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Public and Private School Segregation in the District of Columbia

Abstract

The purpose of this research brief is to describe racial and ethnic school segregation in the District of Columbia, within and between the private and public sectors (including charter schools). Using different measures, we find, unsurprisingly, a high degree of segregation within both sectors. Total segregation among private schools is driven largely by the separation of White students from Black and Hispanic students, whereas, in the public sector, the separation of Black from Hispanic students contributes roughly as much to total segregation as does the separation of White students from Black and Hispanic students. We also find that segregation is more extensive citywide than it is within either sector. This is because 25—40 percent of total citywide segregation is found between sectors, due mostly to the fact that private schools, while serving only 15 percent of all D.C. students, enroll almost 60 percent of its White students. This between-sector segregation, in addition to that within the private sector, means that even if D.C.'s public schools were perfectly integrated, as much as half of total segregation would remain intact. Finally, we find that segregation between the regular public and charter school subsectors contributes very little to total public sector segregation. Our results suggest that excluding private schools from similar analyses may obscure the extent and forms of student segregation in many locations.

Introduction

A large and long-standing body of research documents the segregation of U.S. schools by race and income. The extent of segregation, both in any given year and over time, varies by location, the type of segregation (e.g., racial and ethnic versus by income), the type of measure used, and other factors.

Attempts to isolate the effects of segregation (desegregation) are even more complicated, due in part to the interplay between race/ethnicity and socioeconomic status. In addition, such causal interpretations require assumptions regarding the relationship between the distribution of resources and student

outcomes (Reardon and Owens 2014). Existing research, however, suggests that desegregation reduces the dropout rate for Black students (Guryan 2004) and improves their chances of graduating high school (e.g., Reber 2010).[1] Researchers have also found that desegregation has positive effects on non-academic outcomes for Black students, such as higher incomes, increased likelihood of having a white-collar job, reduced chances of living in poverty, improved health outcomes, and a lower probability of incarceration (Johnson 2015).

The segregation of Hispanic students is comparable to that of Black students and is growing (e.g., Orfield et al. 2014; Fry 2007), presumably with similar negative effects, especially for foreign-born Hispanic students (Ryabov and Van Hook 2007).

Conversely, research has found no negative academic effects of desegregation for White students (e.g., Johnson 2015) and indicates that it might be beneficial for all students – i.e., can prepare all students to succeed and improve social cohesion in an increasingly diverse nation by encouraging relationships and reducing prejudice between groups (Pettrigrew and Tropp 2006; Mickelson and Nkomo 2012).

Although private schools can be an important feature of the educational landscape, most analyses of school segregation exclude them. There are good reasons for this. For one thing, national private school data are not collected regularly, and their availability varies by location. Second, school desegregation efforts have traditionally focused on public schools.

That said, private schools serve roughly one in ten of the nation's school children, with higher proportions in many big cities (Snyder et al. 2016). Attempts to describe school segregation without including private schools therefore may be missing a significant part of the picture. Moreover, the student populations at private schools tend to be disproportionately White relative to their public school counterparts (Broughman and Swaim 2013). In this sense, the sorting of children into private and public schools may actually serve to shape segregation in both sectors. For example, Clotfelter (2006) finds that, due in large part to desegregation efforts, racial segregation within public school districts declined rather sharply between 1970 and 2000, but this was partially offset by increases in private school enrollment.

Accordingly, the purpose of this research brief is to describe and decompose school segregation by race and ethnicity in the District of Columbia, with a particular focus on segregation within and between the public and private sectors.

Segregation in Washington, D.C.

The City of Washington has long had a large African-American population. Begun shortly after the landmark *Brown* decision in 1954, the desegregation of the city's schools was supposed to serve as a model for the nation. These efforts were widely believed to have compelled the flight of White residents from the city into the surrounding Maryland and Virginia suburbs.

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[1] A note on nomenclature: Under ordinary circumstances, we might prefer to use the terms "African American," "Latino," "Native American," and "people of color," following what seems to be the current preference of the preponderance of people in each of these groups. However, as the reader will see, when referring to empirical findings, we use the terms "Black," "Hispanic," "American Indian," and "minority," since the two sets of terms are not exactly synonymous and most data on race and ethnicity in the United States is collected using the categories employed by the U.S. Census Bureau—that is, White, Black, Hispanic, Asian and Pacific Islander, and American Indian.

