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Teacher Segregation in Los Angeles and New York City

Abstract

Although the past few decades have seen many empirical studies of student segregation by race and ethnicity in U.S. public schools, research on the segregation of teachers is extremely limited. Insofar as diversity is a resource for both students and teachers, one that has been shown to have implications for outcomes among both groups, teacher segregation is important, as it represents the distribution of that resource, within and between districts.

In this paper, we present a straightforward descriptive analysis of teacher segregation by race and ethnicity in the two largest U.S. school districts—New York City and the Los Angeles Unified School District. We find meaningful levels of teacher segregation in these districts, particularly of Black teachers from their White, Hispanic, and Asian colleagues. We also find that, unlike student segregation, teacher segregation is driven as much by the separation of minority teachers from each other as it is by the separation of White teachers from minority teachers. Finally, our results suggest that teacher segregation is related systematically to that of students, which can have a rather drastic effect on the experiences of those students. Black students in New York City and Los Angeles, for example, are four to five times more likely to have a Black teacher than are their White peers. Recent efforts to improve teacher diversity must include close attention to teacher segregation, and states and districts should be collecting the data necessary to do so.

Introduction

Why does teacher segregation matter?

In recent years, policymakers and commentators have paid increasing attention to the issue of teacher diversity in U.S. public schools. These discussions generally focus on the fact that a majority of U.S. students are Black or Hispanic, whereas a vast majority of teachers are White.[1]

Often underappreciated in these discussions about diversity is the importance of not only how many minority teachers there are but also how they are distributed across schools. If we view teacher diversity as a resource for both teachers and students, this resource, like any other, can be more or less equally allocated across schools (and districts). If, for example, teacher diversity increases within a given district, the benefits of this trend—both for teachers and students—will be limited if all of the new minority teachers are placed in just a handful of schools.

There is empirical evidence suggesting that workplace segregation in multiple sectors matters for meaningful outcomes. For instance, even though the research is somewhat mixed in terms of diversity's effect on workers' effectiveness at the organizational level, it suggests that heterogeneous groups are more creative, arrive at higher-quality solutions to problems, and achieve better business outcomes (see Fischer, 2009; Herring, 2009). On the other hand, a number of studies conducted across sectors find a negative relationship between racial heterogeneity and individual attachment to the group and job satisfaction (for a review, see Williams and O'Reilly, 1998; also Tsui et al., 1992; Sorensen, 2004). All of these effects, however, can be exacerbated[2] or attenuated by appropriate diversity management practices (for a review of such practices, see Guillaume et al., 2015).

In the education context, there already is a fair amount of research indicating the significance of segregation for both teachers and students. For example, one study of a large urban district found that the racial and ethnic composition of schools is associated with job satisfaction, collaboration, and career commitment, particularly among White teachers (Mueller et al., 1999). More specifically, the authors found that mismatches, both between teachers and their colleagues and between teachers and students,[3] affect these outcomes negatively, with that relationship being strongest among White teachers.

The teacher segregation can also have implications for students. Dee (2004), using data from Tennessee Project STAR study, finds that students who had teachers of their own race scored higher on math and reading tests, which suggests that the relationship between teacher and student segregation may influence achievement results. Similarly, Gershenson et al. (2015) find that non-Black teachers have lower expecta-

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[1]A note on nomenclature: Under ordinary circumstances, the terms "African American," "Latino," "Native American," and "people of color" might be used in this report, following what seems to be the current preference of the preponderance of people in each of these groups. As the reader will see, however, we use the terms "Black," "Hispanic," "American Indian," and "minority" in this paper, 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.

[2]Even well-intended efforts to improve diversity can create backlash (Devine et al., 2002; Rudman et al., 2001). For example, Plant and Devine (2001) find that in some situations, pressuring individuals to make a pro-African-American hiring decision can have the opposite effect. However, several studies suggest that teachers who leave high-poverty, high-minority schools do so because of their dysfunctional work environments rather than the characteristics of the students they teach (Boyd et al., 2011; Allensworth et al., 2009; Johnson and Birkeland, 2003; Johnson et al., 2012).

[3]However, several studies suggest that teachers who leave high-poverty, high-minority schools do so because of their dysfunctional work environments rather than the characteristics of the students they teach (Boyd et al., 2011; Allensworth et al., 2009; Johnson and Birkeland, 2003; Johnson et al., 2012).

tions of Black students than do Black teachers (also see Dee, 2005), and Grissom and Redding (2016) find that Black students are referred to gifted programs at significantly lower rates when taught by non-Black teachers.

In addition, teacher integration could potentially expose more students to successful minority role models (Marx and Goff, 2005; Marx and Roman, 2002; McIntyre et al., 2003) and, more broadly, expose *all* students to stereotype-disconfirming experiences, thus helping to prepare them to live and thrive in an increasingly diverse, multicultural nation.

