefore of very limited value. For example, U.S. students have lower exposure to Hispanic students than we might expect based on the Hispanic share of the total population. But this is because a large proportion of Hispanic Americans live in the Southern U.S., whereas they constitute only a tiny minority of the population of other states like Vermont and West Virginia.⁴¹

On the other hand, choosing a very small area introduces the risk of missing residential segregation that occurs at a larger geographical level. A school district that has well-integrated schools (i.e., a low dissimilarity index) based on the school-aged population within its borders can look very different if the geographical net is cast over a larger area.

The Richmond-Petersburg metro area in Virginia offers a real-life example. Just outside the city

of Richmond is Hanover County. The overall Richmond-Petersburg metro area (which includes both Hanover and Richmond City) is 50 percent white. But Richmond City and Hanover have separate school districts, with very different demographic characteristics. In 2010, Hanover's schools were 84 percent white. Richmond's schools were just 10 percent white.⁴²

The white-black dissimilarity index in Richmond City is 0.69, high compared to districts around the country.⁴³ But the index in Hanover is only 0.21, because Hanover's relatively small black population is evenly distributed throughout the county.⁴⁴ Hanover, on this measure and at this geographical scale, looks like a well-integrated district; it is Richmond that seems to have the problem. But zooming out, it becomes clear that the real segregation is *between* the two districts, rather than within them. At the metro level, the schools are highly segregated, with a dissimilarity index of 0.57.⁴⁵

In *The Future of School Integration*, Mantil, Perkins, and Aberger compare the potential for desegregation (in this case on economic grounds) via *within*-district changes, compared to *between*-district changes, using data from Virginia, Nebraska, Colorado, Massachusetts, Missouri, and Florida.⁴⁶ They find that within-district desegregation policies could reduce the prevalence of high-poverty schools modestly. Between-district strategies would be more effective: in four of the six states, they could reduce the prevalence of high-poverty schools by more than one-third.

In many cases, the population of the metro area will be an appropriate one against which to compare schools. In others, the city may cover too large a geographical area to be a useful point of comparison. For example, computing a dissimilarity index for schools in Staten Island or the Bronx based on the school-aged population for all of New York City might be of limited use. Perhaps someone might consider using the dissimilarity index as a basis for a policy to move students among schools—say, a plan to transport students between Staten Island and the Bronx to achieve more school integration. But that would be impractical in terms of transit times, much less politics.

An appeal of metro-based measures is that, at this level, housing policy and zoning laws influence residential segregation and therefore school segregation, too. These are issues that might be the province of a metropolitan planning council, or the state that includes a metropolitan area, or businesses that can use decisions on where to locate or relocate to leverage government action. A metro-level dissimilarity index might help city policymakers think about larger reforms to address residential segregation (and by extension, school segregation), involving zoning and affordable housing in places like Staten Island.

For principals, or school administrators, or school boards, or mayors (as well as the parents and voters that inform their actions), on the other hand, measures based on the district or neighborhood might be more useful than metro measures of segregation, because this is where

they have some control over decisionmaking and are held accountable.⁴⁷

The point here is that there is not one “correct” geographical area to use in calculating indices, simply that there is a need to be sensitive to local political and economic geographies, as well as to the level at which potential policy interventions might be carried out.

There are, then, many different ways to measure segregation, between different groups of people, and using different comparisons. None is perfect or comprehensive. Each gets at a different aspect or result of segregation. Being clear about what aspects of segregation are of interest—and why—will help policymakers select the best available measure, and use it correctly.

A final cautionary note, aimed at those attempting to interpret research findings in this field. Researchers examining segregation might use different indices to look at different groups compared to different geographical areas over different periods of time. Again, this is not to say that one approach is wrong and another right; merely that we should be keenly aware that apparently technical methodological choices often reflect a specific kind of concern with segregation, and can weigh heavily on results.

3. School segregation: Trends and levels

Equipped with an understanding of the various measurement tools, we turn now to an examination of trends in racial school segregation. How has segregation changed over time, and what is it like today?

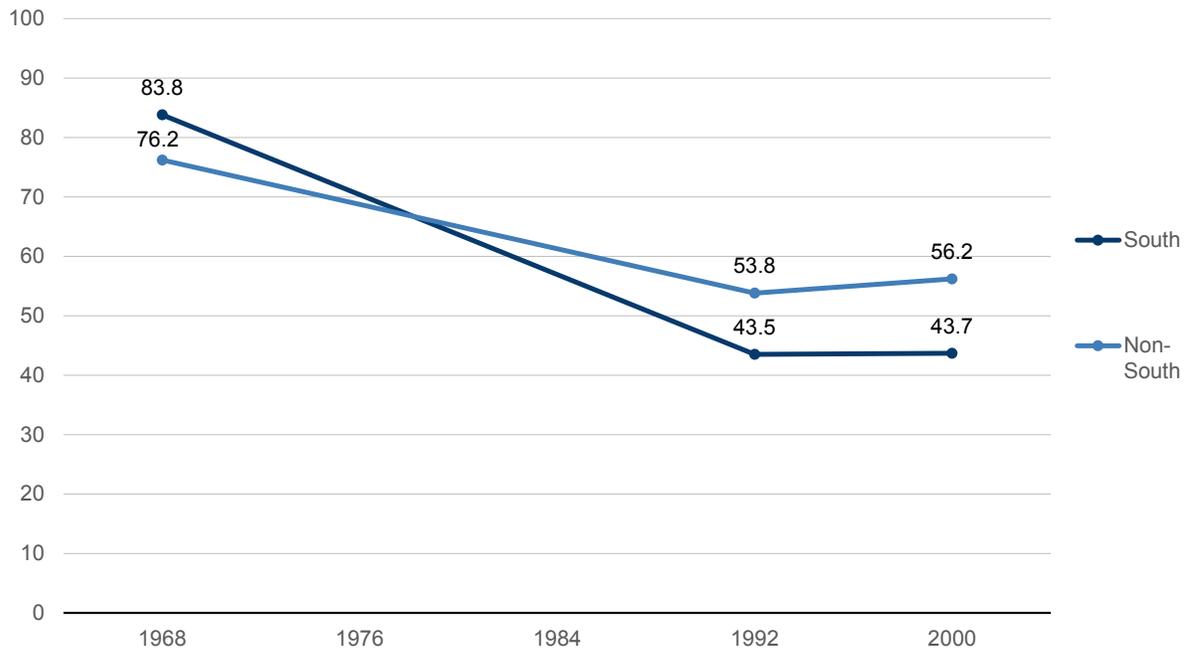
DESEGREGATION IN THE 1960s AND 1970s

Before the late 1960s, American schools were almost completely segregated by race. In 1964, only 2.3 percent of black students attended schools that were majority-white, despite the fact that white students comprised more than 80 percent of total public school enrollment.⁴⁸ The dissimilarity index between black and white students (measured within districts and then averaged to the national level) was roughly 80 percent in 1968. So, in the average district, four in five black students (or four in five white students) would have had to transfer schools to make school compositions mirror the proportions of black and white students in the district.⁴⁹

The Civil Rights Act of 1964, among other changes, allowed the U.S. Attorney General to bring suit against segregated school systems on behalf of plaintiffs, free of charge to the plaintiffs, and freed the U.S. Department of Education to collect data on race in schools.⁵⁰ The Civil Rights Act of 1968 strengthened the federal government's ability to curtail housing segregation, which also slowly improved minority access to majority-white schools and school districts.⁵¹ A succession of court cases helped break patterns of segregation in housing and education.⁵² In 1973, for example, the Supreme Court's *Keyes v. School District No. 1, Denver* decision ordered Northern districts to desegregate; Nixon conditioned Southern schools' federal education funding on their compliance with desegregation orders.⁵³

In 1968, the share of black students attending schools that were more than 90 percent black was 78 percent. Just four years later, that figure had fallen to 25 percent.⁵⁴ In 1968, the average black student attended a school that was 22 percent white; by 1988, that figure had risen to 36 percent.⁵⁵ Logan and Oakley found that the black-white dissimilarity index (again measured within districts and averaged to the national level) fell from 81 percent to 48 percent over the same period.⁵⁶ The move towards integration was most marked in the South, where segregation had been at its highest.⁵⁷ Southern school districts, as a whole, saw larger gains in integration by 1990:

Figure 1. Dissimilarity index in Southern and non-Southern school districts



Source: John Logan, "Resegregation in American Public Schools?" (Albany, NY: Lewis Mumford Center for Comparative Urban and Regional Research, University at Albany, 2004), Table 1.

But while the segregation of schools within districts declined substantially between the late 1960s and late 1980s, segregation between districts increased.⁵⁸ This reflects, in part, the “white flight” to the suburbs.⁵⁹ The 1975 Coleman report, for example, found that between-district segregation rose between 1968 and 1972, even as within-district segregation was falling. The authors also found that white student enrollment declined most between 1968 and 1972 in the districts that desegregated most. This was especially true in Northern districts, which tended to be smaller—making it easier to move out of the district (many Southern districts, by contrast, encompass whole counties).⁶⁰

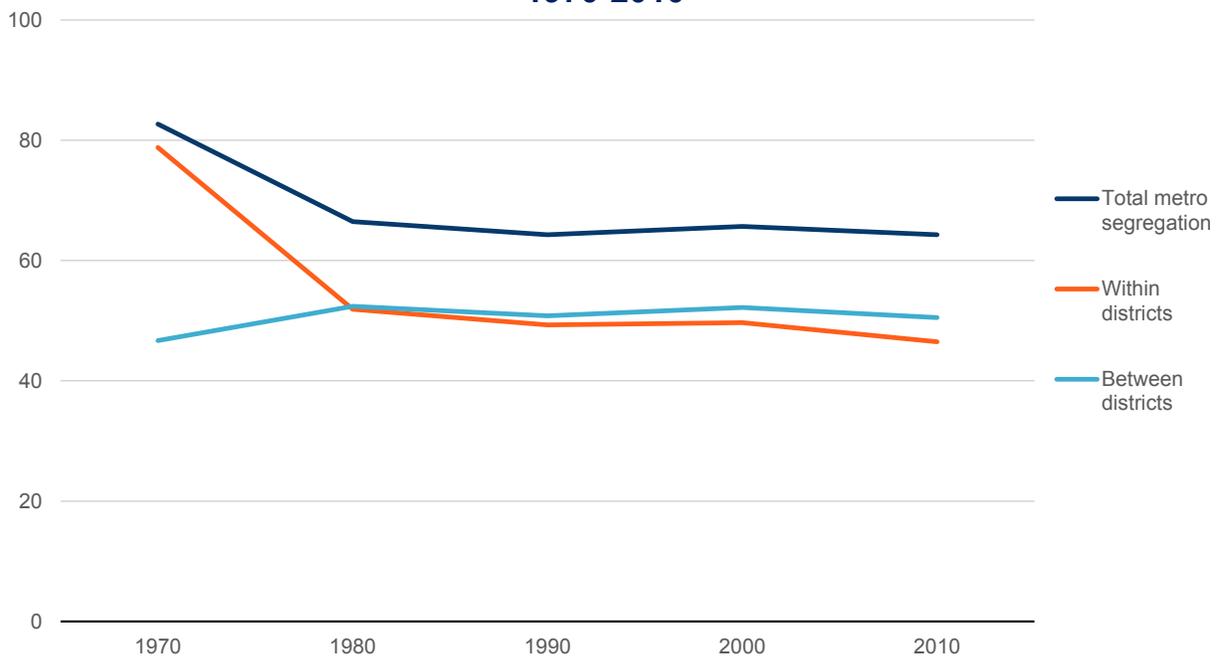
Logan, Oakely, and Stowell also find that between-district segregation rose slightly after 1970, cancelling out some reductions in within-district segregation during that period.⁶¹

[Integration gains] were concentrated in shifts within school districts, which is where enforcement actions have almost always been targeted. There was nearly a 40 percent fall in segregation at this level. But these gains were partly counterbalanced by increasing between-district segregation... The trends are consistent with the interpretation that in this era when black-white separation in schools could no longer be taken for granted, white families with children were systematically selecting homes in school districts with smaller minority populations. We have not measured white flight directly, but we infer it from rising between-district disparities. White flight was of

sufficient magnitude to limit gains from desegregation, but not to nullify them.⁶²

The legal pressure for desegregation did not extend beyond district borders, however. In *Milliken v. Bradley* (1974), the Supreme Court ruled that administrators were not obliged to counter growing inter-district segregation by providing cross-district busing options or merging neighboring districts.⁶³ In a forthcoming paper, Logan, Zhang, and Oakley find that between-district segregation did stop rising around 1980, as racial residential segregation lessened.⁶⁴ The chart below plots the black-white dissimilarity index between schools within each district, between schools within metros, and between districts within metros:⁶⁵

Figure 2. Metropolitan-level black-white dissimilarity index, 1970-2010



Source: John R. Logan, Weiwei Zhang, and Deirdre Oakley, "Court Orders, White Flight, and School District Segregation, 1970-2010," forthcoming.

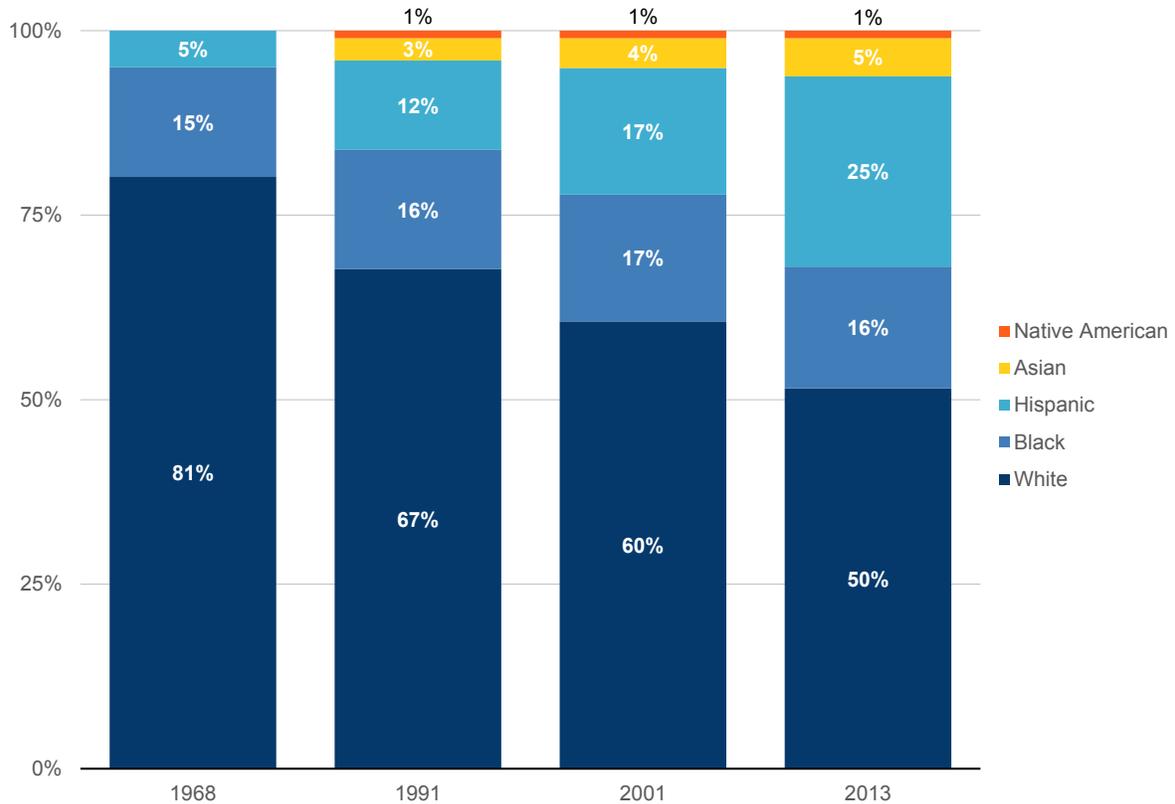
The basic story in terms of black-white segregation is a rapid fall in segregation after civil rights legislation, offset during the 1970s by some increased segregation between school districts (even as within-district segregation continued to fall), and a broadly flat trend since the early 1980s.