Throughout the 1950s and into 1960s, the city's African American population continued to grow while its White population declined with equal speed; African American families expanded into the neighborhoods that White families had left. This dynamic changed during the 1970s, as many middle class African American families began to flee to the suburbs while the White population stabilized and began to grow again, occupying and gentrifying city neighborhoods. By 2012, the African American population had declined 40 percent from its peak in the 1970's, and Washington was no longer a majority African American city (Orfield and Ee 2017).

Yet these rapid population shifts did not affect public schools as much as one might think. D.C. public schools have been – and remain – overwhelmingly African American, albeit with an increasing share of Hispanic students. In a recent analysis, Orfield and Ee (2017) found that roughly 70 percent of African American public school students attend schools in which virtually every one of their peers is non-White.

One reason for this mismatch between the size of the White resident population and that of the White student population may be that a large proportion of White residents do not have school-aged children. But another reason is that most White school children attending school in D.C. are enrolled in private schools.

This carries important implications for understanding school segregation in D.C., in both the public and private sectors. Segregation, whether by race or income, occurs not only within but also *between* independent units such as metropolitan areas and school districts. For instance, a given district can be perfectly integrated internally (*within*-district segregation), with equal mixes of students of multiple races and ethnicities attending all of its schools, but might still contribute to segregation in the overall metro area (*between*-district segregation) if, for example, it serves a disproportionately large percentage of that metro area's students of color.

Conversely, a metro area composed of extremely diverse districts, each serving an equal proportion of students of different races and ethnicities, might still be segregated if the students within those districts are sorted into schools by race and ethnicity.

The segregation of public and private school students, while not defined geographically, is also found within and between units (in this case, sectors). Both forms can shape the educational experiences of students, and how those experiences vary by school.

Evidence on private and public school segregation by race and ethnicity

As mentioned above, U.S. private schools enroll smaller proportions of minority students, compared with public schools. Moreover, the proportion of White students attending private schools tends to be highest in big cities and larger metro areas, compared with smaller cities and metro areas, and also higher in areas with large Black student populations, even controlling for income (Reardon and Yun 2002).

Clotfelter (2004) finds the same basic pattern in the South, where White enrollment in private schools tended to rise along with the proportion of non-White students in public schools. These studies suggest that between-sector segregation may in part be due to the decision of White families to avoid enrolling their children in public schools with significant shares of minority students (Saporito and Sohoni 2007).

Put simply, from a between-sector perspective, the availability of private schools may exacerbate segregation.

The situation *within* sectors is somewhat more complicated. Among the earliest studies, by James Coleman and colleagues (Coleman et al. 1982a, 1982b) found that, while private high schools enrolled larger shares of White students than public high schools, White students in these private schools were more evenly distributed than their public school peers. Greeley et al. (1982) reached a similar conclusion about private Catholic schools (the largest share of private schools).

More recent evidence, however, suggests that, nationally, Black students who attend private schools are just as segregated from White students as are their Black peers in public schools (Reardon and Yun 2002). Similarly, a report by the Southern Education Foundation finds that private schools are almost 50 percent more likely than public schools to serve students who are 90 percent or more White (Suitts 2016). Thus, depending on the time period, location, and methods, private school sectors may or may not be more integrated than public schools.

D.C. is a somewhat different context from these national studies. Most obviously, D.C. has a small White student population relative to the nation as a whole, which means that White private school students might not be as racially isolated as their peers elsewhere. D.C. also maintains one of the nation's largest charter school sectors, which could influence segregation within the public sector, as it partially decouples school from residential segregation.

Finally, D.C. has been home to one of the most closely watched and controversial private school voucher programs in the U.S. We do not address directly the impact of this program (and it is too small to have much impact on segregation in either sector) but our results might certainly inform the ongoing debates about vouchers and segregation.

Data and analysis

Our data are from the Common Core of Data (CCD) and Private School Survey (PSS), both administered by the National Center for Education Statistics (NCES). The analysis presented below focuses entirely on the 2011-2012 school year, the last year for which private school data are available. Additional details about the sample are discussed in the Technical Appendix.

Although income-based segregation is interdependent with segregation by race and ethnicity, and the two are often confounded, our analysis will focus exclusively on the latter due to data availability – private schools do not participate in the federal lunch program, eligibility for which is typically used as a (very rough) proxy for income.

Table 1 presents the number of schools and students in our sample, as well as the race and ethnicity distribution of students, by sector and subsector. Throughout this analysis, we refer to the public/private distinction in terms of sectors, and the charter/district distinction in terms of subsectors. The private sector, of course, has no charter schools.