Why might teachers be segregated by race and ethnicity?

Although explaining the sources of teacher segregation is beyond the scope of this brief,[4] it may be instructive to discuss briefly its possible causes. Teacher segregation of course is an instance of *within* occupation segregation, which is different from inter-occupational segregation and, as such, is not driven by the same set of factors. Segregation between occupations might, for example, be driven by differences in requirements (e.g., education), whereas this and other factors are far less salient in the context of intra-occupational segregation.

In talking about causes, it is also important to distinguish between *within* and *between* district segregation. If we are talking about teacher segregation *between* school districts, then given the preference of teachers to work relatively close to their homes (Marvel et al., 2007), as well as their unique tendency to work close to their childhood homes (Reininger, 2006), it is plausible to speculate that residential segregation is the most important factor driving teacher segregation. Put simply, White teachers will tend to be the majority group in areas with mostly White residents, whereas teachers of color will be better represented in schools located in areas with larger proportions of residents of color.

This research brief, however, focuses on segregation *within school districts*, which is a somewhat different situation. Without question, residential segregation still plays a role, particularly in large residentially segregated cities such as Los Angeles and New York City. As mentioned above, given the general preference for working close to home, teachers in certain areas may be disproportionately represented in schools in those areas, and to the degree certain races or ethnicities are strongly represented among residents of those neighborhoods, this may generate teacher segregation.

Nevertheless, this type of residential factor, which has been shown to be very important for teachers' choice of schools (Boyd et al., 2005), is unlikely to explain all or even most of teacher segregation within large urban districts such as Los Angeles or New York City.[5]

Residential segregation, in other words, is only one of the pre-hire factors that may contribute to teacher segregation. Among other factors are self-segregation and discrimination. Self-segregation refers to the employees' preferences regarding workplace composition. Regarding self-segregation, for example, Young et al. (1997), in their study on teacher recruitment, found that when the race of the recruiter and the applicant matched, applicants viewed vacancies more positively than when their races did not match.

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[4]We will be attempting one possible explanation, the impact of school race and ethnicity composition on teacher mobility, in a future paper.

[5]A direct examination of this from outside of the education field found that, among blue-collar workers in four large urban areas, roughly the same increase (10-13 percent) in inter-firm segregation was predicted by residential segregation as was explained by the homophily of social networks and informal hiring practices (Muow, 2002).

Out of different forms of discrimination, steering seems the most relevant. Employers, driven either by beliefs that homogeneous workforces are more productive because of higher trust and lower coordination costs among workers (den Butter, 2004) or by racial stereotypes (Fang and Moro, 2011), may steer candidates toward schools with a demographic composition matching that of the candidate. The steering phenomenon is also one of the causes of residential segregation.

Finally, after teachers are hired and placed, another potentially influential factor in the within-district context is the pattern of voluntary turnover. Voluntary turnover is a post-hire factor that affects segregation, but the two are rarely studied together. One notable exception from outside of education is the study of bank branches by Sorensen (2004), in which he demonstrated that the chance of an employee leaving his or her bank branch increased if another employee of the same race left, or if a new co-worker was of a different race, but that a worker's chance of leaving was unaffected by an addition of a co-worker of the same race. Sorensen concludes that turnover rates are consistent with Schelling's (1971) threshold models of residential segregation and are asymmetrical—that is, losses in same-race representation are more important than gains. Parallel findings have been observed in social networks studies. For example, Popielarz and McPherson (1995) found that the more a given person is unlike other members of a group, the more likely she or he is to leave.[6]

This is consistent with Bristol's (2014) study of Black male teachers in the Boston Public Schools district, which found that "loners" (teachers who were the only Black men on their faculty) were much more likely to switch schools than "groupers" (teachers who had four or more Black male colleagues), and that loners were also more likely to cite challenges with colleagues as one reason for their decision to leave.

Prior research on teacher segregation

The research on student segregation is copious and spans decades (e.g., Reardon and Owens, 2014; Stroub and Richards, 2013), and there is also a great deal of evidence regarding the distribution of teachers by characteristics such as qualifications and effectiveness (e.g., Lankford et al., 2002). There is, however, precious little empirical work on teacher segregation by race/ethnicity.

The small handful of exceptions include an analysis of 167 school districts by Parker (2008), which finds that, while results varied by district, White students are generally more likely to have White teachers, compared with their Black peers, and vice versa. Using a nationally representative survey of U.S. teachers, Frankenberg (2009) concludes that White teachers are generally isolated from minority, low-income, and other groups of traditionally underserved students (also see Frankenberg and Siegel-Hawley, 2010).

Missing from this literature is any attempt to describe teacher segregation using measures other than those based on the student/teacher "match" perspective, as well as any thorough analyses of teacher segregation within districts.