DEMOGRAPHIC CHANGE SINCE THE LATE 1980s

Meanwhile, the American student body as a whole has become more racially diverse, especially as a result of an influx of Hispanic students since the early 1990s. The Hispanic share of public school enrollment doubled between 1991 and 2013, from 12 percent to 25 percent. Meanwhile,

the white share fell from 67 percent to 50 percent and the black share remained stable at around 16 percent.⁶⁶

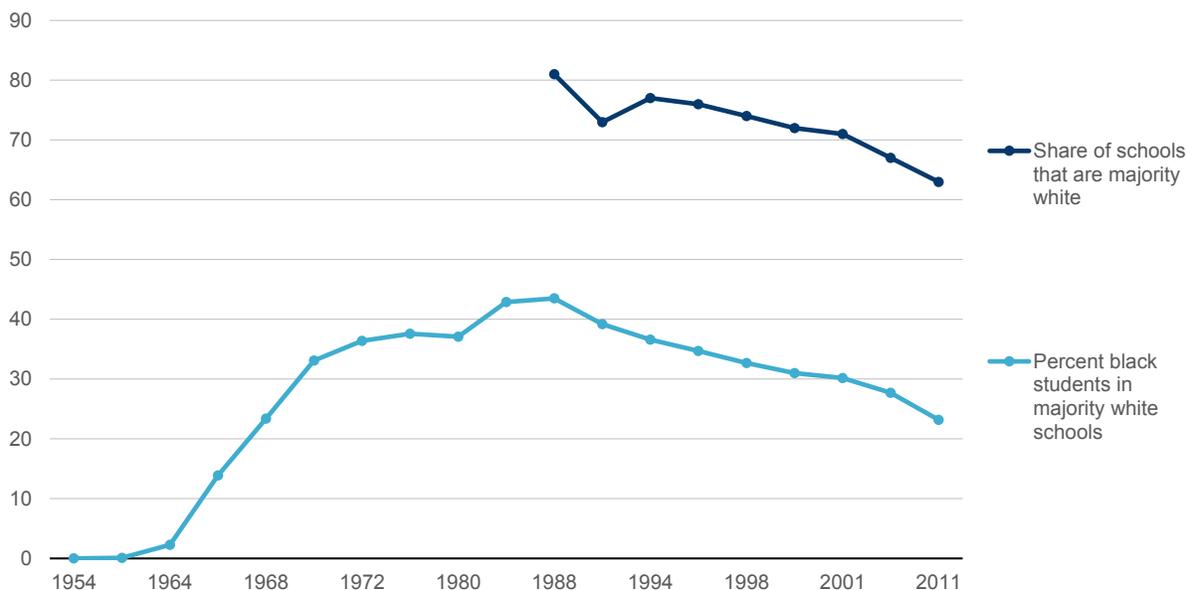
Figure 3. Public school enrollment by race, 1968-2011



Source: 1969, 1991, and 2001 data from: Gary Orfield and Erica Frankenberg, with Jongyeon Ee and John Kuscera, "Brown at 60: Great Progress, a Long Retreat and an Uncertain Future" (Los Angeles: The Civil Rights Project at UCLA, 2014). 2013 data from: National Center for Education Statistics, "Racial/Ethnic Enrollment in Public Schools," May 2016.

These changing national demographics make it tougher to track trends in segregation. Schools have become more diverse, with fewer majority-white or majority-black simply because there are fewer whites and more Hispanics. This means that certain segregation measures have to be handled carefully, in particular those that rely on exposure to whites. Take this chart as an example, showing the percentage of black students in majority-white schools (i.e., over 50 percent white):⁶⁷

Figure 4. Falling exposure rates between 1988-2011: Perhaps not as bad as it first looks



Source: Author's calculations using IPUMS CPS and Common Core of Data.

After rising rapidly from the 1960s through the 1980s, the percentage of black students in majority-white schools actually fell from 44 percent in 1988 to 23 percent in 2011.⁶⁸ An immediate interpretation of this chart might be something along these lines: “there was some dramatic desegregation after civil rights legislation, but it looks like from the late 1980s, some re-segregation has taken place.” Indeed, many observers have drawn this conclusion.⁶⁹ But since the late 1980s, schools have become less white in general, largely because of a rise in the number of Hispanic students. Since white students are a smaller share of the total population, it’s “harder” for black children to attend a majority-white school.⁷⁰ The number of majority-white schools in the U.S. fell from 81 percent in 1988 to 58 percent in 2013.⁷¹

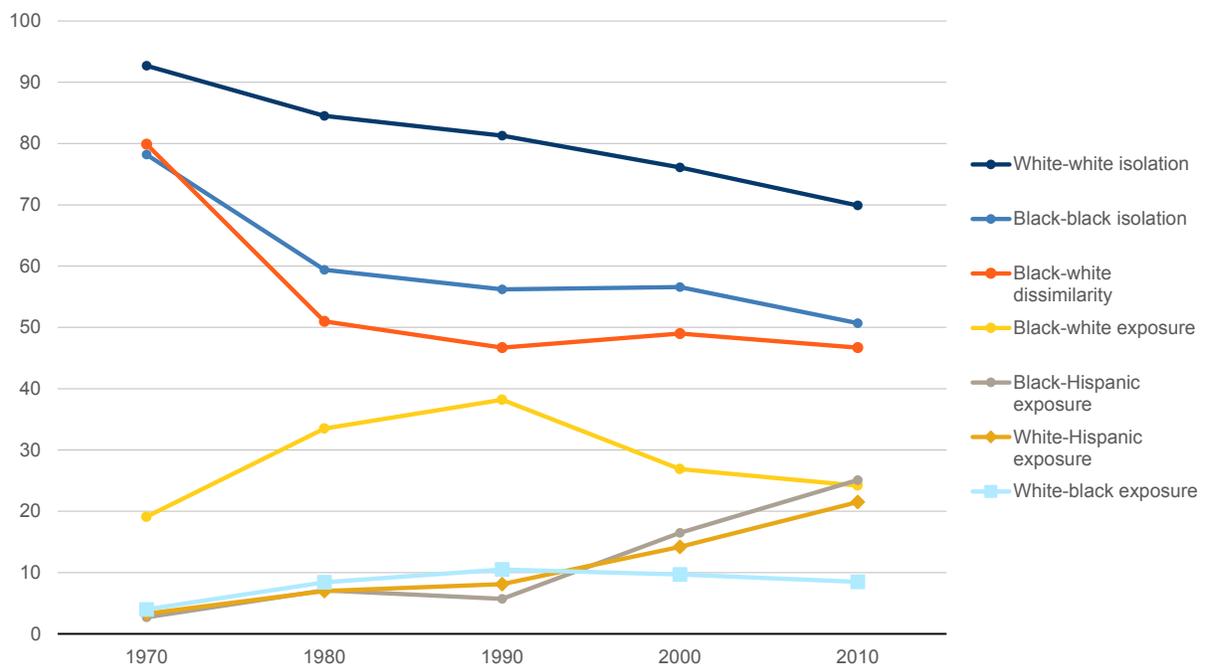
Exposure measures are still useful in terms of seeing how the school experience differs for students of different races. From the perspective of broader race relations, we may well be concerned, for instance, with the degree to which white and black students are educated together and interact with each other, even if there are fewer majority-white schools.⁷² There may be fewer black students at majority-black schools, but there are many black students attending schools that are heavily-minority (i.e., more than 90 percent black and Hispanic).⁷³ The key is to understand what particular kind of segregation is being expressed through each measure, and what other factors may influence it.

The indices that measure segregation between multiple groups, rather than just between two, can help to fill out the broader picture.⁷⁴ But they also have limitations. In some metro areas,

an influx of Hispanic students “diversified” schools that predominantly served black students. In these cases, the Theil index might show a slight lessening of segregation. But if black and Hispanic students are treated as a single minority group, their segregation from whites may actually have increased.⁷⁵ If the black and Hispanic students are still in lower-quality schools, a white-minority measure might be more meaningful than a Theil/diversity measure that treats black and Hispanic students as separate groups.⁷⁶

Forthcoming research from Logan, Zhang, and Oakey shows how increased diversity has influenced various segregation measures for elementary schools (note that their dissimilarity index is a within-district measure, averaged across the nation):⁷⁷

Figure 5. School racial segregation measures (within-district)



Source: John R. Logan, Weiwei Zhang, and Deirdre Oakley, “Court Orders, White Flight, and School District Segregation, 1970-2010,” forthcoming.

These findings show how changes in the racial composition of the overall student population have impacted the various segregation measures: less white isolation, less black isolation, and more exposure of black and white students to Hispanic students, but less black-white exposure. Both black and white students have become much more likely to share classrooms with Hispanics, but not more likely to share classrooms with each other.

Most studies of recent trends using dissimilarity or Theil indices find a slight increase in black-white segregation during the 1990s, followed by a slight fall in the 2000s.⁷⁸ Stroub and Richards compare Theil indices from 1993 and 2009 for a range of racial categories, including

a white-minority contrast, and find modest declines in segregation.⁷⁹ But there was significant variation across cities: two out of three showed a decline in segregation, but one in three saw an increase, often as a result of policy changes that rolled back integration efforts.⁸⁰

School districts and metro areas that were released from court-ordered desegregation plans during the 1990s and 2000s showed a marked trend towards greater segregation, especially in the South. In a comprehensive study of 483 districts under desegregation orders in 1990, Reardon et al. find that “within 10 years of release, the white/black dissimilarity index grows by an average of 6.4 percentage points in Southern districts, a sizeable amount (roughly a third of the 1990 standard deviation of segregation levels for districts under order).”⁸¹

Two specific examples: in 2010, the Wake County school board in North Carolina effectively repealed its diversity assignment policy, which had reassigned 1,000 students from schools in lower-income areas to schools in higher-income areas. After repeal, these students were assigned to schools that were closer to home, but often poorer and more heavily minority.⁸² Since 2008, the number of Wake County schools where minority students make up more than 70 percent of enrollment has doubled, even though minority enrollment only increased by 3 percentage points in this period.⁸³ Similarly, the 2001 repeal of race-based busing in North Carolina’s Charlotte-Mecklenburg schools, after which half of students were reassigned to neighborhood schools, led to a “marked increase in segregation.” The share of students that attended schools that were at least 65 percent black almost doubled in the space of just one year, from 12 percent in the 2001-02 school year, to over 21 percent in 2002-03, while the minority/non-minority dissimilarity index jumped almost 10 percentage points.⁸⁴

Overall, racial segregation trends were relatively flat when averaged to the national level during the 1990s and 2000s. The national figures, however, mask significant variation across places—many have become slightly more integrated, while others have become more segregated.

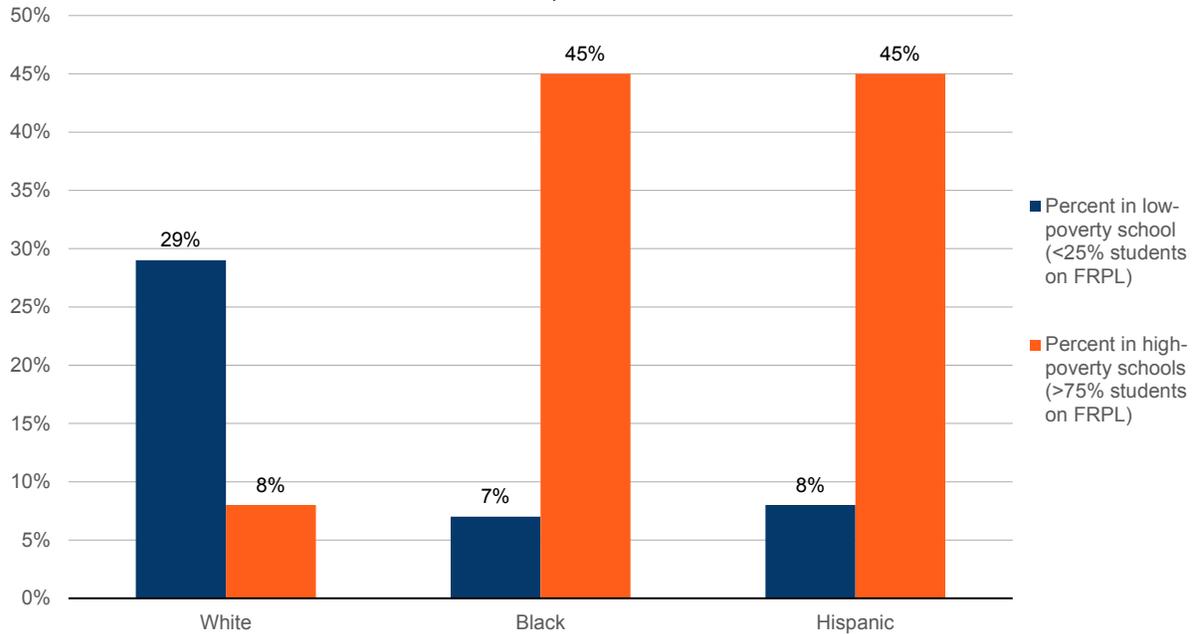
ECONOMIC SEGREGATION

The focus of this paper is on segregation by race. But race and economic status are related for social and historic reasons, and economic segregation matters in its own right. The review by Reardon and Ann Owens suggests that income-based residential and school segregation increased between 1970 and 2009.⁸⁵ The general finding is that economic segregation appears mostly between districts, rather than within them.⁸⁶

Combining race and economic factors in measures of segregation allows us to look at the important intersection between the two. There are, for example, large differences in the number of poor children in the schools attended by white, black, and Hispanic students.⁸⁷

Another way to examine the link between race and economic status in schools is to calculate how many students of different races are in high-poverty and low-poverty schools (with more than 75 percent receiving free or reduced-price lunch, or FRPL, or fewer than 25 percent FRPL, respectively). White students are more than three times as likely to be in an affluent school than a poor one, whereas black students are more than six times as likely to be in a poor school as an affluent one.⁸⁸

Figure 6. Exposure to low- and high-poverty schools by race, 2012-13



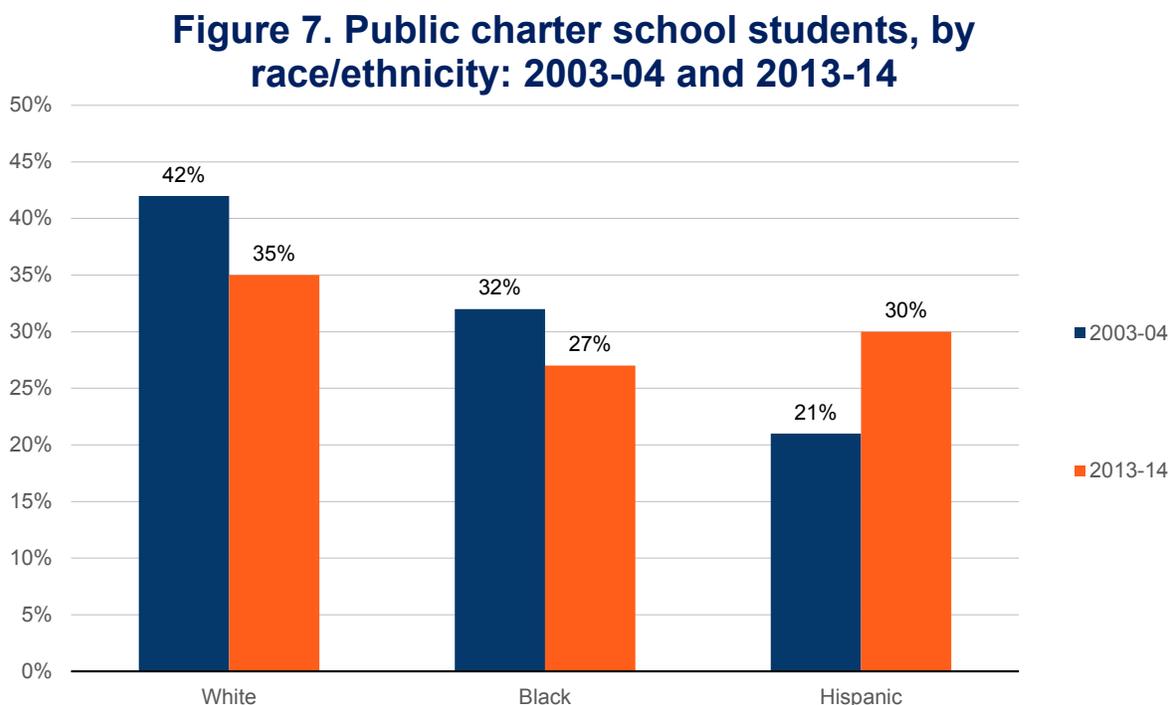
Source: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 2012-13. (This table was prepared December 2014.)

4. Charter schools and segregation: The evidence

We have examined segregation, especially in terms of race, across all public schools. But an important question for policy is whether particular school systems, admissions procedures, or school types influence patterns of segregation. In particular, the relationship between charter schools and segregation has attracted considerable attention.