Table 1	Number of schools, enrollment, and student race and ethnicity distribution, by sector and subsector, District of Columbia, 2011-12				
	Public			**Private**	**Citywide**
Variable	**DCPS**	**Charter**	**All**		
Schools	121	98	219	60	279
Students	44,733	29,986	74,719	13,600	88,319
% city students	50.6	34.0	84.6	15.4	100.0
Student race and ethnicity distribution (column percentages)					
White	10.5	3.4	7.6	56.5	15.2
Black	71.3	85.0	76.8	28.0	69.3
Hispanic	14.8	10.3	13.0	7.5	12.2
Asian	1.9	0.6	1.4	3.3	1.7
Two or more races	1.5	0.6	1.1	4.7	1.7

Notes: Excludes a very small number of students coded as "Native American/Alaska Native" and "Hawaiian Native/Pacific Islander." See the appendix for more details on the sample. Percentages may not sum to 100 due to rounding.

In 2011-12, roughly 15 percent of D.C. students attended private schools, about one third were in charter schools, and just over half were enrolled in regular public schools.[2]

Charter schools served a larger proportion of Black students, relative to regular public schools, and a smaller proportion of White and Hispanic students. Over half of private school students, in contrast, were White. In fact, while private schools served only 15 percent of the District's students, they served almost 60 percent of its White students.

Our descriptive analysis of student segregation in the District of Columbia will focus on two measures, the exposure index and Theil's information theory (or entropy) index. These two measures are discussed in general terms below. Readers interested in more details should consult the Technical Appendix (also see Massey and Denton [1988]).

The **exposure index** is a simple, common manner of characterizing the segregation of two groups. If we use the example of White and Black students, the exposure index indicates the proportion of the typical White student's peers (fellow students within their school) who are Black. This is fundamentally a measure of interaction, or at least the possibility of interaction (Greene and Mellow 1998), between two different groups. It ranges from zero (in our example, the typical White student has no Black peers at her school) to one (all of her peers are Black).

The advantages of this measure are its simplicity and how it provides an easy-to-understand characterization of how things look "on the ground." The disadvantages include the fact that it can only be calculated for two groups at a time, as well as its sensitivity to the composition of the student population, which complicates comparisons between units (e.g., districts) and within units over time (for more discussion, see: Reardon and Owens [2014]; Massey and Denton [1988]).

Because we are primarily interested in comparing segregation between the public and private sectors, most of our analysis will focus on the information theory (IT) index, also known as the entropy index.

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[2] Note that this analysis does not include students who live in D.C. but attend private schools outside of the city, nor does it include private schools outside D.C. that serve D.C. students.

This measure focuses on the degree to which overall (in our context, citywide[3]) student diversity is distributed evenly among schools within a unit, which is why it is often classified as an "evenness" measure (Theil 1972; Theil and Finizza 1971).

The IT index is not as common in the segregation literature as other evenness measures, such as the dissimilarity index.[4] However, in addition to its independence from the composition of the student population, it offers two advantages for our analysis. First, it can be calculated using multiple groups (i.e., race/ethnicity categories), rather than just for pairwise combinations. This is important in areas, such as D.C., with a truly diverse population of students. Second, the index can be decomposed into within and between components, which, as we will see, provides very useful insight into segregation in these districts (Reardon et al. 2000).

The primary relevant disadvantage of the IT index is the fact that it is somewhat difficult to interpret in "real world" terms – i.e., the index, as discussed below, measures segregation in terms of how much schools' diversity varies from that of the overall unit (e.g., district, area, etc.). This is less of a problem in our context, however, given that we are comparing sectors.

As mentioned above, the IT index can be broken down into within-group and between-group (or area) components. This allows us to decompose "total citywide segregation" into two parts: the contribution of segregation within sectors; and the contribution of segregation between sectors (public|private) and subsectors (charter|regular public). If, for example, total segregation is driven mostly by segregation between the public and private sectors, then the citywide impact of even the most successful efforts to integrate schools in either sector will be constrained. Similarly, we examine the degree to which total segregation in D.C. is due to the separation of minorities from each other, rather than the separation of Whites from minorities.

Results

Exposure

Table 2 presents the exposure (and isolation) index values for each combination of students' race and ethnicity, by sector and subsector. To facilitate interpretation, these indexes are presented in terms of the average race and ethnicity distribution of the typical students' peers, by the race or ethnicity of the student. Note that the diagonal cells in each panel are not exposure index values, but rather are the difference between one and the sum of the four other cells in that row (each of which are exposure index values). This value is known as the isolation index, which can be useful when interpreting the exposure index.