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[6]Note that both self-segregation and turnover patterns can be explained (to a degree) as an outcome of the similarity/attraction mechanisms, which, in the most general terms, refer to the fact that people prefer to be surrounded by and interact with people they perceive to be like them (Byrne, 1961; Berscheid and Walster, 1978; Tajfel and Turner, 1986; Smith et al., 2014). This preference to interact with others who are similar affects both the creation of ties (e.g., workplace preferences) and their dissolution (e.g., job switching) (McPherson et al., 2001). Also important to note is the fact that cognitive biases and perceptions of similarities can be altered by purposeful interventions (e.g., Gehlbach et al., 2016).

Data and Analysis

Our data were obtained via public records requests to the New York City Department of Education and the Los Angeles Unified School District. Most of our analysis focuses on 2012 (by which we mean the 2012-13 school year). Additional details about the coding of these data are presented in the technical appendix.

The distribution of teachers by race and ethnicity is presented in Figure 1.

Figure 1 indicates that both New York City and the Los Angeles Unified School District employ diverse teacher workforces, relative to the overall U.S. public school teacher workforce in 2011-12 (the closest year of available data), which was more than 80 percent White, non-Hispanic (Goldring et al., 2013). In Los Angeles, in fact, White teachers constitute less than half the workforce.

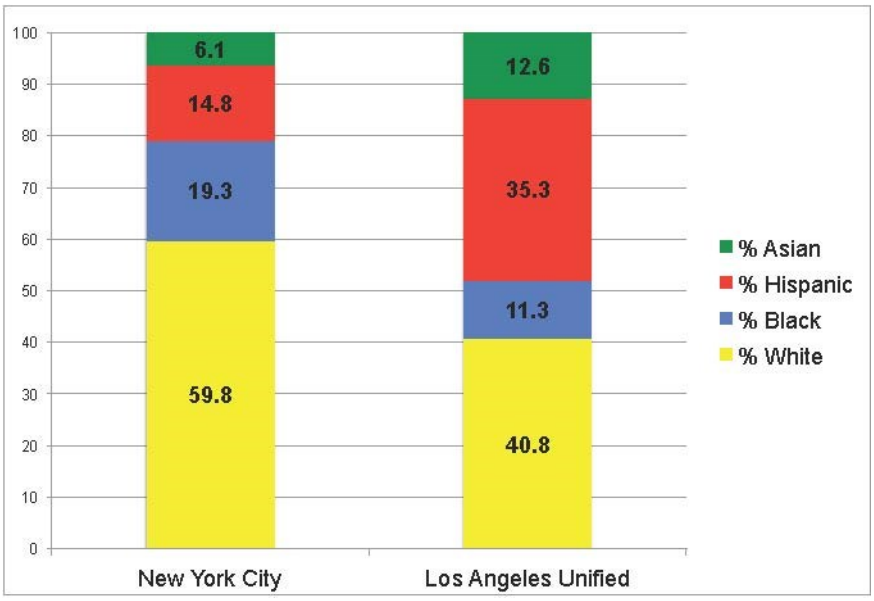

Figure 1. Race and ethnicity distribution of teacher sample, by district, 2012
Notes: New York City sample in 2012 includes 1,592 schools with 68,606 teachers; Los Angeles sample in 2012 includes 890 schools with 24,469 teachers.

Our purely descriptive analysis of teacher segregation will focus on two measures, the exposure index and Theil's information theory index. We discuss these two measures briefly below, and how they might be interpreted. In the technical appendix of this report, we describe in more detail their calculation.

The **Exposure index (EXP)** is an exceedingly simple, common manner of characterizing the segregation of two groups. If we use the example of White and Black teachers, EXP indicates the proportion of the typical White teacher's colleagues who are Black. As its name suggests, this is a measure of interaction, or at least opportunity for interaction, between two different groups. It ranges from zero (in our example, the typical White teacher has no Black colleagues at her school) to one (all of her colleagues 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 teacher workforce in a given district,

which complicates comparisons between districts and within districts over time (for more discussion, see Reardon and Owens, 2014; Massey and Denton, 1988).

In the teacher segregation context, **Theil's information theory index**, also known as the entropy index, focuses on the degree to which overall (in our context, districtwide) teacher diversity is distributed evenly among schools within that district, which is why it is often classified as an "evenness" measure (Theil, 1972; Theil and Finizza, 1971).

Theil's index is not as common in the segregation literature as other evenness measures, such as the dissimilarity index,[7] but, in addition to its independence from the composition of the teacher workforce, 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 given the multigroup composition of the teacher workforces in Los Angeles and New York City. Second, as discussed below, the index can be decomposed into within and between components, which provides very useful insight into teacher segregation in these districts (Reardon et al., 2000). The primary relevant disadvantage of Theil's index is the fact that it is somewhat difficult to interpret in "real world" terms. For this reason, we will present index values for both teachers and students, thus facilitating the comparison of teacher segregation with that of a "benchmark" that is generally regarded to be high.