Charter schools form a small but growing part of the school systems of many states. Enrollment in charters increased from 0.8 million (1.6 percent of total public school enrollment) to 2.5 million (5.1 percent) between the 2003-04 and 2013-14 school years, according to National Center for Education Statistics data.⁸⁹ There is wide variation between states: from zero in states without charter laws,⁹⁰ to 4.6 percent in Texas, 8.3 percent in California, 8.5 percent in Florida, and 17.8 percent in Arizona.⁹¹ Together these four states account for almost half of national charter enrollment.⁹²

Who attends charters? In terms of race, charters serve almost equal numbers of white, black, and Hispanic students, and are becoming more balanced in terms of racial share over time:⁹³



Source: National Center for Education Statistics, *Digest of Education Statistics*, Table 216.30, http://nces.ed.gov/programs/digest/d15/tables/dt15_216.30.asp.

Despite this racial balance in overall numbers, there are signs that charters may be more segregated than comparable traditional public schools (TPS). The challenge here is that since charter schools make up only a small number of schools, measuring their levels of segregation requires care in selecting comparable TPS. Again, measures matter. The two main approaches taken by scholars are:

i) *longitudinal studies*, which track children moving into charters from TPS and compare the demographics of the two.

ii) *area-based studies*, which compare charters to TPS in the surrounding area. The extent of this area is defined differently by researchers; it could be the neighborhood, the district, the metro, or even the state. This choice makes a big difference to the results.

LONGITUDINAL STUDIES OF CHARTERS AND SEGREGATION

Longitudinal studies examine the flows of students from TPS into charters, and, by comparing the racial composition of the old school and the new school, estimate the aggregate impact on segregation.

The schools in PresidentTown can be used help to illustrate the basic methodology. Say Hamilton High (the mostly white school) becomes a charter. If a white student then leaves Jefferson High for Hamilton, segregation will increase, because Hamilton would be more white (and Jefferson more black).⁹⁴

Longitudinal studies are valuable, since they track real moves by real students. But they are data-intensive and can only be conducted at a local level. This means findings cannot be necessarily extrapolated to other places or to the national level. Because of the time lag required to collect the data, these studies are also often backward-looking in terms of the policy landscape.

The headline result of most longitudinal studies is that students typically move into a charter school that is more segregated than the TPS they leave. But importantly, this pattern varies by place and race. Black students, in particular, often move to charters that have more black students than their previous TPS. The key findings from the principal longitudinal studies are:

- In Texas, “whites, African Americans, and Latinos transfer into charter schools where their groups comprise between 11 and 14 percentage points more of the student body than the traditional public schools they are leaving.”⁹⁵
- In California, charter students enter schools slightly more diverse than the TPS they left, with

one exception: black students. “The typical black transfer moves from a traditional public school that is 39 percent black to a charter that is 51 percent black.”⁹⁶

- In San Diego, open-enrollment charter schools increased segregation, in contrast to the district’s magnet schools and integration busing program, which decreased racial segregation. “The [charters] increase the exposure of whites to Asians but decrease the exposure of whites to blacks and Hispanics...The Choice open-enrollment program does the least to boost integration, and across some measures of diversity, it actually segregates the district’s schools.”⁹⁷
- In North Carolina, both black and white charter students ended up in more segregated schools. Black switchers “transferred from traditional public schools that are 53 percent black, on average, to charter schools that are 72 percent black, on average.”⁹⁸
- In Arizona, where by the late 1990s around 5 percent of students attended charters, black students, especially at the elementary level, move into more racially segregated schools.⁹⁹ The average black mover enters an elementary charter that has 29 percentage points more black students.¹⁰⁰
- Across eight states from the mid-1990s to the mid-2000s, “students are moving to charter schools with racial compositions that do not differ dramatically from those of the TPSs they left behind.” But black students may be the exception to this pattern, at least in some places: in Texas, Ohio, Philadelphia, Denver, and San Diego, black movers all entered charters with a greater percentage of same-race peers.¹⁰¹

Overall, then, longitudinal studies suggest charter schools maybe be slightly more segregated than TPS. Importantly, this often seems to be the result of black students moving to predominantly black charter schools, especially in particular cities.

AREA-BASED STUDIES OF CHARTERS AND SEGREGATION

The second way to gauge the levels of racial segregation is to compare how far charter schools reflect the populations they serve. If the local TPS reflect the composition of the overall area more closely than charters, it is reasonable to worry that charters are leading to more segregation.

But here, too, it is important to be careful about what is defined as the “overall area.” Take PresidentTown as an example. Remember that Hamilton High is mostly white and Jefferson High is mostly black. This is because Hamilton is in the residentially-segregated “white half of town,” and Jefferson is in the residentially-segregated “black half of town.”

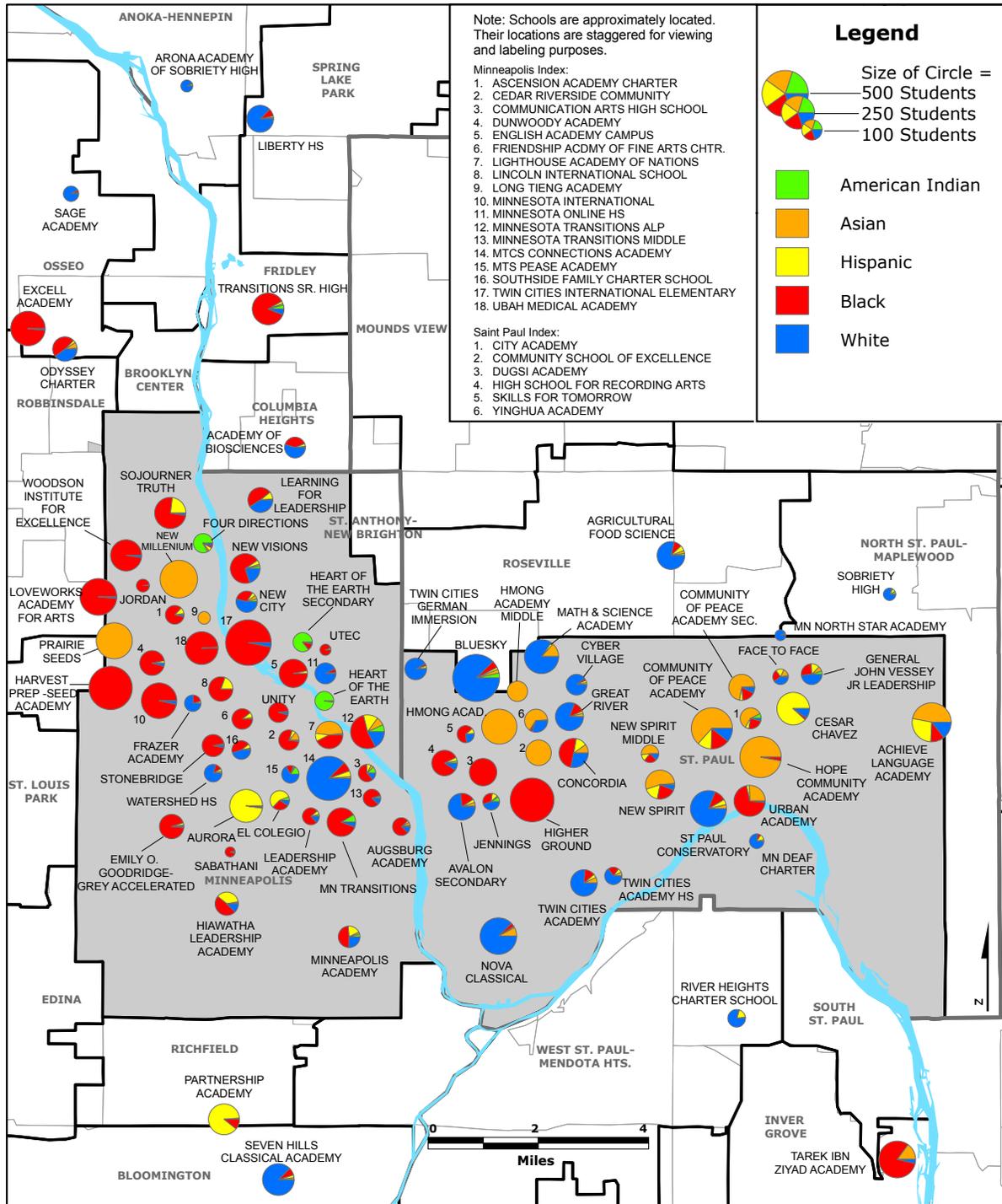
Now say a charter, Madison High, opens near Jefferson, and enrolls a first class that is 80 percent black. Does this 80 percent figure mean that Madison is more segregated than the traditional schools? It depends on the comparison area. The 80 percent black enrollment is way above the 38 percent representation of black students in the whole district, but actually below the TPS right next door: Jefferson, which is 95 percent black.

The main message of area-based studies, especially those of the highest quality, is that charters are more segregated along racial lines than TPS, especially for black students. There are also a few cases where the segregation of whites into charter schools is very pronounced. But the chosen area of comparison matters a great deal: more granular studies find smaller differences between charters and TPS. The main findings of area-based studies are as follows:

- Charter schools are more segregated than TPS at national, state, and metro levels. “Black students in charter schools are far more likely than their traditional public school counterparts to be educated in intensely segregated settings. At the national level, 70 percent of black charter school students attend intensely segregated minority charter schools (which enroll 90-100 percent of students from under-represented minority backgrounds), or twice as many as the share of intensely segregated black students in traditional public schools.”¹⁰²
- At a smaller geographical level, the picture is much more nuanced. It is true that charter enrollments differ significantly from national enrollment demographics. But charters aren’t located in nationally-representative areas. So national comparisons don’t tell us much. If we zoom in to the county level, for example, there looks to be little difference between charters and TPS.¹⁰³
- In the Twin Cities, “A geographical analysis shows that the racial makeups of charter schools mimic the racial composition of the neighborhoods where they are located...charter schools are segregating students of color in non-white segregated schools that are even more segregated than the already highly-segregated traditional public schools”: heavily white charters sit beside heavily black, Asian, or American Indian charters.¹⁰⁴

Figure 8.

**MINNEAPOLIS - SAINT PAUL (CENTRAL REGION)
Race and Ethnicity
Charter Schools, 2007-2008**



Data Source: Minnesota Department of Education

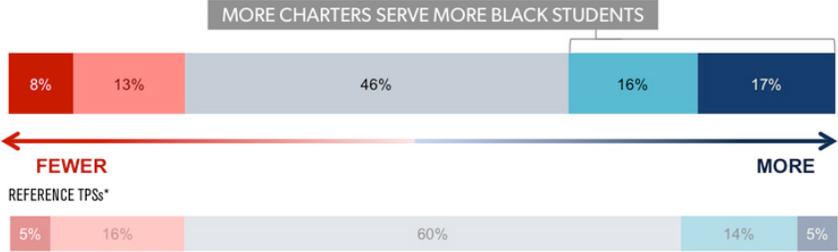
Source: Institute on Race and Poverty, "Failed Promises: Assessing Charter Schools in Twin Cities" (Minneapolis: University of Minnesota Institute on Race and Poverty, 2008).

- Charters in Michigan reflect the composition of the most residentially-segregated districts, but are more segregated than TPS in more residentially integrated districts: “Predominantly white rural or suburban districts or predominantly African American Detroit, reflect that racial segregation, and in some cases show evidence of greater racial integration. However, where charter schools draw their students from racially diverse districts—mostly central cities—they are less diverse than these districts.”¹⁰⁵
- Charters do not reflect the diversity of their surrounding areas as closely as nearby TPS, according to a new study by Nat Malkus, who draws on three datasets from the 2011-2012 school year, including the Department of Education’s Common Core of Data (CCD).¹⁰⁶ Malkus matches 4,800 charter schools to their five nearest TPS counterparts, which provides a fine-grained look at how charters compare to TPS.¹⁰⁷ He also creates a random sample of 25,000 TPS that mimics the urban-suburban-rural composition of the charter schools. Then, as with the charter schools, he compares these “control” TPS schools to their five nearest TPS. This allows him to report the difference not only between charters and nearby TPS schools, but between TPS schools in similar areas to charters and their neighboring schools. The first striking result is the heterogeneity of TPS schools. Ten percent of TPS have black enrollment shares that differ from their neighboring five TPS by more than 20 percentage points; 13 percent of TPS have similarly divergent white student shares. But charters show even more variation: 17 percent of charters enroll 20 percentage points or more black students than surrounding TPS. There are also more charters that enroll substantially more white students, and substantially fewer Hispanic students.¹⁰⁸

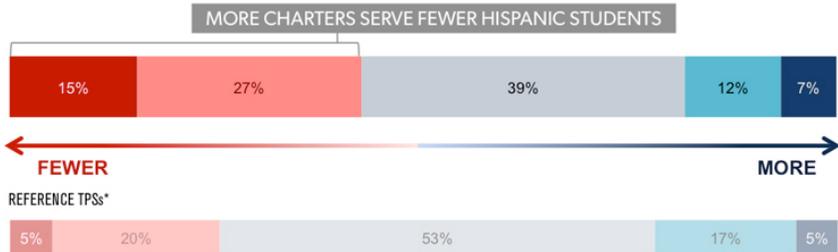
Figure 9.

■ LESS BY 20+%
 ■ LESS BY 5-20%
 ■ +5%
 ■ MORE BY 5-20%
 ■ MORE BY 20+%

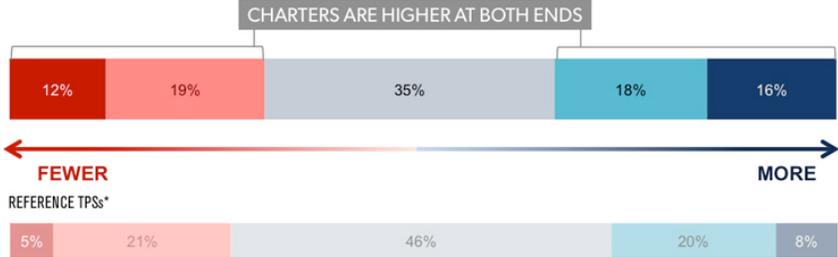
BLACK STUDENTS



HISPANIC STUDENTS



WHITE STUDENTS



Source: Nat Malkus, "Differences on Balance: National comparisons of charter and traditional public schools" (Washington: American Enterprise Institute, 2016).

Malkus also finds that charters tend either to enroll lots of low-income (FRPL) students, or very few, relative to the TPS comparison group.¹⁰⁹

On the basis of this study at least, it seems as if charters tend to have more homogeneous student bodies. Malkus's study, thoughtfully and carefully conducted, seems to confirm earlier analyses suggesting that, on average, charters are slightly more segregated, especially for black students. But it also reinforces the general finding that there is wide variation this front. Different metros, districts, and schools have very different patterns of segregation.

5. The impact of racial and economic segregation of schools on education outcomes

So far we have presented evidence on the extent of school segregation by race and family income. The next question is how much segregation influences certain outcomes, especially educational achievement. If policies intended to reduced segregation are primarily motivated by a desire to close education disparities by race, it is important to understand the relationship between them. Policy decisions that may be impacted by an understanding of the relationship between segregation and achievement include:

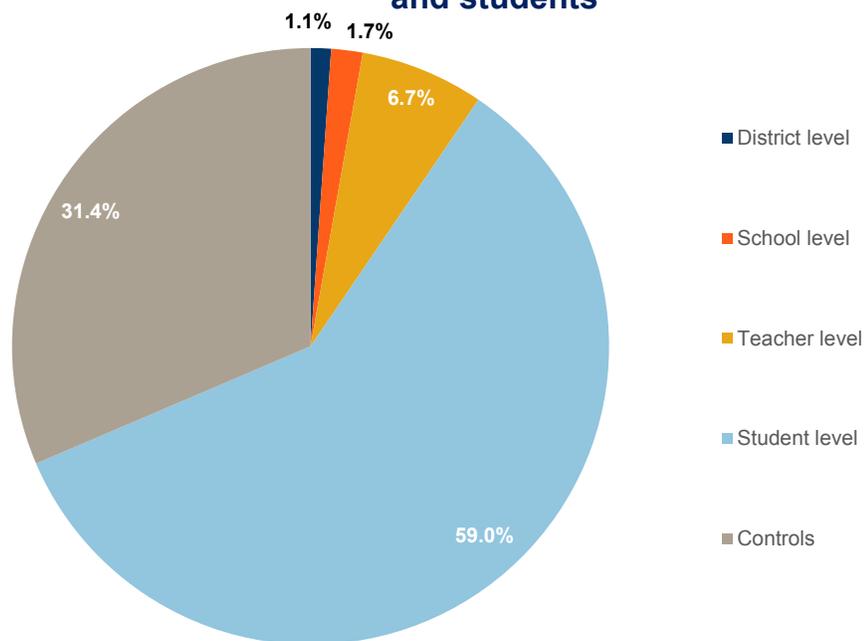
- economic busing: a district buses students to achieve rough parity in student composition among schools in different neighborhoods;
- controlled choice: parents rank-order the schools in which they want their child to enroll and the district's assignment algorithm places a thumb on the scale to achieve better integration;
- magnet schools: schools with special programs and often additional resources intended to draw more socioeconomically advantaged students to what would otherwise be highly segregated schools;
- open-enrollment: parents rank-order the schools in which they want their child to enroll and nothing other than the lottery number the parents draw determines school assignment;
- geographically wider assignment zones: encompass much larger and more economically diverse geographical areas in which parents have a higher priority for their child's enrollment in particular schools than would be the case with traditional neighborhood assignment zones; and
- housing policies intended to produce integrated neighborhoods that can support integrated neighborhood schools.