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[3] In order to avoid confusion, we use the term "citywide" instead of "districtwide" when referring to estimates for D.C. as a whole (public and private).

[4] Replicating this analysis using the dissimilarity index instead of the IT index yields similar results.

Table 2	Race and ethnicity distribution of school peers (exposure and isolation indices), by student race and ethnicity and sector/subsector, District of Columbia, 2011-12

Public (DCPS+charter)

		Proportion of peers who are				
	Race/ethnicity	White	Black	Hispanic	Asian	Two/more races
For the typical student who is	White	0.423	0.349	0.140	0.044	0.044
	Black	0.035	0.875	0.076	0.008	0.007
	Hispanic	0.082	0.446	0.433	0.026	0.014
	Asian	0.240	0.428	0.240	0.060	0.033
	Two/more races	0.301	0.447	0.161	0.041	0.051

Private

		Proportion of peers who are				
	Race/ethnicity	White	Black	Hispanic	Asian	Two/more races
For the typical student who is	White	0.740	0.121	0.050	0.038	0.051
	Black	0.245	0.648	0.059	0.019	0.030
	Hispanic	0.379	0.222	0.330	0.028	0.042
	Asian	0.651	0.158	0.064	0.060	0.067
	Two/more races	0.610	0.180	0.067	0.047	0.096

Citywide (public+private)

		Proportion of peers who are				
	Race/ethnicity	White	Black	Hispanic	Asian	Two/more races
For the typical student who is	White	0.605	0.218	0.089	0.040	0.048
	Black	0.048	0.861	0.075	0.008	0.008
	Hispanic	0.110	0.425	0.423	0.026	0.017
	Asian	0.364	0.347	0.187	0.060	0.043
	Two/more races	0.434	0.332	0.120	0.044	0.070

Notes: Excludes a very small number of students coded as "Native American/Alaska Native" and "Hawaiian Native/Pacific Islander." Proportions may not sum to 1 due to rounding.

For example, in the first cell of the top panel, we see that the typical White public school student attends a school in which 42.3 percent of his or her peers are also White. The comparable proportion for private schools (the second panel) is 74.0 percent. This discrepancy may theoretically be due to greater segregation within the private sector. In reality, however, it is driven mostly by compositional differences between sectors – i.e., the larger White share of the private school student population relative to that of the public sector. Put differently, while the exposure and isolation indexes are *within*-sector segregation measures, comparing them between D.C. public and private schools is telling us more about compositional differences (and segregation) *between* sectors.

It is therefore instructive to compare the exposure and isolation index values with the overall racial and ethnic distributions presented in Table 1. For instance, citywide (bottom panel in Table 2), 60.5 percent of the typical White student's peers are also White, even though we see in Table 1 that only 15 percent of the city's students are White. Even in a city where the vast majority of students are minorities, the average White student still attends a mostly White school. This is rather striking and is indicative of the concentration of White students in certain schools in both sectors.

D.C.'s Black students have even less potential for interaction with students of other races and ethnicities; citywide, 86.1 percent of the typical Black student's peers are also Black. This situation, however, is much less pronounced in the private versus the public sector. In the former, for instance, almost a quarter of the typical Black student's peers are White, compared with 3.5 percent in the latter. Once again, though, this is largely a result of the fact that private schools serve a much larger share of White students than do public schools.

Finally, D.C.'s Hispanic students, who constitute about 12 percent of the student population, still attend schools in which over two out of five of their peers are also Hispanics. The typical Hispanic student's peers in private schools are much more likely to be White, and much less likely to be Black, than they are in public schools.

Overall, then, students in D.C. attend schools in which their own races or ethnicities are strongly overrepresented, but compositional differences complicate between-sector comparisons of within-sector segregation *per se*. In private schools, minorities have much greater potential for interaction with white students than they do in public schools, but this is mostly because over half of the private school student population is white, compared to less than 10 percent of the public school population. In contrast, due to the fact that the overwhelming majority of public school students are minorities, white public school students have far more exposure to their minority peers, vis-à-vis white students in private schools, but the typical minority public student's school serves a much smaller white population.