As mentioned above, Theil's index can be broken down into within-group and between-group (or area) components, which in our context allows us to gauge the contribution to total segregation of: (1) segregation between White teachers and teachers of other races/ethnicities; and (2) segregation of Black, Hispanic, and Asian teachers from each other (Reardon et al., 2000).

If, for example, total teacher segregation is driven substantially by separation of non-White teachers from each other, this is a different situation than one in which total segregation is largely due to the separation of White teachers from other teachers. This is discussed in further detail below.

Finally, we also present **teacher-student odds ratios**, which express the likelihood of a student of a given race or ethnicity having a teacher of a given race or ethnicity, compared with a student of a different race or ethnicity. For example, we might assess the chance of a Black student having a Black teacher versus that of a White student having a Black teacher.[8]

These odds ratios are intended to provide some idea of the impact of teacher segregation on the diversity experiences of *students* (though, of course, the odds ratios are a function of both teacher and student segregation). If, hypothetically, teachers were perfectly integrated (i.e., equally distributed across schools by race and ethnicity), the odds ratios would equal one, as all students would be equally likely to have a teacher of any given race as would their peers. If, on the other hand, teachers are segregated by race and ethnicity, the odds ratios will vary depending on the relationship between student and teacher segregation.

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[7]We replicated the analysis presented here using the dissimilarity index instead of Theil's index, at least that part of the analysis that could be performed using the dissimilarity index (e.g., pairwise comparisons). Both analyses produce similar conclusions. For these calculations, we do not have classroom-level data, and so we assume that there is no within-school sorting by race and ethnicity. See the technical appendix for more discussion.

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Results

Exposure

Table 1 presents the exposure index values for each combination of teachers' race and ethnicity, by district. To facilitate interpretation, these results are presented in terms of the average race and ethnicity distribution of the teachers' colleagues, by the race or ethnicity of the teacher. Note that the diagonal cells in each panel are not exposure index values per se, but rather are the difference between one and the sum of the three other cells in that row (each of which are exposure index values). This value is known as the isolation index, which, as we will see, can be useful when interpreting the exposure index.

What these New York City results make clear is that teachers of all races and ethnicities have relatively little exposure to teachers of color, despite working in schools in which the vast majority of students are minorities. In the top panel of Table 1, for example, you can see that more than two-thirds of White teachers' colleagues, on average, are also White, whereas only 13.1 percent are Black, 12.6 percent are Hispanic, and 5.8 percent are Asian.

Table 1. Average race and ethnicity distribution of schools' teachers (exposure and isolation index), by teacher race and ethnicity and district, 2012

New York City					
		Proportion of colleagues who are			
	Race/ethnicity	**White**	**Black**	**Hispanic**	**Asian**
Of the typical teacher who is	White	0.686	0.131	0.126	0.058
	Black	0.417	0.391	0.140	0.052
	Hispanic	0.506	0.176	0.264	0.054
	Asian	0.573	0.161	0.133	0.133

Los Angeles Unified					
		Proportion of collagues who are			
	Race/ethnicity	**White**	**Black**	**Hispanic**	**Asian**
Of the typical teacher who is	White	0.506	0.092	0.279	0.123
	Black	0.331	0.298	0.263	0.109
	Hispanic	0.323	0.085	0.481	0.112
	Asian	0.397	0.098	0.314	0.191

Note, however, that this generalization is far less true when it comes to minority teachers' exposure to colleagues of their own race or ethnicity (the isolation indices on the diagonals in Table 1). Black teachers, for instance, work in schools in which nearly two in five of their colleagues are Black, on average, a proportion that is more than twice as large as that of the typical White, Hispanic, and Asian teachers. These discrepancies are also quite sharp for Hispanic and Asian teachers, as well as, to a much lesser degree, White teachers.

In Los Angeles, there is considerably more exposure to minority teachers. The schools of teachers of all races and ethnicities exhibit substantial representation of both Hispanic and Asian teachers. White teachers' colleagues, for example, are, on average, 50.6 percent White, 9.2 percent Black, 27.9 percent Hispanic, and 12.3 percent Asian. And there is even more diversity of colleagues for minority teachers. In fact, only for White teachers do other White teachers make up more than half of colleagues.

Once again, though, we find substantial relative overrepresentation of colleagues of each race or ethnicity for teachers of the same race or ethnicity. For example, strikingly, roughly 30 percent of the typical Black teacher's colleagues are Black, which is more than three times as high as the proportion for White, Hispanic, and Asian teachers.