Consider, for example, the difference between controlled choice and open-enrollment. Controlled choice may result in more integrated schools by assigning many children to a school that is further down on their family's preference list than would be the case in an open-enrollment system, in which the goal is to produce the closest match between parental preference and school assignment. There are costs associated with interfering with parental preference in a choice system in order to achieve more integrated schools. Judging whether those costs are worthwhile requires clarity about the goal of the overall policy, an estimate of the benefits of integration, and, critically, what those benefits consist of and how they can be measured.

THE ASSOCIATION BETWEEN DEMOGRAPHICS AT THE SCHOOL LEVEL AND STUDENT ACHIEVEMENT

Before we examine the results from studies that are intended to shed light on the contribution of school economic and racial composition to student achievement, it is worth considering evidence on the bounds of the impacts of differences in schools on student achievement. The figure below, from Chingos, Whitehurst, and Gallager,¹¹⁰ illustrates the results of a variance decomposition analysis of where differences in student achievement lie. The figure displays a summary of the variance decomposition results from Florida and North Carolina. The summary represents the mean values from separate analyses for each state of reading and mathematics achievement scores in grades 4 and 5 for the 2009-2010 academic year:

Figure 10. Variance in student achievement associated with differences among teachers/classrooms, schools, districts, and students



Source: Grover J. "Russ" Whitehurst, Matthew M. Chingos, and Michael R. Gallager, "Do School Districts Matter?" (Washington: Brown Center on Education Policy at Brookings, 2013).

An oversimplified but, perhaps, helpful way to think about the statistical technique that generates the graph is that it calculates the differences in the means (the variance) of achievement scores for students at one level of the analysis, classrooms, relative to the variance in the means for students in those classrooms at the next level up, schools. It answers the question of how variable the scores are at the classroom level relative to the school's mean in which the classrooms are found. Ditto for schools relative to districts and districts relative to the grand mean for all students in a state. If, for example, students differ more among themselves in achievement depending on the school they attend within a district than the district

they attend within a state, the variance decomposition detects this and estimates the magnitude of the differences among students at the school vs. the district level.

The figure shows that only 1.7 percent of the variance in school achievement in the two states examined is located at the school level, whereas demographic characteristics of students used as controls, including race, eligibility for free and reduced price lunch, age, and cognitive disability account for 31.4 percent of the variance in student outcomes.

Using more detailed results from the same analysis,¹¹¹ we can tease out the contribution of the demographic variables to differences between schools, as opposed, for example, to differences between classrooms within schools. Of the 31.4 percent of the total variance in student outcomes that is attributed to demographic controls (per the figure), about one-fifth is located at the level of schools. In other words, 7 percent of the total variance in student achievement is associated with student demographics at the school level. That is a large share of the variance—on an order of magnitude of the variance associated with teachers.

METHODOLOGICAL ISSUES

School districts have an influence on the demographic composition of individual schools through their school assignment policies. What is the evidence on the impact of policy changes here?

The findings on the impact of school segregation on student achievement are suggestive rather than definitive. This is because few, if any, studies are based on research designs that permit strong causal conclusions with respect to school composition *per se*. The extant studies worthy of serious consideration are, by-and-large, of two types:

- intervention studies which estimate the impact of an intervention that moves minority students to more integrated schools; and
- observational studies in which statistical techniques are used to try to disentangle the effects of race and socioeconomic status from the many other variables that differ among schools and students.

The problem with the intervention studies is that they involve changes in many schooling variables in addition to the racial composition of the schools attended by the intervention and comparison groups. Suppose, for example, we compare a control group of low-income minority students who are given traditional neighborhood school assignments with an intervention group of otherwise similar students. The intervention group is given an opportunity to transfer out of their high-minority neighborhood school into a more geographically distant and racially diverse school. If the intervention group experiences better outcomes than the control group, is this because the schools to which they transferred were less racially segregated, served more

economically advantaged families, had better teachers, offered more rigorous coursework, had a culture that placed greater value on high achievement, were better resourced, were smaller, had a broader curriculum, had more stable and capable leadership, experienced more community support, had lower levels of discipline problems, or some combination of these and other things? It is difficult and often impossible in such a study to tease apart these multiple paths of influence and their interactions.

If the goal of the intervention is produce better outcomes for the students who experience it, then it doesn't make any difference whether the change in the racial composition of the schools attended by the intervention group is a critical component the success of the intervention. But if the goal is to use the results of the study to draw conclusions about the value of more racially integrated schools and to advocate for policies intended to achieve that outcome, then the evidence is weak. We will describe some important recent studies of this type and place them in context.¹¹²

The problems with the observational studies of the influence of racial and economic segregation on student achievement are the problems with nearly all observational studies seeking evidence of causal influences, whether they be about school segregation, diet, exercise, crime, or anything else. First, because there are many ways to control for the observed differences among the units being studied so as to isolate the impact of just one variable, e.g., the racial composition of a school's student body—different methods produce different answers. Second, there is no way to control for differences that have not been observed and measured.

Consider, for example, a study that examines the association/correlation of student achievement with the extent to which schools are racially segregated, controlling statistically for observed differences among schools in the sample on poverty levels in each school's student body, the experience of the teacher workforce, and the per pupil expenditure per school. If the finding is that school-level segregation is negatively correlated with student achievement, after adjusting for the listed control variables, we are left to worry about the impact of other variables not included in the equation, both those that are potentially measurable and might have been included, e.g., neighborhood demographics, and those not pragmatically measurable and thus impossible to include, e.g., parental attitudes towards education that are transmitted to children and are correlated both with achievement outcomes and with where parents choose to live and send their children to school. Was the correlation between segregation and achievement really reflecting one of the variables not included is the list of statistical controls rather than school segregation itself? The answer depends on the details of the observational design, including the extent to which variables that plausibly could affect the outcomes of interest are measured well and included as controls, the sophistication of the statistical treatment of the control variables, and the size and representativeness of the sample of participants.

Our focus here is on observational studies that do the best job of isolating the influence of

school-level segregation on student achievement from the impact of many other variables that can also affect student achievement. This is not because the variables controlled for statistically are unimportant influences on student achievement, or should not be front and center in discussions of education policies informed by race—but rather because they are plausibly exactly that. The question is whether school-level segregation, the focus of this report, is itself likely to be a strong direct influence on student achievement or whether it serves the role of a canary in a coal mine, signaling the presence of other factors like weak instruction that are actually the explosive elements.

The focus here is on intervention studies with strong external and internal validity that have implications for present and future policy choices with respect to school segregation. In both cases, the studies that draw our attention are recent and have stronger methods and more generalizability than older studies.

OBSERVATIONAL STUDIES

*The NCES study.*¹¹³ A 2015 report by the NCES examined the black-white achievement gap as it relates to the percentage of students in a school who identified as “black or African American,” i.e., the density of black students. The data were from the National Assessment of Educational Progress (NAEP) 2011 Mathematics Grade 8 Assessment (which provided achievement test results from a nationally representative sample of students), and from the CCD for 2010–11 (which provided school characteristics). The strengths of the study, along with the use of nationally representative data from a very large sample on an achievement test with league-leading psychometric qualities, are:

1) Disaggregation of the results by levels of density of black students in a school, rather than focusing on average results across the whole distribution (the important policy questions are not about “average” schools but about schools at various levels of segregation); and

2) The extensive set of control variables. The control variables for the analysis presented in the subsequent figure include:

- Student level: mother’s and father’s highest level of education, student National School Lunch Program (NSLP) eligibility status, whether the student had an individualized education program, whether the student’s home had more than 25 books, whether the student’s home had an encyclopedia.
- Teacher level: whether the teacher had a higher education degree with a minor in mathematics, whether the teacher had a higher education degree with a major in mathematics, whether the teacher had used different methods to teach different students, whether the teacher assigned more than one hour of homework each night.

- School level: proportion of students in the school who were male, proportion of students in the school who were NSLP eligible, proportion of students in the school who had an individualized education program, proportion of students in the school who had as the highest level of parent education a high school diploma or more, proportion of students in the school who had as the highest level of parent education a bachelor's degree or more, proportion of students who had more than 25 books in the home, proportion of students who had an encyclopedia in the home.

The figure below presents the results without the control variables on the left, and with the control variables on the right. The horizontal axis in each figure presents the black student density for schools in four categories, e.g., black students are 0-20 percent of the student body. The vertical axes represent NAEP math scores. The bars representing the results for each category of black student density include: in dark blue at the top the average score for white students, in orange at the bottom the average score for black students, and in light blue in the middle the size of the gap in score points between white and black students. Results marked with an asterisk are significantly different ($p < .05$) from the 0-20 percent black student density category.

Figure 11. Black-white student achievement and achievement gap, by black student density category, without and with accounting for student, teacher, and school characteristics, Grade 8 mathematics: 2011



Source: "School Composition and the Black-White Achievement Gap," Figure 10, National Center for Education Statistics, 2015, http://nces.ed.gov/nationsreportcard/subject/studies/pdf/school_composition_and_the_bw_achievement_gap_2015.pdf.

Notice first in the figure that the results in the left graph, without controls, indicate both decreasing scores for both black and white students as black density increases as well as large gaps in math achievement by race in each density category (25 to 26 points, which, by way of comparison, is about the difference between the highest and lowest performing state in

the nation).¹¹⁴ In contrast, in the right graph, which includes the full set of student, teacher, and school controls, the size of the race gap in achievement is reduced by nearly half, from about 26 points without controls to about 14 points with controls. Importantly, the negative association between black student density and student achievement disappears entirely for white students and is present for black students only in the schools with the highest density of black students.

The results of this study support the conclusion that a large proportion of the race gap in achievement and the vast majority of the impact of black student density in schools on student achievement is carried by the control variables. These include (and emerge again in the other observational studies we cover): the socioeconomic status of families attending a school as well as the quality of the school itself (here indexed at the level of teacher qualifications to teach mathematics and the teacher's instructional practices). In broad strokes, the results of the NCES study suggest it is family poverty and weaker teaching that are the drivers at the school level of lower student achievement rather than racial segregation *per se*.

Our confidence in this conclusion is tempered somewhat by the inability of the authors of the NCES study to break apart the 60-100 density category of schools into 60-80 and 80-100, simply because there are too few observations in schools with more than 60 percent black students to have those separate categories. It is possible that the impact of being a student in a school in which 95 percent vs. 65 percent on the student body is black is different than would be suggested by looking only at the results for the 60-100 category in the graph.

This caveat aside, the results of the NCES study are clear. The large race gaps in achievement are the result of minority students, and especially black students, attending worse schools with poorer fellow students. Clearly a huge array of factors, including residential segregation, discrimination, criminal justice, urban development and so on, help to explain these racial patterns, which can be addressed in a similarly broad fashion by policymakers concerned with racial inequality but which lie well beyond the scope of this report. The key point is simply that in terms of education policy, the lower levels of student educational achievement in schools with high concentrations of minority students are due to correlates of race, including weak schools and the low socioeconomic status of the families of the student body, rather than the concentration of minority students itself.

*The Reardon study.*¹¹⁵ Reardon's analysis shares with the NCES study an examination of the association between density of black students and student achievement, with and without control variables. It differs from the NCES study in several respects, including its focus on metropolitan areas rather than the whole country, the use of state achievement test scores rather than the NAEP, and, most importantly, grounding in a theoretical model that motivates specific comparisons and contrasts that are unexplored in the NCES work.

The theoretical model identifies 16 characteristics of racial and economic density/segregation

and its corollary, exposure to students of the same or a different race. Importantly for our focus and for evaluating the generality of the conclusions from the NCES study, the model distinguishes between residential vs. school segregation at the district, neighborhood, and school levels.

Reardon’s study uses state accountability test scores in grades 3-8 in the years 2009-2012 in every public school district in the nation, aggregated to 339 metropolitan areas. Measures of segregation for schools are derived from the CCD, which includes for every public school racial composition and counts of students by NSLP eligibility. Residential segregation measures come from the American Community Survey, which includes racial composition and poverty rates for each census tract in the United States. Measures of the difference in exposure of black and white students are obtained by averaging school, district, or census tract racial composition or poverty rates within each metropolitan area and computing the difference in black (or Hispanic) and white students’ exposure.

The table below displays coefficients from models designed to isolate the primary dimensions of segregation driving the general association between segregation and achievement gaps. We will not describe the model testing and results in detail because the story they tell with statistical precision is revealed more intuitively by examination of the coefficients in the table.

Table 1. Coefficient estimates and hypothesis tests from multivariate regression models of the association between white-black achievement gap and segregation, 325 metropolitan areas, 2009-2012

	Model 1	Model 2	Model 3	Model 4
Difference between black and white students’ exposure to:				
a. District enrollment proportion black	0.256 (0.278)			
b. District residents proportion black	-0.432 (0.299)			
c. District enrollment proportion poor	0.680 *** (0.160)		0.111 (0.144)	
d. District residents proportion poor	0.137 (0.543)			
e. School enrollment proportion black		-0.157 (0.157)		
f. Neighborhood residents proportion black		0.145 (0.151)		
g. School enrollment proportion poor		0.636 *** (0.134)	0.597 *** (0.142)	0.687 *** (0.079)
h. Neighborhood residents proportion poor		0.267 (0.293)		

Source: Adapted from Sean F. Reardon, “School Segregation and Racial Academic Achievement Gaps,” CEPA Working Paper No. 15-12. (Stanford, CA: Stanford Center for Education Policy Analysis, 2015), Table 6.

Model 1 in the table includes the four between-district segregation measures. Notice that only the coefficient of proportion poor in the district's schools is statistically significant. The proportion black in the district's schools as well as the level of residential poverty or black density at the district level are not statistically significant correlates of school achievement.

Model 2 includes between-school enrollment segregation and between-tract residential segregation measures. Here, as in Model 1, only poverty at the school level makes a difference. Racial concentration at the school level is not statistically significant, nor is racial concentration or poverty at the neighborhood level.

Model 3 includes only the two statistically significant terms from the first two models, district poor and school poor. Here school poverty captures nearly all of the association between poverty and school achievement. District poverty is unimportant.