The importance for these results of compositional differences, particularly the stark overrepresentation of White students in the private sector, speaks to the need for alternative indices in any attempt to describe and understand D.C. segregation. This is especially salient when attempting to compare segregation between sectors (and subsectors).

Evenness (the information theory index)

Table 3 presents the IT index values for multiple race and ethnicity comparisons, as well as by sector (public/private) and subsector (charter/regular public). Recall that this index is independent of compositional differences between sectors, as it focuses on the degree to which schools deviate from a situation in which each school has the same racial and ethnic diversity as the overall unit (the overall units in Table 3 are subsectors in the first two columns, sectors in the third and fourth columns, and the District as a whole in the fifth and final column

Table 3	Segregation (IT) index, by race and ethnicity comparison and sector/subsector, District of Columbia schools, 2011-12				
	Public				
Comparison	**DCPS**	**Charter**	**All**	**Private**	**Citywide**
White|Black	0.569	0.472	0.566	0.498	0.659
White|Hispanic	0.527	0.422	0.512	0.358	0.579
Black|Hispanic	0.409	0.436	0.424	0.369	0.421
White|Black|Hispanic	0.456	0.428	0.459	0.427	0.525
White|Minority	0.472	0.394	0.473	0.353	0.557
Multiracial	0.405	0.411	0.419	0.337	0.469

Notes: White|Minority comparison aggregates categories of Black, Hispanic, Asian, and two or more races ($H_{W|BHAT}$), whereas multiracial ($H_{W|B|H|A|T}$) comparison includes each group separately. Results exclude a very small number of students coded as "Native American/Alaska Native" and "Hawaiian Native/Pacific Islander."

For example, the first column of the first row shows that White|Black segregation *within* DCPS is 0.569, which means that the "amount of diversity" in the typical DCPS school is 56.9 percent lower than it is for DCPS students as a whole. If, hypothetically, all DCPS schools were the same in terms of their students' racial and ethnic diversity (in this case defined solely in terms of White and Black students), the index would be zero, indicating perfect integration.

As a *very* rough rule of thumb, IT index values between 0.20-0.40 might be interpreted as reflecting moderate segregation, and values above 0.40 might be interpreted as high segregation. For an additional frame of reference, consider that the White|Black IT index in New York City schools is equivalent to the figure for DCPS and to that for D.C. public schools (DCPS and charter) as a whole (Wysienska-Di Carlo et al. 2016).

White|Black segregation citywide (public+private) is even higher (0.659) than it is in the public sector. D.C.'s schools are over 65 percent less diverse (in terms of White and Black students) than the student population overall, another somewhat striking figure.

Moving on to the other comparisons presented in Table 3, White|Black segregation, as is often the case, is the strongest of all the comparisons, but high index values are also found for all other citywide comparisons, particularly the White|Hispanic, White|Black|Hispanic, and White|Minority comparisons, with the latter representing segregation of White students from those who are identified as any one of the other groups (Black, Hispanic, Asian, or two or more races). By any comparison, D.C.'s students are quite heavily segregated by race and ethnicity.

Segregation of all five race and ethnicity groups (Multiracial segregation) is moderately weaker (but still quite high), perhaps due in part to the fact that segregation between minorities is less strong than that of White from minority students (see the index values for Black|Hispanic). We shall return to this issue below.

Among the most interesting findings from Table 3 is the fact that, for virtually every comparison presented, the IT index is at least modestly higher within the public sector than it is within the private sector, but overall citywide segregation is substantially higher than it is in either sector. This means, first, that while students are segregated within both sectors, they are slightly more evenly distributed by race and ethnicity across private schools than they are across public schools. Second, and more importantly, it suggests that *between*-sector segregation may be contributing substantially to total citywide segregation. We examine this possibility next.

Within-/between-sector decomposition

Table 4 presents the decomposition of citywide segregation (row 1) into: within-public sector (4); within-private sector (6); and between-sector (5) components. Note that these three components add up to (1).

In addition, the table further decomposes within-public sector segregation (row 4) into within-subsector (2) and between-subsector (3) components. The former represents the sum of segregation within the charter and regular public school subsectors, whereas the latter is the contribution to total public sector segregation of segregation between its two constituent subsectors. This particular subsector decomposition is not possible for the private sector.