Overall, then, the exposure (and isolation) index results show that, while teachers of each race and ethnicity work with substantially larger proportions of colleagues of their own race or ethnicity than do teachers of other races and ethnicities, exposure to minority teachers is generally low in both districts, with the exception of Hispanic teachers in Los Angeles, who represent a significant share of the colleagues for the typical teacher of all races and ethnicities.

As mentioned above, however, these results depend greatly on the composition of each district's workforce. Hispanic teachers, for example, represent a larger share of colleagues in Los Angeles vis-à-vis New York City because they represent a larger share of the teacher workforce in the former compared with the latter. That is precisely why many analyses of segregation, within and beyond education, also rely on "evenness" measures that examine the distribution of teachers or students across schools in a manner independent of composition.

Evenness: Theil's index

Table 2 presents the results for one such evenness measure, Theil's information theory index. Estimates are presented for both teachers and students, in order to provide a frame of reference for interpretation, since, as mentioned in the previous section, interpreting Theil's index is not particularly intuitive. Index values are presented for all possible pairwise combinations of race and ethnicity, as well as overall (multigroup).

As would be expected, the overall (multigroup) segregation of students by race and ethnicity is far more extensive than that of teachers. In both Los Angeles and New York City, you can interpret the figures in the bottom row of Table 2 as indicating that the diversity of the average New York City school's teachers is roughly 20 percent (0.202) lower than diversity districtwide, compared with 32.7 percent for students. The figures are similar in Los Angeles. This means, essentially, that the overall "amount of diversity" in these districts is distributed unequally among their constituent schools, which are approximately 20 percent more homogeneous than each district as a whole.

Table 2. Segregation (Theil's index) of teachers and students, by comparison and district, 2012

	New York City		Los Angeles Unified	
Comparison	Teachers	Students	Teachers	Students
White/Black	0.288	0.567	0.289	0.482
White/Hispanic	0.179	0.407	0.193	0.435
White/Asian	0.153	0.298	0.134	0.238
Black/Hispanic	0.266	0.278	0.335	0.296
Black/Asian	0.324	0.531	0.330	0.442
Hispanic/Asian	0.271	0.353	0.183	0.291
Multigroup	0.202	0.327	0.182	0.315

These multigroup index values for teachers are generally interpreted as moderate, but they are, perhaps, higher than might be expected, given that we are talking about intra-occupational and intra-district segregation, in which social and economic inequality and residential segregation are almost certainly less of a factor than they are in segregation between districts or occupations (or among students within districts).

The estimates for the pairwise race and ethnicity combinations in Table 2 provide crucial insight into the multigroup figures. The Theil index values representing the separation of Black teachers from White teachers, Black teachers from Hispanic teachers, and Black teachers from Asian teachers are the highest of all the combinations, whereas White/Asian segregation is the lowest by this measure. Thus, as is generally the case for students, Black teachers are the most segregated from their colleagues of other races and ethnicities in these two districts, and the extent of this segregation is arguably substantial, given the context.

In fact, according to the estimates in Table 2, in both Los Angeles and New York City, the degree of Black/Hispanic teacher segregation is equal to or greater than the segregation of Black students from Hispanic students. This is a somewhat striking result, given that, once again, teacher segregation is less constrained than student segregation by social and economic forces (e.g., residential segregation).

Another interesting result in Table 2 is seen in the index values representing the separation of White teachers from Hispanic teachers. They are among the lowest in both districts, whereas this combination is among the highest when applied to students. Put differently, the separation of White and Hispanic teachers contributes much less to the total segregation of teachers than it does to that of students.

Finally, one might notice in Table 2 that the index values representing the separation of White teachers from minority teachers (the first three rows) are not much larger in magnitude than those representing the segregation of minority teachers from each other (rows 4-6). This stands in stark contrast with the results for students, in which the Theil index values measuring separation of Whites and minorities are substantially higher than those representing the separation of minorities from each other.

In order to examine this more thoroughly for teachers, Table 3 presents the decomposition of the overall (multigroup) Theil's index into two parts: (1) the segregation of White teachers from minority teachers; and (2) the segregation of minority teachers from each other (for more details on this procedure, see the technical appendix).

Table 3. Between group decomposition of Theil's Segregation index, by district, 2012

Component	New York City	Los Angeles Unified
White / Minority	53.1	39.9
Between minority	46.9	60.1

In New York City, nearly half of total segregation is between groups of minority teachers; in Los Angeles, the proportion is 60 percent. These rather surprising results indicate that overall teacher segregation in these two districts is due almost as much to the separation of Black, Hispanic, and Asian teachers from each other as it is to these minority teachers' segregation from White teachers.