Finally, Model 4 includes only the measure of school level poverty. Notice that the coefficient of association (0.687) is larger than for any other combination of coefficients, including the combination of all the other measures (not presented in the table). In other words, all the predictive power for racial gaps in academic achievement in eight measures of school and district racial and economic segregation is captured in just one of those measures: the proportion of school enrollment that is poor. As Reardon puts it:

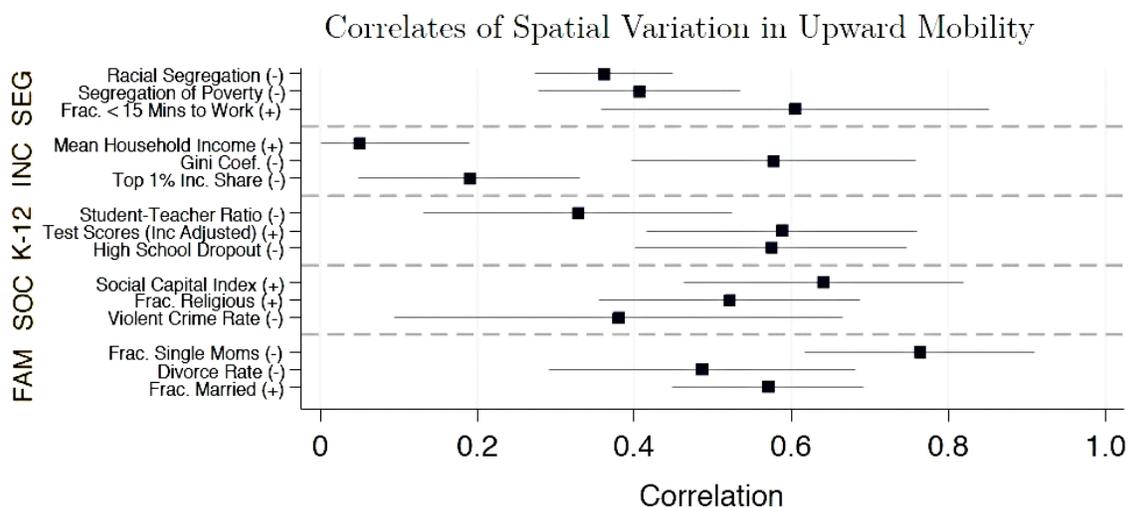
The results...are unequivocal. The racial difference in the proportion of students' schoolmates who are poor is the key dimension of segregation driving the association between segregation and achievement gaps.¹¹⁶

*The Chetty et al. study.*¹¹⁷ Chetty and his colleagues have a focus that is different from the school achievement outcomes in the NCES and Reardon studies. Their primary outcome is the difference between the earned income of parents and their adult children as obtained from IRS tax returns, translated into a measure of intergenerational mobility based on the expected rank of children whose parents are at the 25th national percentile. They utilize tax data from over 40 million parents and their children spanning 1996-2012. The data include both income tax returns (1040 forms) and third-party information returns (e.g., W-2 forms). They use Census and CCD information to develop geographical correlates of social mobility that start at the national level and penetrate down to the individual county level. Their primary analyses are with respect to 709 commuting zones, which are similar to the Census concept of an urban metropolitan area, but include the entirety of the U.S., including rural areas.

Our interest in their study is due to its inclusion of school quality, racial segregation, and economic segregation among the variables whose association with social mobility are examined. The figure below includes simple correlations between variables found to be

statistically associated with differences among commuting zones in social mobility:

Figure 12.



Source: Raj Chetty, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez, "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States," Figure VII, http://www.rajchetty.com/chettyfiles/mobility_geo.pdf.

Note that two measures of school quality, test scores adjusted for family income and the high school dropout rate, are very highly correlated with upward mobility. The magnitude of the correlation between both measures and upward mobility is nearly 0.6. Note also that racial and economic neighborhood segregation (the top two rows in the figure) also are associated with upward mobility, but at a lower level than the measures of school quality. Finally, note that the fraction of single mothers is by far the biggest correlate of upward mobility. The finding that the most powerful predictors are in the area of family background is consistent with the variance decomposition of student, classroom, school, and district effects on student achievement previously presented.

Putting together the results of the three observational studies we have examined, the patterns of associations among variables suggest:

- First, that the socioeconomic background of the student body of the school a student attends is a very strong predictor of achievement test scores and upward mobility, drowning out the possible influence of the racial composition of the student body as well as the influence of poverty and race at the neighborhood and district levels.
- Second, school quality, a strong correlate of school-level poverty, emerges as a possible mediator of achievement outcomes. School quality in the Chetty et al. and NCES studies is a powerful independent predictor of student achievement that, as we will see later, can override the negative association between school-level poverty and student outcomes. Knowing nothing about school quality, the best measure a parent could use to select a

school for her child would be the socioeconomic family background of the students attending the school. But if she had good information on the achievement outcomes of students in a school, particularly adjusted for their socioeconomic background, that would be a much better guide.

INTERVENTION STUDIES

We review two categories of intervention studies. The first set, the integration studies, examines the impact of interventions that move students from schools that are highly racially and economically segregated to more integrated schools that are, typically, in more economically advantaged neighborhoods. The second set, the charter studies, examines the impact of moving students from highly racially and economically segregated traditional public schools to highly racially and economically segregated charter schools that have a set of practices and an organizing philosophy focused on academic achievement, so-called no excuses charters.

The charter studies help inform decisions on education policies that are focused on improving the quality of schools without a particular concern with, or sometimes embracing, the overwhelmingly minority and poor status of their students.

Integration studies

The integration studies help inform decisions on education policies that are intended to reduce racial and economic segregation of public schools in order to increase student achievement. These include controlled choice, magnets, and residential policies (including housing vouchers that enable families to afford to live in more affluent neighborhoods and low-income housing set-asides that require housing developers to reserve a percentage of units in new housing developments for low-income families).

*Montgomery County.*¹¹⁸ Because racially and economically segregated housing generates racially and economically segregated neighborhood schools, one way to produce more integrated schools is through policies that lead to more integrated neighborhoods. One of the prevalent mechanisms to achieve this is with a regulatory set-aside that requires developers of new multifamily residential complexes to reserve a set percentage of their units for low-income families.

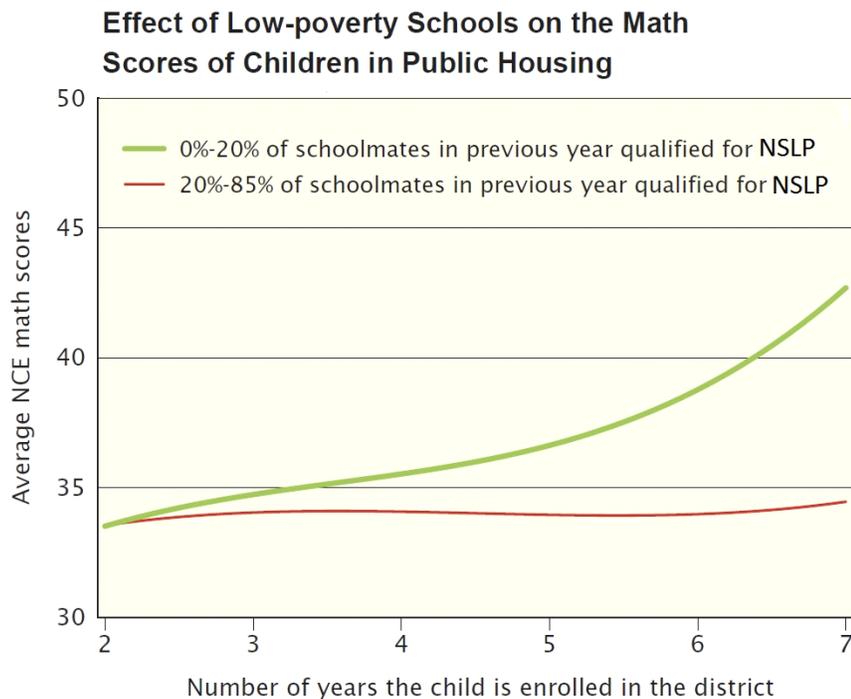
A procedurally different but conceptually similar approach has been taken by Montgomery County, Maryland, one of the most affluent counties in the nation. Montgomery County's zoning policy allows the public housing authority to purchase homes within each subdivision to operate as federally subsidized public housing. This permits low-income families to live in affluent neighborhoods and access neighborhood schools in which most of the students are from economically advantaged backgrounds. As of 2010, the housing authority operated 992 public

housing family apartments leased to very low-income families and spread across nearly all of the district's 131 elementary schools.

The housing authority uses a random lottery to assign applicants for public housing to a particular apartment. The effect is to randomly distribute low-income families across the elementary schools in the district, which vary by the poverty rates of their student bodies. In a 2010 study, the RAND Corporation carried out an analysis of the impact of differences in the poverty level of the overall student body of the schools to which students from the low-income public housing families were assigned.¹¹⁹ The outcomes of interest were math and reading achievement test scores on district and state tests.

Results for math achievement, which were stronger than those for reading achievement, are presented in the figure below.¹²⁰ The graph presents the trend line over time for math achievement scores reported in normal curve equivalents (NCE) for two groups of low-income lottery winners, those attending schools in which the overall level of poverty as marked by eligibility for the National School Lunch Program (NSLP) was very low (0-20 percent) vs. higher (20-85 percent). These differences in NSLP eligibility were associated with large differences in racial makeup (58 percent white in the 0-20 percent poverty schools vs. 22 percent white in the 20-85 percent poverty schools). The horizontal axis presents the longitudinal findings for each year of attendance in the district.

Figure 13.



Source: Heather Schwartz, "Housing Policy is School Policy: Economically Integrative Housing Promotes Academic Success in Montgomery County, Maryland" (New York: The Century Foundation, 2010), <https://tcf.org/assets/downloads/tcf-Schwartz.pdf>.

Differences between the two groups are not statistically significant until the fifth year of attendance. The differences increase, remain statistically significant, and are substantively important in the sixth and seventh year. In the seventh year they reached 0.40 of a standard deviation, which is a large effect for an education intervention.

Note that there was no change in the academic performance of low-income students in the higher-poverty elementary schools, even though the poverty levels in those schools were quite low by national standards. This effect is not driven by the highest-poverty schools: more detailed analyses by the authors of the study (not represented in the graph) demonstrate that the average student in public housing in a school with a poverty rate as high as 35 percent performed no better in math than the typical student in public housing in an elementary school with up to 85 percent poverty.¹²¹

In other words, the beneficial effect of Montgomery County's low-income housing on student achievement is limited to students who attend its very best, most economically advantaged elementary schools. Levels of economic integration that would seem visionary in most urban school districts, e.g., low-income children attending schools in which only about a third of their peers are poor, did not increase student achievement over time for low-income students or reduce gaps between low-income and more affluent students in Montgomery County.

Also worth noting is that an analysis by the RAND authors in the same report, identical to the one above but using neighborhood poverty levels instead of school poverty levels as the comparison of interest, found much smaller impacts than for school poverty levels. This is consistent with the previously described results from the Reardon observational study that school poverty rather than neighborhood poverty is the dominant influence on academic achievement.

The Montgomery County study demonstrates that children from low-income, predominantly minority families can benefit academically and close achievement gaps when they are long-term attendees in public elementary schools serving very affluent families. However, their achievement levels are static in public elementary schools serving even moderate proportions of low-income students. In other words, the impact of economic school integration on the achievement of students from disadvantaged backgrounds is decidedly nonlinear. These children benefit in terms of rising achievement levels over time only at the extreme positive end of the dimension of school poverty.

*Moving to Opportunity.*¹²² The Moving to Opportunity (MTO) experiment was conducted between 1994 and 1998 in five large U.S. cities. Roughly 4,500 families were randomly assigned to one of three groups: an experimental voucher group that was offered a subsidized housing voucher that required that the family move to a census tract with a poverty rate below 10 percent, a

Section 8 voucher group that was offered a standard subsidized housing voucher with no requirement for relocating to a low-poverty area, and a control group that retained access to public housing but was not offered a voucher. These group assignments produced large differences in neighborhood environments for comparable families, providing an opportunity to evaluate the impact of neighborhood and associated schooling on children.

A rigorous analysis of program effects four to seven years following random assignment found no impacts on the reading or math achievement of children, i.e., students from families in the three arms of the study performed at the same level.¹²³ This is consistent with the low impact of neighborhood poverty on achievement test outcomes reported in the Reardon and Montgomery County studies.

A recent analysis by Chetty and colleagues involves longer-term follow-up of children in the MTO study using earned income and college-going from IRS tax records as the outcomes of interest.¹²⁴ In addition to providing an overall impact estimate, the authors of the study report results disaggregated by subgroup: children who were below the age of 13 at the time of random assignment vs. older children. As indicated in the following table, the study finds a statistically significant positive impact on adult earnings for children who were less than age 13 at the time of random assignment to the voucher condition that required a move to a high-income neighborhood (the intent to treat, or ITT, estimate is based on the offer of the voucher whereas the treatment on treated estimate, or TOT, is based on the actual use of the voucher). For the younger children the Section 8 voucher also leads to positive findings, but they do not reach statistical significance. In contrast, the direction of influence for both the experimental and Section 8 voucher conditions is negative but not reaching statistical significance for children who were age 13 or older at the time their families were randomly assigned.

Results for college attendance and the quality of the college attended, not represented in the table, also were positive and statistically significant for the experimental group of younger children whereas they were negative, larger, as well as statistically significant for the children who were older at random assignment.

Table 2. Impacts of MTO on children’s income in adulthood W-2 earnings (\$)

	Children < age 13		Children age 13-18	
	ITT	TOT	ITT	TOT
Exp. vs. control	1339.8*	3476.8*	-761.2	-2426.7
Sec. 8 vs. control	687.4	1723.2	-1048.9	-2051.1

Source: Raj Chetty, Nathaniel Hendren, and Lawrence F. Katz, “The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment,” Table 3, 2015, http://scholar.harvard.edu/files/hendren/files/mto_paper.pdf.

The finding of positive long-term labor market and college-going impacts for younger children and negative impacts for older children, when combined with the results of the earlier analysis showing no impacts on achievement test scores, suggests that neighborhood poverty matters for outcomes that may be mediated by the expectations and behavior of peers such as college-going but not for academic achievement in school. For that, as the previously reviewed studies suggest, it is the school that matters.

The mixed effects for college-going and earned income, with signs in the positive direction for the children in the sample who were pre-teens at the time of random assignment and in the other direction for teenagers suggests, first, that neighborhood interventions should focus on families with young children. Second, if they do not, the overall program impacts on the outcomes for children, summing across all age groups, are likely to be small to nil.

Charlotte-Mecklenburg. A notable transition in large public school districts over the last decade is the growth of public school choice. In a well-designed public school choice system, families rank-order the schools in which they seek to enroll their children aided by available and easily understood comparative information on school performance. All public schools within a district are available as choices for all families. The assignment of a student to a particular school is entirely dependent on the family's preference, conditional on the lottery number they draw.

The conceptual advantage of such open-enrollment systems is that, coupled with available transportation for students, they break the bond between neighborhood demographics and school demographics and quality. Ordinarily, affluent families, by virtue of their place of residence, gain access to the best public schools. That need not be the case under a public school choice plan. However, the quality of the school a student attends by virtue of the parents' choice is dependent on the information available to the parents and how they use it.

Several studies have examined the impact of a public school choice program that operated in the Charlotte-Mecklenburg, North Carolina school district in the early 2000s, replacing three decades of busing. Similar to all school choice programs, parents rank-ordered their school preferences, which directly impacted their child's school assignment. Unlike typical choice systems, the one in Charlotte provided a preference to higher-poverty and lower-performing students who chose lower-poverty and higher-performing schools.

Hastings and Weinstein carried out an intervention study in which they demonstrate, first, that parents who are sent a printed form with information on the standardized test score averages from the previous year of schools that are available for choice choose higher performing schools than parents who have to rely only on the complicated, multidimensional information available on the district's website.¹²⁵ Second, they show that there are large impacts (effect size = 0.41) on student test scores of the quality of the school selected (as indexed by the school's previous

test scores). Thus, moving students to higher-performing schools via the information provided in the school choice process can have a significant impact on their achievement.

Deming et al. use the same Charlotte-Mecklenburg public school choice system to examine postsecondary outcomes.¹²⁶ In this case, they compare outcomes for students who won lottery admission to their first choice school vs. those who did not. They examine impacts on high school graduation, postsecondary attendance, and degree completion. They find no effects for males and large impacts for females. Females who won the lottery to attend their first choice school compared to the lottery losers had higher grade point averages, were more likely to take the SAT, completed significantly more college coursework, and were 14 percentage points more likely to complete a four-year college degree.

Most importantly for our focus and consistent with the results from the previously described study, the Deming et al. study finds that lottery winners with the largest gains in school quality relative to their neighborhood school experienced the largest gains in postsecondary attainment. Their findings also suggest that it is the instructional aspects of the school as captured by measures of teacher quality and value-added to academic achievement from baseline achievement scores that are the most important contributors to the observed impacts. They find that lottery winners from low-quality neighborhood schools who attend their first-choice school access peers that are significantly stronger academically than those in their neighborhood schools (e.g., 0.36 standard deviations higher eighth-grade math scores), but similar in terms of demographics.

Taken together, the two studies of the Charlotte-Mecklenburg choice system demonstrate that moving low-income minority students from low-quality neighborhood schools to higher-quality schools that are further away geographically through a choice system has an impact on student achievement and postsecondary success for some students, and that this impact appears to be mediated by school quality rather than the racial and economic composition of the student body in the choice schools.