	Sectoral decomposition of segregation (IT) index, by race and ethnicity comparison, District of Columbia schools, 2011-12							
Table 4	**White | Black**		**White | Minority**		**White | Black | Hispanic**		**Multiracial**	
	$H_{W|B}$		$H_{W|BHAT}$		$H_{W|B|H}$		$H_{W|B|H|A|T}$	
Component	**H**	**%**	**H**	**%**	**H**	**%**	**H**	**%**
(1) Total citywide	0.6587	100.0	0.5573	100.0	0.5248	100.0	0.4688	100.0
Public sector								
(2) Within subsectors	0.2848	43.2	0.2350	42.2	0.3106	59.2	0.2794	59.6
(3) Between subsectors	0.0237	3.6	0.0189	3.4	0.0151	2.9	0.0145	3.1
(4) Total within public sector	0.3085	46.8	0.2539	45.6	0.3256	62.0	0.2940	62.7
(5) Between sector	0.2465	37.4	0.2158	38.7	0.1305	24.9	0.1121	23.9
Private sector								
(6) Total within private sector	0.1037	15.7	0.0876	15.7	0.0686	13.1	0.0628	13.4

Notes: White|Minority comparison aggregates categories of Black, Hispanic, Asian, and two or more races ($H_{W|BHAT}$), whereas all other comparisons include groups separately. Subsectors in rows (2) and (3) refer to charter and regular public schools. Results exclude a very small number of students coded as "Native American/Alaska Native" and "Hawaiian Native/Pacific Islander." Percentages may not sum to 100 due to rounding.

The percentages in the table represent the proportion of total segregation contributed by each component, by race and ethnicity comparison. They can also be interpreted as the amount by which total citywide segregation would be reduced if perfect integration were achieved. For instance, eliminating White|Black segregation within the private school sector (row 6, first supercolumn) would reduce citywide Black|White segregation by 15.7 percent. Note that the contribution of within-private sector segregation is larger than that of within-public sector segregation mostly because the latter is larger in terms of enrollment.

Perhaps the most noteworthy finding from Table 4 is that between 24-39 percent of total segregation is a result of segregation *between* the public and private sectors. If, for example, White|Black segregation within the public sector was completely eliminated, over half of total segregation would still remain, in the form of the contributions of between-sector (5) and within-private sector segregation (6). This in no small part reflects the aforementioned fact that private schools serve a disproportionate number of the city's White students. As a result, even if public schools were totally integrated, Black and Hispanic public school students would still be separated from over half of the city's White students.

The contribution of between-sector segregation is lower in the White|Black|Hispanic and Multiracial comparisons, but still quite high – roughly one quarter of total segregation is due to the racial and ethnic separation of students between sectors. Thus, even if multi-race integration were achieved within the public school sector, almost 40 percent of total segregation would still persist.

In contrast, the results for between-subsector segregation (row 3 in Table 3) indicate that only a small proportion (no more than 3.4 percent) of total public sector segregation is due to segregation between charter and regular public schools.

Consider that Reardon et al. (2000), in a national analysis using data from 1995, report that 41 percent of total multiracial metro area segregation is due to segregation between cities and suburbs. In a very loose sense, then, D.C.'s private schools serve as the segregation equivalent of a suburb within the city.

To be clear, however, these results do not necessarily support the conclusion that private schools exacerbate segregation (or that charter schools do not). Making this determination would require, among other things, addressing issues such as what parents would do if they did not have the private school option. It is quite plausible, for instance, that White parents would send their children to public schools that already had large White populations, or simply move elsewhere. Between-sector segregation, by definition, involves both sectors.

What our findings do suggest is that the private school sector, while relatively small in size, plays an important role in shaping citywide segregation in D.C.

Within-/between-group decomposition

Table 5 presents, by sector, the proportion of total segregation that is due to: 1) separation of White from Black and Hispanic students; and 2) separation of Black from Hispanic students. We exclude Asian and Multi-race students from these decompositions because they represent only about three percent of the city's students.

Table 5	Group decomposition of segregation (IT) index, by sector, District of Columbia schools, 2011-12					
	Public		**Private**		**Citywide**	
Component	**H**	**%**	**H**	**%**	**H**	**%**
(1) Total segregation	0.4594	100.0	0.4272	100.0	0.5248	100.0
(2) Between white and Black|Hispanic	0.2127	46.3	0.3425	80.2	0.3353	63.9
(3) Between Black and Hispanic	0.2467	53.7	0.0848	19.9	0.1895	36.1

Notes: Results include only White, Black, and Hispanic students ($H_{W|B|H}$). Results exclude a very small number of students coded as "Native American/Alaska Native" and "Hawaiian Native/Pacific Islander." Percentages may not sum to 100 due to rounding.