And this is not just driven by the separation of Asian teachers from Black and Hispanic teachers. If we return to Table 2 for a moment, we see that the Theil index values measuring Black/Hispanic segregation are higher than those for White/Hispanic segregation in both districts, and comparable to (New York City) or higher than (Los Angeles) those for White/Black segregation.

Trends

It might also be instructive briefly to examine trends in Theil's segregation index in Los Angeles and New York City. Figure 2 presents index values overall, and for each combination, from 2002 to 2012.

Although overall (multigroup) segregation in New York City was roughly the same in 2012 as in 2002, this overall flat trend masks increases in the Black/White, Black/Hispanic, and Black/Asian combinations. In contrast, multigroup segregation in Los Angeles did increase somewhat from 2002 to 2012, particularly from 2008 to 2012. This jump seems to have been the result of increases in all of the pairwise combinations, but also of the particularly to strikingly large increases in White/Black and Black/Asian segregation.

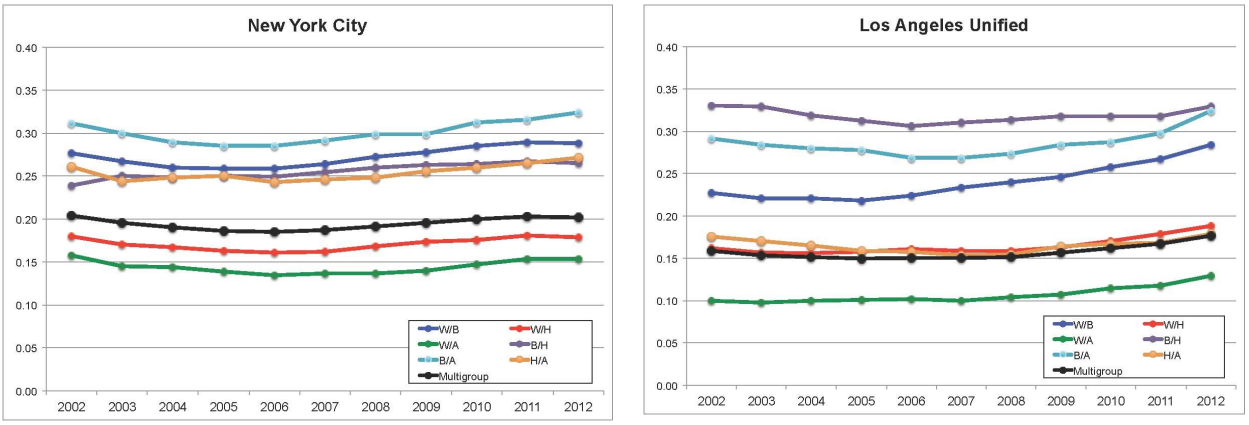

Figure 2. Segregation (Theil's index) trends, by combination and district, 2002-2012

It bears noting that, during this same time period, the diversity of teachers in New York City, like segregation, was generally flat, whereas there was a substantial increase in the proportion of Hispanic and Asian teachers in Los Angeles (Shanker Institute, 2015). This finding, along with Figure 2, illustrates the possibility that the benefits of increased teacher diversity might be attenuated by concurrent increases in teacher segregation.

Teacher-student odds ratios

Just as the benefits of diversity for teachers are mediated by teacher segregation, so too are the benefits for students. And the results presented thus far make no reference to the important fact that teacher segregation is highly related to that of students.

In order to illustrate this relationship, as well as the potential impact of teacher segregation on students more generally, Table 4 presents odds ratios showing the likelihood of a student of a given race having a teacher of that same race, relative to the odds of a student of a different race having that same teacher.

In both districts, across all combinations, students are more likely to have a teacher of their own race or ethnicity than are their peers of different races and ethnicities. In New York City, for example, the odds of a Black student having a Black teacher are more than five times higher (OR=5.21) than the odds of a White student having a Black teacher, and more than four times higher in Los Angeles (OR=4.35).

Similarly, Hispanic students in New York City are two and a half times more likely (OR=2.50) to have a Hispanic teacher than their White peers, and twice as likely in Los Angeles (OR=1.98). And, once again, these dynamics are not just about White and minority students—Black students in New York City are twice as likely (OR=2.07) to have a Black teacher as are Hispanic students, while the comparable odds ratio is 2.78 in Los Angeles.

On the whole, the odds ratios are substantially greater than one for all other combinations, with the possible exception of the comparison of White versus Asian students having a White teacher (OR=1.13 in New York City, and 1.16 in Los Angeles). So, for example, all students in New York City are more likely to have a White teacher than a non-White teacher, since the city's teachers are predominantly White. But White students are 39 and 64 percent more likely to have a White teacher compared with their Black and Hispanic peers, respectively.