Recall from the study of Montgomery County that schooling impacts for students from low-income families were found only in schools serving extremely economically advantaged and atypically white student bodies. That appears to differ from the Charlotte-Mecklenburg results. But there was no measure of school quality in the Montgomery County study and no comparison group of low-income students who did not have the opportunity by virtue of a housing policy to live in and attend any Montgomery County school. Further, the Montgomery County study was of elementary school students whereas the studies of Charlotte-Mecklenburg included high school. It may be that school quality is paramount and powerful when the alternative is a low-performing, high-poverty neighborhood school, whereas when the context and counterfactuals are the neighborhood schools in a very affluent suburban county, only extreme demographic

advantage makes a difference. And there are many reasons, including the results from the MTO study, to believe that the impacts for economic integration and school quality for younger students are different than for older students.

CHARTER STUDIES

The observational and intervention studies we have reviewed suggest, first, that the observed association between racial and economic segregation at the school level and academic achievement are largely a function of the socioeconomic background of families rather than race. Poverty at the school level is a strong correlate of academic achievement and academic gains. The intervention studies suggest that a significant portion of the association between school level poverty and academic achievement is mediated by school quality. In other words, it is that poor children get poor schools rather than poor children produce poor schools.

This hypothesis is strengthened considerably by research on charter schools, which are publicly-funded schools of choice that are managed outside the traditional school district system. As we described in our introduction, charter schools across the nation perform only slightly better than regular public schools.¹²⁷ But there is a subset of charter schools serving overwhelmingly black and poor students in large cities using a so-called “no excuses” education model in which students have experienced dramatically higher achievement than comparable students attending regular public schools. The impact of these schools has been examined in gold standard randomized designs based on comparisons of lottery winners who receive an offer of admission to their preferred charter school vs. lottery losers who typically remain in their neighborhood traditional public school.¹²⁸ The impact of these schools, including those that are not oversubscribed and thus not subject to a lottery for admissions, has also been examined in matched comparison designs in which academic gains are compared for similar students in these charter schools vs. the traditional public schools that most frequently lose students to these charters.¹²⁹ It is important to note that these schools educate a small proportion of students compared to traditional public schools and that there are caps on their growth in many states.

The research literature on charter school impacts is extensive and recent. We cite in the previous paragraph a meta-analysis, five random assignment lottery studies, and a national matched student comparison study. We will not provide a detailed analysis of these studies. Rather, we focus on the outcomes that are most important with respect to the impacts of school quality and racial/economic segregation on student achievement. These are that:

- Student achievement is substantially higher in urban charter schools, in particular those that focus on academic achievement, than in comparison traditional public schools serving the same neighborhoods and students. The national quasi-experimental study finds that

students enrolled in urban charter schools experience 0.06 standard deviations greater growth in math and 0.04 standard deviations greater growth in reading per year than their matched peers in traditional public schools.¹³⁰ A study of Boston charter middle schools using a random assignment lottery design found that they generate gains of about 0.36 of a standard deviation per year in math and 0.12 of a standard deviation in reading.¹³¹ These are very large impacts, and they can cumulate from year to year.

- Charter school impacts are substantially larger for low-income and minority students than for more advantaged students. A study carried out by the federal government's Institute of Education Sciences included virtually every charter nationally that was oversubscribed, subject to a lottery, and had achievement test scores available. The study found that the percentage of students eligible for free or reduced-price meals in a charter school was positively and significantly related to impacts on mathematics scores. In other words, the poorer the student body, the better the school performed. In contrast, charter schools serving fewer disadvantaged students had statistically significant negative impacts on both reading and mathematics.¹³² Similarly, a study of Massachusetts charters found that urban charter middle schools generate much larger positive effects for non-whites and free-lunch-eligible applicants than for white applicants. At the same time, nonurban charters do not seem to be raising scores for the same type of student. The authors conclude that, "this suggests that something about the schools themselves rather than the student body composition drives large urban charter gains."¹³³
- The urban charter schools producing these substantive academic gains are often more segregated than traditional public schools serving the same general catchment areas, according to the studies described in the previous section. Urban charters disproportionately serve low-income and minority, particularly black, students.

The takeaway from the charter studies, when combined with the research previously reviewed, is that school quality is the primary determinant of student achievement. Race matters primarily through its association with poverty, and poverty matters primarily through its association with school quality. As seen in the charter studies, high-quality schools can exist and thrive with little racial or economic diversity. In fact, some of the high-performing charters have a curriculum and approach that is tailored to the unique needs of a relatively culturally, racially, and economically homogenous student body. Note in this regard that white students see limited or no academic gains in the very same Boston charter schools in which gains for black students are impressively large.¹³⁴

These findings and conclusions do not, of course, support an argument for more racially and economically segregated schools. They do, however, provide evidence that supports a focus on quality schools for students and suggest that economic and racial integration of schools is an indirect route to that goal, and not necessarily essential to its achievement.

6. Conclusion

The U.S. is an increasingly diverse nation, but remains a highly segregated one. Our schools reflect both our separateness and our inequality. Hispanic and especially black students are more likely to be poor, to live in low-income neighborhoods, and to attend lower-quality schools.

The segregation of schools has been a political flashpoint in U.S. history, and a key element in the civil rights movement and the legislation it inspired. It is hardly surprising that evidence of racial segregation in schools provokes strong reactions. In large part this is because separate has almost always, in practice, meant unequal.

Following the sharp drop in the segregation of black and white students in the 1960s and 1970s (somewhat undermined by suburban “white flight”), the diversification of schools in recent decades has been driven largely by the increase in the Hispanic and Asian American populations. While there is wide variation between different parts of the country, on aggregate, black and white students have become no less segregated from each other in recent decades.

The desire for more integrated schools is understandable. But it is helpful to be as clear as possible about what lies behind that desire. If the main objective is to narrow racial achievement gaps, we need to understand to what extent, and in what way, segregation influences those gaps. The weight of evidence suggests that, at least in the context of the education system, the worse educational outcomes for minority students are the result not of the racial composition of their schools, but the economic backgrounds of their fellow students, and the quality of the school itself—both of which are strongly correlated with race.

Studies of urban charter schools provide some of the most compelling evidence for the proposition that good schools can make a big difference, especially for students in the most disadvantaged circumstances. But charter schools are also, on average, more racially segregated than traditional public schools—especially for white and black students. Policymaking is always a balancing act, and requires a careful weighing of different objectives that may not always run easily together. Reducing school segregation and improving the quality of schools serving minority students are both important goals, but they are not the same. Policy should be based on a clear idea of what goals we are trying to achieve, and on the best evidence for how to reach them.

Endnotes

1. <https://www.propublica.org/article/ferguson-school-segregation>
2. A Google search within News on “school segregation” returns 78 percent more hits for the most recent 12-month period ending in July of 2016 with the same 12-month period a decade earlier.
3. <https://medium.com/@JohnKingAtED/stronger-together-why-our-budget-supports-voluntary-community-led-efforts-to-increase-diversity-53b45a5f49df#.wowojumji>
4. Sarah J. Reber, “School Desegregation and Educational Attainment for Blacks,” *Journal of Human Resources* 45 (2010): 893-914.
5. Sean F. Reardon, “School Segregation and Racial Academic Achievement Gaps,” CEPA Working Paper No.15-12 (Stanford, CA: Stanford Center for Education Policy Analysis, 2015).
6. Raj Chetty, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez, “Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States,” June 2014, http://www.rajchetty.com/chettyfiles/mobility_geo.pdf.
7. Julian R. Betts and Y. Emily Tang, “The Effect of Charter Schools on Student Achievement: A Meta-Analysis of the Literature” (Seattle: National Charter School Research Project, October 2011).
8. <https://www.brookings.edu/research/massachusetts-charter-cap-holds-back-disadvantaged-students/>
9. Nat Malkus, “Differences on Balance: National Comparisons of Charter and Traditional Public Schools” (Washington: American Enterprise Institute, August 2016).
10. Peter Cunningham, “Is School Integration Necessary?” *U.S. News & World Report*, August 5, 2016, accessed October 12, 2016, <http://www.usnews.com/opinion/articles/2016-08-15/segregated-schools-may-not-be-that-bad>.
11. Rucker C. Johnson, “Long-run Impacts of School Desegregation & School Quality on Adult Attainments,” NBER Working Paper No. 16664 (Cambridge, MA: National Bureau of Economic Research, January 2011).
12. Sean F. Reardon and Ann Owens, “60 Years After Brown: Trends and Consequences of School Segregation,” *Annual Review of Sociology* 40 (2014): 199-218; Steven Rivkin, “Desegregation Since the Coleman Report,” *Education Next* 16, no. 2 (Spring 2016): 28-37; John R. Logan, Weiwei Zhang, and Deirdre Oakley, “Court Orders, White Flight, and School District Segregation, 1970-2010,” forthcoming.
13. Statistics on school segregation based on counts of schools generate different results than statistics based on counts of students. For example, 82 percent of white students attended majority-white schools in 2013 whereas 60 percent of public schools were majority-white [compare the 2013 data from https://nces.ed.gov/programs/digest/d15/tables/dt15_216.55.asp with http://nces.ed.gov/programs/coe/indicator_cla.asp figure 2]. These differences reflect a negative correlation between school size and white enrollment. Majority-white schools have smaller enrollments than public schools in general and thus white students can be a majority in the schools they attend (82 percent), and a majority in a majority of schools (60 percent) while being only 50 percent of the population served by public schools.
14. Among schools with at least 10 students.
15. https://nces.ed.gov/programs/digest/d15/tables/dt15_216.55.asp
16. John Logan, “Resegregation in American Public Schools? Not in the 1990s” (Albany, NY: Lewis Mumford Center for Comparative Urban and Regional Research, 2004), <http://www.s4.brown.edu/usschools2/reports/report1.pdf>.
17. Ann Owens, Sean F. Reardon, and Christopher Jencks, “Income Segregation between

Schools and School Districts,” *American Education Research Journal*, forthcoming, <http://cepa.stanford.edu/content/income-segregation-between-schools-and-school-districts>.

18. http://cps.edu/About_CPS/At-a-glance/Pages/Stats_and_facts.aspx.

19. *Parents Involved in Community Schools v. Seattle School District No. 1 et al.*, 551 U.S. 701 (2007).

20. <https://nextcity.org/features/view/the-integrationists>.

21. <http://www.diversecharters.org/home>.

22. Dana Goldstein, “Integration and the ‘no excuses’ charter school movement,” *The Washington Post*, June 2, 2011, accessed October 10, 2016, https://www.washingtonpost.com/blogs/wonkblog/post/integration-and-the-no-excuses-charter-school-movement/2011/06/02/AGmKLRHH_blog.html; Alexander Russo, “Diverse Charter Schools,” *Education Next* 13, no. 1 (Winter 2013): 28-34; Richard D. Kahlenberg, “From All Walks of Life: A New Hope for School Integration” *American Educator* (Winter 2012-13): 1-14; Richard D. Kahlenberg and Halley Potter, *Diverse Charter Schools: Can Racial and Socioeconomic Integration Promote Better Outcomes for Students?* (Washington: Poverty & Race Research Action Council and The Century Foundation, May 2012), https://tcf.org/assets/downloads/Diverse_Charter_Schools.pdf; <http://www.chalkbeat.org/posts/tn/2014/09/16/bucking-statewide-trend-a-nashville-charter-school-makes-diversity-a-central-goal/#.V36xCjkrJQJ>.

23. This data touches on an especially contentious question in the charter-traditional public school discussion: whether charters disproportionately “skim” non-ELL and non-special education students from the traditional public schools.

24. Reardon and Owens, “60 Years After Brown.”

25. The Healthy, Hunger-Free Kids Act of 2010 includes a provision called “community eligibility” allowing schools with at least 40 percent of students in families participating in anti-poverty programs (like SNAP or TANF) to provide free lunch to all students. By 2015, about 13 percent of students attended schools that had adopted community eligibility. This policy makes sense, not least since it reduces administrative costs and pushes up take-up rates. The problem for researchers is that school lunch data have become a weaker proxy for poverty rates: now we can’t tell the difference between a school where 40 percent of students are poor, and one where 99 percent are. Between 2000-01 and 2012-13, according to Tom Snyder and Lauren Musu-Gillette, “the percentage of children eligible for a free/reduced price lunch increased from 38 percent to 50 percent, an increase of 12 percentage points. In contrast, the percentage of public school children who lived in poverty increased from 17 to 23 percent, an increase of 6 percentage points.” <http://nces.ed.gov/blogs/nces/post/free-or-reduced-price-lunch-a-proxy-for-poverty>. See also Chingos (2016) <https://www.brookings.edu/research/no-more-free-lunch-for-education-policymakers-and-researchers/>.

26. We ask that readers keep this in mind when we employ the phrase “racial groups,” and when we variously use “white Americans,” “black Americans,” “European Americans,” “African Americans,” “Hispanic Americans,” and “Asian Americans” as shorthand for admittedly heterogeneous groups of people. See here for a quick overview of how “race” is a more nebulous concept than we often acknowledge. In the grand scheme of things, actually, it’s mostly made up.

27. This material draws heavily on appendix B of a 2002 Census Bureau report titled, *Racial and Ethnic Residential Segregation in the United States: 1980-2000*. That report is available here: https://www.census.gov/hhes/www/housing/housing_patterns/pdfoc.html.

28. There are other measures, like the Atkinson index, but we focus on these five for brevity’s sake.

29. Note that the index values for black exposure to white students and white exposure to black students will not necessarily be the same, since they may differ in number.

30. Or, “how poor is the average poor student’s school?” “How Hispanic is the average Hispanic student’s school?” Etc.
31. Logan, “Resegregation.”
32. Elizabeth Roberto, “The Boundaries of Spatial Inequality: Three Essays on the Measurement and Analysis of Residential Segregation,” PhD thesis, Yale University, 2015.
33. “Larger area” here could mean “district,” “metro,” “state,” “nation,” or other geographic area by which we could group schools.
34. Note: Multi-group versions have been developed, but it is typically only calculated for two groups.
35. Roberto, “The Boundaries of Spatial Inequality.”
36. The divergence index also satisfies the “transfers and exchanges” criterion (Roberto 2015). This means that the divergence index will always fall (improve) if, say, a black student leaves a disproportionately black school for a disproportionately white school. Likewise, it will always rise (worsen) if, for example, a white student leaves a disproportionately black school (or a well-integrated one) for a disproportionately white school. The dissimilarity index only satisfies a weak form of this criterion.
37. John Iceland, “The Multigroup Entropy Index” (College Park, MD: University of Maryland, 2004), https://www.census.gov/housing/patterns/about/multigroup_entropy.pdf.
38. Technically it can fall below 0.
39. This is because it would be impossible, in practice, to have every school be half-white and half-black in a district that was only 25 percent black, for example. So the Theil usually reaches its minimum value when the schools approximate the district or metro student composition.
40. Daniel T. Lichter, Domenico Parisi, and Michael C. Taquino, “Toward a New Macro-Segregation? Decomposing Segregation within and between Metropolitan Cities and Suburbs,” *American Sociological Review* 80 (2015): 843-873.
41. Adam Silverman, “Racial diversity inches higher in Vermont,” *USA Today*, February 17, 2011, accessed October 11, 2016, http://usatoday30.usatoday.com/news/nation/census/2011-02-10-vermont-census_N.htm.
42. <http://www.s4.brown.edu/usschools3/DataSub.aspx?Schid=5101830>; <http://www.s4.brown.edu/usschools3/MSADataSub.aspx?Schid=6760>.
43. Genevieve Siegel-Hawley, Kimberly Bridges, and Thomas J. Shields, “Solidifying Segregation or Promoting Diversity? School Closure and Rezoning in an Urban District” *Educational Administration Quarterly* (2016): 1-35.
44. Author’s tabulations of Common Core of Data. U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), “Public Elementary/Secondary School Universe Survey,” 2010-11 v.2a, 2013-14 v.2a.
45. <https://www.civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/miles-to-go-a-report-on-school-segregation-in-virginia-1989-2010>.
46. Richard D. Kahlenberg, ed., *The Future of School Integration: Socioeconomic Diversity as an Education Reform Strategy* (New York: The Century Foundation Press, 2012).
47. There is segregation within schools, too, partly due to practices like tracking, but this report focuses on segregation at the school and district levels. Looking at the relationship of a specific type of school such as charters adds another new wrinkle to geographic analysis, as we’ll see.
48. <https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/brown-at-60-great-progress-a-long-retreat-and-an-uncertain-future/Brown-at-60-051814.pdf>.
49. John Logan, Deirdre Oakley, and Jacob Stowell, “School Segregation in Metropolitan Regions, 1970-2000: The Impacts of Policy Choices on Public Education,” *American Journal*

of *Sociology* 113: 1611-1644. One could define “ensuring that each school mirrors the proportions of black and white students in the nation at large” as “desegregation.” While we think this conceptualization of desegregation is pretty good, we also want to acknowledge that this definition is grounded in the dissimilarity and divergence indices. And there are other possible definitions of desegregation, too, conceptualized in other indices. Because we want to emphasize that there are other possible definitions of desegregation, we abstain from referring to any one measure’s definition of desegregation as the only one. One could, for example, define desegregation as “a situation in which school student bodies mirror the metro-level student demographic composition (as opposed to national- or state-level).” One could also define desegregation as falling within a certain number of percentage points of the demographics of the larger state or metro. This, in fact, is roughly how places like Hartford, Connecticut, and Louisville, Kentucky, have defined their integration goals. In Hartford, a school is considered integrated if, “less than three-quarters of a school’s student population are minorities.” (The Hartford school district itself is less than 10 percent white, but the larger metro that includes the suburbs is almost 70 percent white, according to the 2014 American Community Survey.) Before 2007, when the Supreme Court’s *Parents Involved v. Seattle* decision forced Louisville to redefine their integration metrics in broader socio-economic terms, the district sought to ensure that each school was “no less than 15 percent and no more than 50 percent black.” (Now Louisville uses the characteristics of student’s neighborhoods to guide their integration efforts; these factors include local poverty rates and parental education levels.) Finally, Wake County, North Carolina, used the following definition before rolling back their integration efforts in 2010: “no more than 40 percent of students [in each school should be] eligible for free or reduced-price lunch, and no more than 25 percent [should be performing] below grade level.”