Citywide (the rightmost supercolumn), almost two-thirds (63.9 percent) of total segregation is due to the separation of White from Black and Hispanic students, whereas 36.1 percent is attributable to the segregation of Black from Hispanic students. In other words, the separation of White students from minorities is the primary driver of segregation in D.C., but a substantial proportion is also a result of Black and Hispanic students attending different schools.

Even if D.C.'s White students were fully integrated with their Black and Hispanic peers, over one third of total segregation would remain, due to the separation of Black from Hispanic students.

There is substantial variation between sectors in this decomposition. In the public sector, segregation of White from Black and Hispanic students contributes roughly the same to total segregation as does segregation of Black from Hispanic students. In private schools, in contrast, about 80 percent of total segregation is due to that of White from Black and Hispanic students, whereas only about one fifth is segregation of Black from Hispanic students.

Once again, this can be interpreted to show that the full integration of White with Black and Hispanic students would only eliminate less than half of total segregation in the public sector, but it would cut down private school segregation almost twice as much (80 percent).

Overall, then, the segregation of White from Black and Hispanic students is the dominant factor in total segregation, vis-à-vis the segregation of Black from Hispanic students, but this is driven in no small part by the shape of segregation within the private sector, and between sectors.

Discussion

The majority of pre-existing school segregation analyses have excluded private (and, in many cases, charter) schools. There are good policy reasons for this, most notably the fact that integration efforts typically proceed within specific school districts. Yet the research that does exist, as well as common sense, strongly suggests that private schools, which tend to enroll a disproportionately White, more affluent student population than do public schools, might be quite influential in shaping segregation among all students in a given area.

The analysis reported above, by including not only regular public schools, but charter and private schools as well, provides a more comprehensive picture of racial and ethnic school segregation in the District of Columbia. Our results indicate, unsurprisingly, a very strong degree of segregation in D.C. schools, one which is found in both sectors.

But we also find important inter-sectoral differences in the extent and shape of this segregation, as well as in how each sector contributes to overall citywide segregation. Although segregation within the private sector tends to be modestly lower than that within the public sector, segregation between sectors accounts for roughly 25-40 percent of citywide segregation, depending on the racial and ethnic groups being compared. This is in no small part due to the fact that private schools serve 15 percent of D.C.'s students but almost 60 percent of its White students. Even if every D.C. public school was perfectly integrated, 35-55 percent of total segregation would still remain intact.

In addition, there are stark differences between sectors in terms of the inter- and intra-group decomposition of segregation. Within the public sector, the segregation of Black from Hispanic students contributes roughly as much to total White|Black|Hispanic segregation as does segregation of White from Black and Hispanic students. In private schools, in contrast, the separation of White from Black and Hispanic students explains around 80 percent of total segregation. In other words, in private schools, the "traditional" separation of White from minority students is the driving force of segregation, whereas in public schools, the separation of minorities from other minorities plays an equally important role. This is certainly something that policymakers should bear in mind, particularly given the District's small White student population.

Finally, we find no evidence that the separation of students between public charter and regular district schools plays anything beyond a minor role in segregation by race and ethnicity in the nation's capital.

Taken as a whole, these results would seem to suggest three primary implications:

First, and most obviously, **the exclusion of private schools from analyses of school segregation may result in an incomplete or misleading picture**. Private schools serve only about one in seven of D.C.'s students, but they play an important role in shaping citywide school segregation. Unfortunately,

private school data are not collected annually by the federal government. Whenever possible and appropriate, researchers should consider their inclusion. And states and big city districts should make an effort to collect private school data and make them publicly available.

Second, **the segregation of minority students from each other is often an important part of segregation, one which can vary by context**. Student segregation is most often conceptualized in terms of the separation of White students from minority students, but the separation of minority students from each other may also be a major impediment to integration in many places. In D.C., about one third of citywide (public and private) White|Black|Hispanic segregation consists of the separation of Black from Hispanic students. But this varies between sectors. Within the public sector, it represents one half of total segregation, compared with only about 20 percent within the private sector. Insofar as diversity is a public resource, policymakers should pay attention to the fact that segregation is not necessarily just about Whites and minorities, particularly in districts serving large proportions of minority students, and that the segregation of minorities from each might not be uniform, even between sectors in the same city.