Table 4. Teacher-student odds ratios, by combination and district, 2012

	New York City	Los Angeles Unified
Black student w/Black teacher / White student w/Black teacher	5.21	4.35
Hispanic student w/Hispanic teacher / White student w/Hispanic teacher	2.50	1.98
Asian student w/Asian teacher / White student w/Asian teacher	1.91	1.28
White student w/White teacher / Black student w/White teacher	1.64	1.52
White student w/White teacher / Hispanic student w/White teacher	1.39	1.53
White student w/White teacher / Asian student w/White teacher	1.13	1.16
Black student w/Black teacher / Hispanic student w/Black teacher	2.07	2.76
Hispanic student w/Hispanic teacher / Black student w/Hispanic teacher	1.64	1.84

This, to reiterate, illustrates the relationship between teacher and student segregation. In other words, not only do teachers of a given race or ethnicity tend to cluster in the same schools, but the schools in which they are located tend to be those serving relatively larger proportions of students of that same race or ethnicity.

The results in Table 4 also illustrate how teacher segregation influences the impact of teacher diversity for students. If, hypothetically, teachers were perfectly integrated across schools, all of these odds ratios would equal one, meaning a White student, for instance, would have the same chance as a Black student of having a Black teacher. In reality, although Black teachers represent only a minority of the teacher workforce in both these districts, they are far more likely to teach Black students than they are to teach White, Hispanic, or Asian students.

Discussion

Although teacher diversity has received a great deal of attention in recent years, very little attention has been paid to teacher segregation, even though, as we have shown in this paper, the latter can have a substantial impact on local levels of diversity (and, thus, on diversity's benefits) for both teachers and students.

Our analysis of data from two large urban districts, the Los Angeles Unified School District and New York City, suggests that the segregation of teachers by race and ethnicity, while not as extensive as that of students, is nevertheless meaningful in its degree. Diversity at the typical school in both districts is approximately 20 percent lower than it is districtwide. In short, teachers of a given race or ethnicity tend to be sorted into schools with disproportionate numbers of colleagues of that same race or ethnicity.

Teacher diversity, therefore, which one can view as a resource for both teachers and students, is distributed unequally among schools, at least in these two districts, which exhibit a great deal more (student and teacher) diversity than in the typical U.S. public school district. Even in Los Angeles, where only two in five teachers are White, more than half of the typical White teacher's colleagues are also White. At the same time, 30 percent of colleagues for the typical Black teacher are also Black, compared with less than 10 percent for the typical White, Hispanic, or Asian teacher.

Moreover, this overall level of teacher segregation, unlike that of students, is driven as much by the separation of minority teachers from each other as it is by the segregation of White teachers from minority teachers. In fact, our estimates suggest that Black and Hispanic teachers exhibit more between-school segregation than do Black and Hispanic students.

Insofar as levels of and trends in diversity within a district, as well as the benefits that diversity confers, may be constrained and shaped by teacher segregation, any attempt to assess or improve teacher diversity should pay close attention to the distribution of teachers across schools (and districts) by race and ethnicity. In Los Angeles, for example, teacher diversity increased from 2002 to 2012, but teacher segregation increased as well, with the latter potentially acting to mitigate the benefits of the former.

We also conclude that teacher segregation bears a strong relationship to student segregation. Black students in Los Angeles and New York City, for example, are four to five times more likely to have a Black teacher than are their White peers, and two to three times more likely compared with their Hispanic peers.

The implications of these results are not straightforward. The conversation about teacher diversity is most often framed in terms of the "mismatch" between the race and ethnicity distributions of minority teachers versus that of minority students *at the district level*, particularly in large urban districts. That is, that most of the teachers in these large districts are White, whereas the vast majority of students are not. This characterization is generally accurate (though not in Los Angeles), but it ignores the important underlying role of within-district teacher segregation, which works to "allot" disproportionate numbers of teachers of a given race or ethnicity to students of that same race or ethnicity. In this sense, the overall district figures overstate the actual extent of the "mismatch," while understating the implications of teacher diversity in terms of students having teachers who are different than they are.

For instance, only about 20 percent of New York City teachers are Black, but Black students are far more likely to be taught by these teachers every day than are students of any other race or ethnicity. This might be viewed as a positive finding, given the aforementioned evidence on the benefits of student-teacher racial and ethnic "match," especially for impoverished students of color; but it also carries negative consequences, such as the limiting of the benefits of interracial contact, particularly among White students.

Nevertheless, on the whole, it is clear that teacher segregation, at least in Los Angeles and New York City, is meaningful in its extent and important in its role of shaping the benefits of teacher diversity for both teachers and students.

Policy Recommendations

We offer three general policy recommendations as to how states and districts might better understand and address the issue of teacher segregation.

Collect and publish data that can be used to monitor and study teacher diversity and teacher segregation. The almost complete lack of research on this topic represents a significant hole in the evidence on and debate about teacher diversity, one that might be filled relatively easily by the collection and dissemination of school-level data on teachers' race and ethnicity. This is our first and most important recommendation.