50. Frank Brown, “The First Serious Implementation of Brown: The 1964 Civil Rights Act and Beyond,” *Journal of Negro Education* 73 (Summer 2004): 182-190.

51. Jonathan Zasloff, “The Secret History of the Fair Housing Act,” *Harvard Journal on Legislation* 53 (2016): 247-278.

52. <https://www.loc.gov/exhibits/civil-rights-act/legal-events-timeline.html>.

53. Northern districts often had more subtle, de facto forms of segregation, rooted in residential patterns and housing laws. See <http://americanradioworks.publicradio.org/features/deseg/e1.html> and <https://www.oyez.org/cases/1972/71-507>.

54. Charles T. Clotfelter, *After Brown: The Rise and Retreat of School Desegregation* (Princeton: Princeton University Press, 2004); Rivkin, “Desegregation;” See table 6 of the following NCES report: <http://nces.ed.gov/pubs98/minidigest97/98020-2.asp>. White students were a minority in the District of Columbia (4 percent white), Hawaii (23 percent white), Mississippi (43 percent), and New Mexico (43 percent). It’s worth noting that in the 1990 Census, Washington, DC and Mississippi combined had only about 1.5 percent of the national African American population. This means that if schools matched the national (or state) racial breakdown, most black students would attend majority-white schools—and more than the 43 percent observed in 1986. In other words, we know that only a small share of black students lived in minority white states around 1986, so we would expect most of them, absent segregation, to attend majority-white schools. We can also break these demographics at the metro level, to provide further evidence that the potential exposure of black students to majority-white schools was much higher than 43 percent in 1986. The 1986 Current Population Survey, for example, shows that only 18 percent of black children ages 5-17 lived in the 22 metros (out of 149 total) that were minority non-Hispanic white. So in the absence of metro-level segregation in 1986, we would’ve expected the 43 percent exposure rate described by the UCLA researchers to be closer to 80 percent—double the integration American society had

managed to foster. See our online tables and table 9 of the following NCES report: <http://nces.ed.gov/pubs98/98018.pdf>.

55. Rivkin, “Desegregation.”

56. John Logan and Deirdre Oakley, “The Continuing Legacy of the Brown Decision: Court Action and School Segregation, 1960-2000” (Albany, NY: Lewis Mumford Center for Comparative Urban and Regional Research University at Albany, 2004). District-level dissimilarity index values were averaged to the national level according to their black student populations. (Only districts with black student shares of at least 5 percent in 2000 were included.) The idea is to describe the experience of the typical black student. Logan, Oakley, and Stowell (2008) find similar results concerning within-district segregation in metropolitan areas, using the same averaging approach. Specifically, they find that the within district black-white dissimilarity index fell from 78.5 percent in 1968-71 to 49 percent in 1990.

57. See technical note in footnote above; Logan and Oakley, “The Continuing Legacy.”

58. “Average” here refers to the national average of district-level segregation.

59. James S. Coleman, “School Desegregation and Loss of Whites from Large Central-City School Districts,” paper presented to the Commission on Civil Rights, December 8, 1975, <http://files.eric.ed.gov/fulltext/ED123301.pdf>; Rivkin, “Desegregation;” Private schools also played a role in growing school segregation during the 1970s.

60. Coleman et al., “Trends in School Segregation, 1968-73” (Washington: The Urban Institute, 1975), <http://eric.ed.gov/?id=ED117252>.

61. Their paper also has a good review of studies on the uptick in between-district segregation.

62. In their forthcoming paper, Logan, Zhang, and Oakely find similar results including data from 1980 and 2010.

63. https://en.wikipedia.org/wiki/Milliken_v._Bradley.

Metro areas that did merge their urban and suburban school districts, however, were sometimes able to leverage a unified district to produce deeper integration. Wake County, North Carolina, and Jefferson County, Kentucky, and Berkeley, California, provide examples of this.

Here’s a simplified example of how this could happen. Pretend we have two school districts, an urban and a suburban one, with two schools each. Say that in the first time period, the first urban school has 100 white students and no black students; the second urban school has no white students and 100 black students. Pretend that both the suburban schools have 100 white students each. So in time period one, we have:

	Black	White	Total
School 1 (urban)	100	0	100
School 2 (urban)	0	100	100
School 3 (suburban)	0	100	100
School 4 (suburban)	0	100	100
Total	100	300	400

Now say that we integrate the urban district, by equalizing the racial groups in the two urban schools, but that this causes half the urban white students to leave for the suburban district:

	Black	White	Total
School 1 (urban)	50	25	75
School 2 (urban)	50	25	75
School 3 (suburban)	0	125	125

School 4 (suburban)	0	125	125
Total	100	300	400

Now, in the first time period, the school-level dissimilarity index was 100 percent—complete segregation. In the second period, the urban schools have been integrated at least (which is more than we could say before), so the school-level dissimilarity index falls to 83 percent.

But for the district-level dissimilarity index, the first time period value is only 67 percent— if 67 black students were to enter the suburban district, there would be a 3-1 ratio of white and black students in both districts. In the second time period, however, this figure rises to 83 percent—because the white suburban population has grown and their urban population has shrunk, more black students would have to move to the suburban district to ensure equal shares in both districts. (white students, of course, could also be the movers in this example).

64. John R. Logan, Weiwei Zhang, and Deirdre Oakley, "Court Orders, White Flight, and School District Segregation, 1970-2010," forthcoming.

65. Averages at the district and metro levels are calculated by weighting by the black student population.

66. Gary Orfield and Erica Frankenberg, "Brown at 60: Great Progress, a Long Retreat and an Uncertain Future" (Los Angeles: The Civil Rights Project at UCLA, 2014), <https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/historic-reversals-accelerating-resegregation-and-the-need-for-new-integration-strategies-1/orfield-historic-reversals-accelerating.pdf>.

67. Data on the share of schools that are majority-white comes from the Common Core of Data. We include only schools with at least 10 students. Data on the share of school age children that are white comes from the Current Population Survey; we tabulate children ages 5-17 by race, excluding those in group quarters.

68. Orfield and Frankenberg, "Brown at 60."

69. Ibid.

70. Ibid.

71. While the fall in the white share can be seen across the country, the results are more dramatic in some areas: European-Americans accounted for just 30 percent of 5-17 year-olds in California by 2011, for example.

72. Logan, "Resegregation." Perhaps more so because of the racial power dynamics that exist in our country (white people may be a smaller share of the population than they were in the 80s, but they still hold a disproportionate share of social, political, and economic power).

73. Orfield and Frankenberg, "Brown at 60." In 2011, 34 percent of black students in the South, 43 percent in the Midwest, 34 percent in the West, 51 percent in the Northeast, and 41 percent of black students in the border states attended schools that were 90-100 percent minority.

74. Reardon and Owens, "60 Years After Brown."

75. See Gary Orfield, Genevieve Siegel-Hawley, and John Kucsera, "Sorting Out Deepening Confusion on Segregation Trends" (Los Angeles: The Civil Rights Project at UCLA, 2014), for more.

76. Though obviously they are in many ways.

77. Forthcoming. The authors restrict their pool of districts to those with at least two elementary schools and at least five white and black students. The national average of the district dissimilarity index values is weighted by the number of black students in each district.

78. Reardon and Owens, "60 Years After Brown;" Note that the dissimilarity index values in this Logan et al study differ from the values in the 2008 Logan, Oakley, and Stowell paper. This

is because the data in the second study include elementary schools from both metropolitan and rural areas, while the first focused on metro schools.

79. Kori J. Stroub and Meredith P. Richards, "From Resegregation to Reintegration: Trends in the Racial/Ethnic Segregation of Metropolitan Public Schools, 1993-2009," *American Educational Research Journal* 50 (2013): 497-531.

80. Elizabeth Kneebone and Alan Berube, *Confronting Suburban Poverty in America* (Washington: Brookings Institution Press, 2013).

81. Stroub and Richards, "From Resegregation to Reintegration;" Sean F. Reardon, Elena Grewal, Demetra Kalogrides, and Erica Greenberg, "Brown fades: The end of court-ordered school desegregation and the resegregation of American public schools," *Journal of Policy Analysis and Management* 31 (2012): 876-904. The author's approach includes state, grade, year, and district-level fixed effects, to account for important confounding factors, like pre-release segregation trends. They also estimate segregation using the Theil index, and find similar results.

82. The desegregation efforts were not court-ordered; <http://www.newsobserver.com/news/local/education/article31101236.html>.

83. <http://www.newsobserver.com/opinion/editorials/article31823946.html>.

84. Stephen B. Billings, David J. Deming, and Jonah Rockoff, "School Segregation, Educational Attainment, and Crime: Evidence From the End of Busing in Charlotte-Mecklenburg," *Quarterly Journal of Economics* (2014): 435-476. The authors also found that both white and black students placed in schools with more minority students saw their test scores suffer. They found decreases in high school graduation and four-year college attendance for non-poor white boys and girls. Finally, they found a sizable jump in arrest and incarceration rates for minority boys. This, the authors note, is in spite of efforts by the district to provide "compensatory" resources to the schools that became more heavily poor and minority.

85. Stroub and Richards, "From Resegregation to Reintegration."

86. <https://www.brookings.edu/blog/brown-center-chalkboard/2015/09/10/growing-economic-segregation-among-school-districts-and-schools/>

87. John R. Logan, "Choosing Segregation: Racial Imbalance in American Public Schools, 1990-2000" (Albany, NY: Lewis Mumford Center for Comparative Urban and Regional Research, 2002), <https://s4.ad.brown.edu/Projects/USSchools/reports/report4.pdf>; Gary Orfield and Chungmei Lee, "Historic Reversals, Accelerating Resegregation, and the Need for New Integration Strategies" (Los Angeles: Civil Rights Project at UCLA, August 2007), <https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/historic-reversals-accelerating-resegregation-and-the-need-for-new-integration-strategies-1/orfield-historic-reversals-accelerating.pdf>.

88. U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 2012-13, http://nces.ed.gov/programs/digest/d14/tables/dt14_216.60.asp.

89. http://nces.ed.gov/programs/coe/indicator_cgb.asp.

90. This lack of legal infrastructure to support charters often represents a choice on the part of the legislature. A charter bill died in the Kentucky House last year, for example; in Washington state, the Supreme Court struck down a law that would have facilitated charter creation.

91. In the 2013-2014 school year. Other states with relatively large shares of charter enrollment include Colorado (10.9 percent), Michigan (9.2 percent), Minnesota (5.2 percent), Nevada (5.4 percent), Ohio (7 percent), Pennsylvania (7.4 percent), and Utah (8.8 percent).

92. Note: Categorizations are based on unrounded percentages. U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 2013-14. See Digest of Education Statistics

2015, table 216.90.

93. Ibid.

94. Whether or not these individual families intend to increase segregation (if they do), or should care about their potential impact on segregation patterns are separate, normative questions. We will return to these later on.

95. Gregory R. Weiher and Kent L. Tedin, “Does choice lead to racially distinctive schools? Charter schools and household preferences,” *Journal of Policy Analysis and Management* 21 (Winter 2002): 79-92.

96. Those six districts are Chula Vista, Fresno, Los Angeles, Napa Valley, San Diego, and West Covina; Kevin Booker, Ron Zimmer, and Richard Buddin, “The Effects of Charter Schools on School Peer Composition,” WR-306-EDU (Santa Monica, CA: RAND, 2005), http://www.rand.org/pubs/working_papers/WR306.html.

97. Julian R. Betts et al., “Does School Choice Work? Effects on Student Integration and Achievement” (San Francisco: Public Policy Institute of California, 2006). One interesting additional finding from the team’s report: “In all of the choice programs, the number of applications outstripped the supply of openings. This lack of supply depressed the actual integrating effects that choice programs might have had. For example, if all the applications filed by black students to exercise one choice option, VEEP, had been successful, these black students would have experienced a nearly 50 percent increase in their exposure to white students in the schools to which they applied. But lack of availability in those schools and other factors reduced the actual increase in exposure to 6.6 percent.”

Cotto and Feder (2014) compare interdistrict Connecticut charters, magnets, and technical schools. They find that the three school types tend to enroll more minority and poor students than TPS, but that they tend to be relatively integrated by FRPL status, according to an integration benchmark magnets are mandated to meet. The legal benchmark magnets must meet is “enrolling between 25 percent and 75 percent minority students.” But the authors also use this definition of integration for FRPL status: “enrolling between 25 percent and 75 percent FRPL students.” They find that a majority of magnet schools are racially integrated—often significantly more integrated than the local TPS—but that many charters are “hyper-segregated,” with minority enrollments greater than 90 percent. The authors’ appendix B details the composition of each of the three school types by city. The tables show that the association of charters with increased racial segregation are mostly driven by roughly a dozen 90 percent+ minority charters in Stamford, New Haven, Hartford, Hamden, and Bridgeport. The authors point out that the magnet schools are held to clear integration standards to maintain relatively mixed student bodies (failing to meet the standard could mean losing funding from the Commissioner of Education); charters, meanwhile, are merely encouraged to integrate. This difference, they suggest, helps account for the observed difference in segregation levels between charters and magnets. Finally, as in the EMO study by Moiron et al, Cotto and Feder find that Connecticut charters, magnets, and technicals generally enroll fewer ELL and special needs students.

98. Robert Bifulco and Helen F. Ladd, “School choice, racial segregation, and test-score gaps: Evidence from North Carolina’s charter school program,” *Journal of Policy Analysis and Management* 26 (Winter 2007): 31-56; Helen F. Ladd, Charles T. Clotfelter, and John B. Holbein, “The Growing Segmentation of the Charter School Sector in North Carolina” (Washington: CALDER and American Institutes for Research, August 2015), http://www.caldercenter.org/sites/default/files/WP%20133_0.pdf; Ladd, Clotfelter, and Holbein (2015) build off Ladd and Bifulco’s 2007 paper. The authors find that the nature of the charter-segregation dynamic in North Carolina has changed since the late 1990s. Before, the charter-segregation effect was related to black students’ decisions to attend mostly black schools. But the authors note that since then, there has been a proliferation of predominantly white charters in North Carolina, which they

claim has led to more segregation.

99. It's also worth noting that Arizona TPS appear relatively segregated to begin with, relative to state demographics. The average white student, for example, attends a TPS that is only 12 percent-14 percent Hispanic, despite the fact that Hispanics constitute 31 percent of students statewide. This would suggest segregation unless Hispanic and white students just happen to live in different parts of the state. It seems more likely, however, that white students' exposure to Hispanic students would be higher in the absence of residential segregation engendered by land-use regulations that isolate wealthier white families, for example.

100. In each case, Garcia uses a chi-squared test at the 0.05 significance level.

101. These districts are Chicago, Denver, Milwaukee, Philadelphia, and San Diego; the authors also use statewide data from Florida, Ohio, and Texas. They also note an important caveat about longitudinal approach, which applies to similar studies: "this analysis examines only students who switch into charter schools after they have been in TPSs. We do not have data that would allow an examination of what the racial composition would have been in a TPS for students who never attended TPSs—most importantly, students who begin in charter schools in kindergarten."