Third and finally, **there may be what amounts to an impermeable ceiling on the citywide impact of big city public school integration efforts**. As noted above, as much as half of total D.C. school segregation would persist even if perfect public sector integration was somehow achieved. This is not to say that such efforts should not proceed – indeed, they should be a priority. But policymakers should consider that school segregation occurs not only between school districts within a single metropolitan region (e.g., between cities and surrounding suburbs), but also within and between the public and private school sectors. In D.C., at least, a fairly large share of the action is outside the purview of within-public sector integration. Private schools should be encouraged to expand their enrollment of minority students, and there should be efforts in both sectors to affect greater dispersion of students across schools by race and ethnicity.

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Technical Appendix

Data

Students coded as "Native American/Alaska Native" and "Hawaiian Native/Pacific Islander" are eliminated entirely from the analysis, as they comprised only a miniscule proportion of the student population in both sectors.

We also eliminated 16 public schools, all of which were either closed in 2011-12 or were adult education programs. Three charter schools in the dataset had missing race and ethnicity data, which we were able to fill in using data from the D.C. Public Charter School Board. In addition, three private schools in the NCES dataset were eliminated due to missing data that could not be obtained elsewhere. Finally, 10 private schools were removed from the dataset due to extremely low enrollment (10 or fewer students). Virtually all of these schools were pre-Kindergarten or childcare centers.

Analysis

Using the example of the exposure of White students to Black students, the **Exposure index** (*EXP*) can be expressed as

$$EXP = \sum_{i=1}^{n} \left(\frac{b_i}{B} \right) \left(\frac{w_i}{t_i} \right)$$

where *b* and *w* represent the number of Black and White students, respectively, in each school *i*, *B* is the number of Black students across the entire subsector, sector, or city, and *t* is the total number of students at the school.

Theil's information theory index (*H*) operationalizes diversity in terms of entropy, which attains a maximum value when all groups (in our case, all four race and ethnicity categories) are equally represented in the student population, and a minimum value when the entire student population is comprised of a single group. Entropy is calculated across the entire unit (*E*) (subsector, sector, or citywide) and for each individual school (*E_i*). *H* is a weighted average of the deviation of schools' diversity from unitwide diversity. *H* can be expressed as:

$$H = \sum_{i=1}^{n} \left[\frac{t_i(E - E_i)}{ET} \right]$$

where t_i is the number of students at school *i*, and *T* represents the size of the student population across the entire unit. In a unit where every school exhibits precisely the same level of diversity as the district as a whole ([$E - E_i$]=0 for all values of *i*), *H* takes on a maximum value of one, indicating perfect integration (*within* the unit).

Sectoral decomposition of H. The decompositions of *H* are from Reardon et al. (2000). Citywide *H* in the equation below is constituted by four different components. The first (H_{PuXPr}) is segregation between public and private sectors. The second is segregation between *G* subsectors (H_{PuG}) – i.e., between charter and regular public schools – weighted by both the public sector's relative size (T_{Pu}/T) and its relative diversity or entropy (E_{Pu}/E). The third term is segregation within subsectors, which is the sum

of H for each subsector g, also weighted by size and diversity. The fourth and final term in the equation is segregation within the private sector (H_{Pr}), weighted by sector size and entropy.

$$H = H_{PuXPr} + \frac{T_{Pu}E_{Pu}}{TE}H_{PuG} + \sum_{g \epsilon Pu} \frac{T_g E_g}{TE}H_g + \frac{T_{Pr}E_{Pr}}{TE}H_{Pr}$$

These calculations are presented in Table 4. Note that a decomposition of H in which the private sector also consisted of subsectors would replace the fourth term with two terms analogous to the second and third in the equation above. In this case, however, between-subsector segregation in the private sector is zero.

Group decomposition of H. In the equation below, total White | Black | Hispanic segregation ($H_{W|B|H}$) is composed of: 1) segregation between White and minority students ($H_{W|BH}$), weighted by the relative magnitude of entropy between White and minority students ($E_{W|BH}/E_{W|B|H}$); and 2) segregation between minority (Black and Hispanic) students ($H_{B|H}$), weighted by the relative magnitude of entropy between Black and Hispanic students ($E_{B|H}/E_{W|B|H}$), and the proportion of Black and Hispanic students in the unit (Q_{BH}).

$$H_{W|B|H} = \left(\frac{E_{W|BH}}{E_{W|B|H}}\right)H_{W|BH} + Q_{BH}\left(\frac{E_{B|H}}{E_{W|B|H}}\right)H_{B|H}$$

These calculations are presented in Table 4.

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