Existing data are limited, scattered, and hard to access. We encourage the federal government, states, and districts to collect data systematically on the race and ethnicity of all teachers and to make these data available to schools as well as researchers and the public. These data collections must include charter as well as regular public schools. In addition, other efforts to collect information from and about teachers, most notably surveys, should always include a question asking teachers for their race or ethnicity.

Finally, our results indicate that, at least in Los Angeles and New York City, teacher segregation is a multigroup issue. That is, minorities are as separated from each other as they are from their White colleagues within their district. To the degree this holds up elsewhere, it is clear that efforts to measure, monitor, and reduce teacher segregation will have to take into account this reality, particularly in districts in which multiple minority groups represent significant shares of the teacher workforce.

Minority teachers are a scarce resource, and, while it's debatable how best to distribute this resource to maximize its benefits to students, it is clear that, at a minimum, we need accurate and timely information in order to make the best possible policy decisions.

Hold decision-makers accountable for teacher integration. At whatever level decisions about hiring and placement are made, district or school, these institutions should be held accountable for the degree to which students have relatively equal access to diverse faculties. This might encourage administrators to consider teacher segregation when devising and implementing personnel policies, including efforts to attract a larger, more diverse pool of qualified candidates.

It bears noting that, under the Every Student Succeeds Act, states are allowed to set aside up to 7 percent of funds for evidence-based interventions. Policies promoting teacher diversity and integration might qualify as such an intervention, given the evidence described throughout this paper.

Improve teacher integration through incentives for voluntary transfers. Given the potentially damaging effects of involuntary transfers, another possible policy recommendation would be to offer monetary or other incentives for group transfers to improve integration, where two or more teachers could move to a new school together.

It is, however, important to keep in mind that any attempt to use voluntary transfers to reduce segregation should be limited in any given year, considering the potential disruption entailed in large-scale transfers, as well as the possible sensitivity of school cultures to abrupt changes in the composition of their staffs (e.g., Sorensen, 2004).

In fact, more generally, whatever the means by which it is addressed, integration is a long-term project, and should be viewed as such among policymakers.

Technical Appendix

Data

School employees who are not classroom teachers per se were eliminated from both samples. This includes categories of workers such as specialists, guidance counselors, and, of course, principals. In addition, teachers who identified with the race and ethnicity category of "American Indian" or "Native American" were eliminated, as they comprised only a miniscule proportion of the teacher workforce in these two districts. Also excluded were teachers with missing race and ethnicity values.

We also eliminated from the sample classroom teachers with work sites that are not traditional schools, such as administrative offices, as well as schools in which fewer than five teachers are employed. Both of these decisions result in less than 1 percent of teachers being removed from the dataset.

Finally, we merged school-level data on student race and ethnicity into our teacher data, which permitted the calculation of the teacher-student odds ratios discussed in the body of this report. These data come from the New York City Department of Education (for New York City schools) and the National Center for Education Statistics (for Los Angeles schools).

Analysis

Using the example of the exposure of White teachers to Black teachers, 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 teachers, respectively, in each school i, B is the number of Black teachers districtwide, and t is the total number of teachers at the school.

Theil's information theory index (H) conceptualizes 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 teacher workforce, and a minimum value when the entire workforce is comprised of a single group. Entropy is calculated districtwide (E) and for each individual school (E_i), and H is a weighted average of the deviation of schools' diversity from districtwide 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 teachers employed at school i, and T represents the size of the districtwide teacher workforce. In a district 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 district).

Decomposition of H. In the equation below, total multigroup segregation $H_{W|B|H|A}$ is constituted by segregation between White and minority teachers ($H_{W|BHA}$) and by segregation between minority (Black, Hispanic, and Asian) teachers ($H_{B|H|A}$), weighted by the proportion of minority teachers in the district (Reardon et al., 2000).

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

Finally, teacher-student odds ratios express the likelihood of a student of a given race or ethnicity having a teacher of his or her own race or ethnicity, compared with that of a student of a different race or ethnicity. Because we do not have classroom-level data, the ratios themselves are essentially calculated as exposure index values for a given student/teacher race and ethnicity combination divided by the value for a different combination.

The assumption here is that the probability of students in a given school having, for example, a Black teacher, regardless of the race or ethnicity of those students, is equivalent to the proportion of Black teachers in that school (b_i / t_i). To the degree this assumption is violated—for instance, if race-based and ethnicity-based sorting occurs within schools—our results would be influenced. It seems plausible, however, that any within-school sorting by race and ethnicity would tend to push the odds ratios up, as it seems more likely that assignments would tend more toward teacher-student "match" than they would toward "non-match" (Parker 2008).

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