Miron, Urschel, Mathis, and Tornquist (2010) looked at charter education management organizations (EMOs), and compared their schools to the "sending districts" of the traditional public school system. The authors use 2007 data on for- and non-profit EMOs, covering 968 schools (or 89 percent of EMO-run schools). In 2010, EMOs operated about one-third of all charter schools. Some of the EMOs represent the ugly, less successful side of the charter experiment. The researchers found that only a quarter of these charters had compositions similar to the sending districts, in terms of ethnicity, economic status, disability status, and ELL need. Online charters showed especially skewed enrollments.

KIPP and many other EMOs served a similar or greater proportion of minorities, relative to the sending district in which they were located. But other EMOs served substantially fewer minority students and poor students; with respect to race and poverty, one of the most striking traits of the EMOs is how heterogeneous their performance appears to be. But almost all of the EMOs served fewer ELL students and fewer special needs students, save for a handful of EMOs who made it their mission to serve these student. Some charters, like KIPP, inadvertently take pride in the fact that their student bodies lack diversity. KIPP has popularized what it calls the "90/90/90" model: >90 percent of the students are low-income, >90 percent are from ethnic minorities and >90 percent meet set academic standards. Some of this impulse is rooted in good intentions; as Sarah Carr reports, one AEI scholar put it this way: "Anyone who has spent much time in the company of school reformers in the past decade has seen this practice turn almost comical, as when charter-school operators try to one-up one another over who can claim the most disadvantaged student population."

102. Erica Frankenberg, Genevieve Siegel-Hawley, and Jia Wang, "Choice without Equity: Charter School Segregation and the Need for Civil Rights Standards" (Los Angeles: The Civil Rights Project at UCLA, January 2010), <https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/choice-without-equity-2009-report/frankenbergs-choices-without-equity-2010.pdf>.

103. <http://www.brookings.edu/research/papers/2013/05/15-school-choice-segregation-chingos>.

104. That said, you could argue about what charter school's responsibility to ameliorate segregation should be. For that matter, you could ask the same question about TPS. Many might answer that charters should have no mandate to further integration, as long as they do a good job educating children. That is a normative question. The UCLA researchers, by defining metro areas as their geographic unit, seem to imply that charters should have

some role in integrating entire metros—which would involve overcoming existing residential segregation patterns. Institute on Race and Poverty, “Failed Promises: Assessing Charter Schools in Twin Cities” (Minneapolis: University of Minnesota Institute on Race and Poverty, 2008); http://minnesota.publicradio.org/features/2008/11/26_charter_school/chartermap.pdf, updated analysis of the 2012-13 school year available here: <https://www1.law.umn.edu/uploads/16/65/1665940a907fdbe31337271af733353d/Charter-School-Update-2013-final.pdf>.

105. Yongmei Ni, “Are Charter Schools More Racially Segregated than Traditional Public Schools?” Policy Report 30 (East Lansing, MI: The Education Policy Center at Michigan State University, March 2007), <http://files.eric.ed.gov/fulltext/ED498628.pdf>.

106. http://www.aei.org/publication/differences-on-balance-national-comparisons-of-charter-and-traditional-public-schools/?utm_source=paramount&utm_medium=email&utm_campaign=mediamalkuscharter; The other two data sources are EdFacts, which contains information on school testing performance, and Office of Civil Rights data, which contains information on student discipline, ELL status, and disability status.

107. He successfully matches 4,800 schools to at least one neighboring TPS (84 percent of his original pool of 5,700 charters), and successfully matches 4,280 charters to five TPS.

108. It’s worth mentioning that this is a macro view. There are obviously some charters, represented by the middle bars, that match the demographics of nearby TPS. From a policy perspective, however, we might wonder “what about charter law and policy allows all these other, seemingly segregated charters?” Charter critics would argue that the charter model itself leads to these patterns of polarization. It’s also possible that the most-dissimilar charters are located in particular places with regimes that are particularly bad at promoting integration in charters. Malkus also finds that charters more often lack the expected number of ELL and special education students. 17 percent of charters, for example, have at least 20 percentage points fewer ELL students than nearby TPS; for the TPS comparison group, that share was only 6 percent. He writes, “While some charter schools serve higher percentages of students with disabilities than their neighboring TPSs, an alarming percentage serve significantly lower proportions. The same pattern is evident for LEP students. These differences show significant patterns that charter school advocates would do better to face head-on than to deflect.”

109. Recall, however, the waning power of the FRPL proxy for poverty.

110. https://www.brookings.edu/wp-content/uploads/2016/06/Districts_Report_03252013_web.pdf.

111. http://www.mattchingos.com/districts_prepub.pdf.

112. These problem of inference to the impact of particular components of an intervention that involves a complex package of differences in schools and schooling in recent studies is compounded in an earlier generation of studies that also have problems with the internal validity of the research design used to address whether the intervention itself worked. Recent studies, some of which we review in detail, use strong causal designs, including random assignment to the intervention vs. control group, to estimate impacts of an intervention whereas older studies, which often focus on the impacts of court-ordered district desegregation plans that followed on *Brown v. Board*, use simple pre-post comparisons or case studies that are relatively weak. A good place to start for readers interested in that literature is: http://www.naeducation.org/cs/groups/naedsite/documents/webpage/naed_080863.pdf.

113. http://nces.ed.gov/nationsreportcard/subject/studies/pdf/school_composition_and_the_bw_achievement_gap_2015.pdf.

114. <http://apps.urban.org/features/naep/>

115. Reardon, “School Segregation.”

116. Ibid.

117. Chetty, Hendren, Kline, and Saez, “Where is the Land of Opportunity?”

118. Booker, Zimmer, and Buddin, "The Effects of Charter Schools."
119. Ibid.
120. Heather Schwartz, "Housing Policy is School Policy: Economically Integrative Housing Promotes Academic Success in Montgomery County, Maryland" (New York: The Century Foundation, 2010), <https://tcf.org/assets/downloads/tcf-Schwartz.pdf>.
121. Booker, Zimmer, and Buddin, "The Effects of Charter Schools."
122. Raj Chetty, Nathaniel Hendren, and Lawrence F. Katz, "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment," June 2014, http://scholar.harvard.edu/files/hendren/files/mto_paper.pdf; <http://www.nber.org/mtopublic/MTO%20Overview%20Summary.pdf>.
123. <http://www.nber.org/mtopublic/MTO%20Overview%20Summary.pdf>.
124. Chetty, Hendren, and Katz, "The Effects of Exposure."
125. Justine S. Hastings and Jeffrey M. Weinstein, "Information, School Choice, and Academic Achievement: Evidence from Two Experiments," *Quarterly Journal of Economics* 123 (2008): 1373-1414.
126. David J. Deming, Justine S. Hastings, Thomas J. Kane, and Douglas O. Staiger, "School Choice, School Quality, and Postsecondary Attainment," *American Economic Review* 104 (2014): 991-1013.
127. Betts and Tang, "The Effect of Charter Schools."
128. Joshua D. Angrist et al., "Student Achievement in Massachusetts' Charter Schools" (Cambridge, MA: Center for Education Policy Research at Harvard University, 2011), <http://economics.mit.edu/files/6493>; Carline M. Hoxby, Sonali Murarka, and Jenny Kang, "How New York City's Charter Schools Affect Achievement, August 2009 Report" (Cambridge, MA: New York City Charter Schools Evaluation Project, September 2009), http://users.nber.org/~schools/charterschoolseval/how_NYC_charter_schools_affect_achievement_sept2009.pdf; <http://www.kipp.org/results/mathematica-study>; Will Dobbie and Roland G. Fryer, Jr., "Getting Beneath the Veil of Effective Schools: Evidence from New York City," December 2012, http://scholar.harvard.edu/files/fryer/files/dobbie_fryer_revision_final.pdf; Philip Gleason et al., "The Evaluation of Charter School Impacts, Final Report" (Washington: Institute of Education Sciences, June 2010), <http://files.eric.ed.gov/fulltext/ED510573.pdf>.
129. Center for Research on Education Outcomes, "Urban Charter School Study Report on 41 Regions" (Stanford, CA: Author, 2015), <https://urbancharters.stanford.edu/download/Urban%20Charter%20School%20Study%20Report%20on%2041%20Regions.pdf>.
130. Ibid.
131. Angrist et al.
132. Gleason et al.
133. Angrist et al.
134. Ibid.

Appendix A: PresidentTown

This appendix presents a hypothetical district before and after an integration initiative. We calculate all five indices at both points in time: isolation, exposure, dissimilarity, Theil, and divergence.

PRESIDENTTOWN BEFORE INTEGRATION

Percent of district that is white	Percent of district that is black
63%	38%

	black students in school i	white students in school i	black students in district	white students in district	students in school i	percent of district white students in school i	percent of district black students in school i	percent of school that is white	percent of school that is black
	b_i	w_i	B	W	t_i	$\frac{w_i}{W}$	$\frac{b_i}{B}$	$\frac{w_i}{t_i}$	$\frac{b_i}{t_i}$
Hamilton	5	95	75	125	100	76%	7%	95%	5%
Jefferson	70	30	75	125	100	24%	93%	30%	70%

Isolation and exposure indices

Average white student's exposure to black students	Average black student's exposure to white students	White student isolation from black students	Black student isolation from white students
21%	34%	79%	66%

Dissimilarity index

	$ \frac{b_i}{B} - \frac{w_i}{W} $	Dissimilarity index value $= \frac{1}{2} * \sum_{i=1}^n \frac{b_i}{B} - \frac{w_i}{W} $
Hamilton	0.69	69%
Jefferson	0.69	

Theil index

π_{black}	π_{white}	E
$\frac{B}{T}$	$\frac{W}{T}$	$\sum_{r=1}^r (\Pi_r) \ln \left(\frac{1}{\Pi_r} \right)$
0.38	0.63	0.66

	E_i		Theil index for district
	$\sum_{r=1}^r (\pi_{ri}) \ln \left(\frac{1}{\pi_{ri}} \right)$	$t_i * (E - E_i)$	$= \sum_{i=1}^n \left[\frac{t_i(E - E_i)}{E * T} \right]$
Hamilton	0.20	46	0.39
Jefferson	0.61	5	

Divergence index

	D_i			Divergence index for district
	$\sum_{r=1}^R \pi_{i,r} \log \left(\frac{\pi_{i,r}}{\pi_r} \right)$	$\frac{t_i}{T}$	$\frac{t_i}{T} * D_i$	$= \sum_{i=1}^n \frac{t_i}{T} D_i$
Hamilton	0.30	0.5	0.15	0.26
Jefferson	0.22	0.5	0.11	

PRESIDENTTOWN AFTER INTEGRATION

	black students in school i	white students in school i	black students in district	white students in district	students in school i	percent of district white students in school i	percent of district black students in school i	percent of school that is white	percent of school that is black
	b_i	w_i	B	W	t_i	$\frac{w_i}{W}$	$\frac{b_i}{B}$	$\frac{w_i}{t_i}$	$\frac{b_i}{t_i}$
Hamilton	36	64	75	125	100	51%	48%	64%	36%
Jefferson	39	61	75	125	100	49%	52%	61%	39%

Isolation and exposure indices

Average white student's exposure to black students	Average black student's exposure to white students	White student isolation from black students	Black student isolation from white students
37%	62%	63%	38%

Dissimilarity index

	$ \frac{b_i}{B} - \frac{w_i}{W} $	Dissimilarity index value $= \frac{1}{2} * \sum_{i=1}^n \frac{b_i}{B} - \frac{w_i}{W} $
Hamilton	0.03	3%
Jefferson	0.03	

Theil index

π_{black}	π_{white}	E
$\frac{B}{T}$	$\frac{W}{T}$	$\sum_{r=1}^r (\Pi_r) \ln \left(\frac{1}{\Pi_r} \right)$
0.38	0.63	0.66

	E_i	$t_i * (E - E_i)$	Theil index for district
	$\sum_{r=1}^r (\pi_{ri}) \ln \left(\frac{1}{\pi_{ri}} \right)$		$= \sum_{i=1}^n \left[\frac{t_i(E - E_i)}{E * T} \right]$
Hamilton	0.65	0.8	0.0007
Jefferson	0.67	-0.7	

Divergence index

	D_i	$\frac{t_i}{T}$	$\frac{t_i}{T} * D_i$	Divergence index for district
	$\sum_{r=1}^R \pi_{i,r} \log \left(\frac{\pi_{i,r}}{\pi_r} \right)$			$= \sum_{i=1}^n \frac{t_i}{T} D_i$
Hamilton	0.0005	0.5	0.0002	0.0005
Jefferson	0.0005	0.5	0.0002	

Appendix B: Equations for Segregation Measures

EXPOSURE

For each large geographic area, like a school district:

$$\text{Exposure index value} = \sum_{i=0}^n \left[\left(\frac{x_i}{X} \right) \left(\frac{y_i}{t_i} \right) \right]$$

The i term indexes smaller geographic units, like schools. x_i is the number of people in school i that belong to our group of interest (like the average black or white student). X is the number of people in our larger geographic area from that group of interest. t_i is the total population of the each smaller geographic unit, i (which usually refers to schools).

It follows that $\frac{x_i}{X}$ is school i 's share of the total district population of our group of interest, and $\frac{y_i}{t_i}$ is the share of school i that belongs to the other group. We multiply these values for each school, then sum all the values obtained for each school to obtain the district-wide exposure index value.

ISOLATION

For each large geographic area, like a school district:

$$\text{Isolation index value} = \sum_{i=0}^n \left[\left(\frac{x_i}{X} \right) \left(\frac{x_i}{t_i} \right) \right]$$

The i term indexes smaller geographic units, like schools. x_i is the number of people in school i that belong to our group of interest (like the average black or white student). X is the number of people in our larger geographic area from that group of interest. t_i is the total population of school i .

It follows that $\frac{x_i}{X}$ is school i 's share of the total district population of our group of interest, and $\frac{x_i}{t_i}$ is the share of school i that belongs to our group of interest. We multiply these values for each school, then sum all the values obtained for each school to obtain the district-wide isolation index value.

Note that the only difference between the exposure and isolation index is that we replace the $\frac{y_i}{t_i}$ term with $\frac{x_i}{t_i}$, because we are interested in the exposure of our reference group to same-group peers, rather than other-group peers.

DISSIMILARITY

For each large geographic area, like a school district:

$$\text{Dissimilarity index value} = \frac{1}{2} * \sum_{i=0}^n \left[\frac{x_i}{X} - \frac{y_i}{Y} \right]$$

The i term indexes smaller geographic units, like schools. x_i is the number of people in school i that belong to our first group. X is the number of people in our school district from our first group. y_i is the number of people in school i that belong to our second group. Y is the number of people in our school district from our second group.

DIVERGENCE

To calculate the divergence index for a district, metro area, or the nation, we first calculate a value for each school, D_i :

$$D_i = \sum_{r=1}^R \pi_{i,r} \log\left(\frac{\pi_{i,r}}{\pi_r}\right)$$

$\pi_{i,r}$ represents group r 's proportion of the population in school i ; π_r represents group r 's proportion of the entire district, metro, or national population. We then use the D_i values for a given district, metro, or nation to calculate the overall divergence index value:

$$D = \sum_{i=1}^n \frac{t_i}{T} D_i$$

Here, T is the larger geography population for the district, metro, or nation. t_i represents the population of each school.

THEIL

To calculate the Theil index, we first calculate each district's "entropy score," which captures the overall level of district diversity using r groups, where r can be two, three, or more.

$$E = \sum_{r=1}^r (\Pi_r) \ln\left(\frac{1}{\Pi_r}\right)$$

In the formula above, r indexes our two groups, Π_r refers to each group's share of the total district population, and E is the district entropy score.¹

¹ For more on the Theil index, see Iceland (2004), available here: https://www.census.gov/housing/patterns/about/multigroup_entropy.pdf.

Similarly, each school has its own entropy or diversity score, calculated like this:

$$E_i = \sum_{r=1}^r (\Pi_{ri}) \ln \left(\frac{1}{\Pi_{ri}} \right)$$

Where i indexes schools, and r indexes each group, as before

After calculating diversity scores for the district area, as well as for each school within the district, we can calculate the district Theil index:

$$\text{Theil index} = \sum_{i=1}^n \left[\frac{t_i(E - E_i)}{E * T} \right]$$

Where t_i is the total population of school i , T is the overall district population, n is the number of schools in the district, and E and E_i are the quantities we calculated above.