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Segregation within Integrated Schools: Racially Disproportionate Student-Teacher Assignments in Middle School

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Abstract: Racial segregation has been an ongoing issue in American education and one of the leading contributors to the racial achievement gap. Prior to the Brown v. Board decision of 1954, Black Americans were legally relegated to substandard schools and educational opportunities. Post-Brown, racial segregation continues to manifest as a result of *de facto* segregation and *second-generation segregation*. Moreover, the predominantly White teaching force – a negative consequence of desegregation – has been linked to poorer outcomes for Black and Latino students. Our study examines trends in racially disproportionate assignment of Black and Latino students to less experienced teachers than their White counterparts. Specifically, our analysis illustrates statistically significant trends in the assignment of less experienced teachers to Black and Latino students in

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middle school math over several years. This analysis contributes to the recent research phenomenon of measuring the cumulative pattern of racially disproportionate teacher-student assignments over time as a particularly effective means of understanding the effects of systematic and sustained inequalities on academic achievement. Across several grades and content areas of instruction, we found that the race of students was related to the teaching experience of their teachers. Our findings illustrate the negative impacts of racial segregation on students of color and supports the need for more intervention and administrative intentions regarding teacher-student assignments and racial equity in schools.

Keywords: academic achievement gap; racial segregation; disproportionality; teacher-student assignment

Segregación dentro de las escuelas integradas: Asignaciones de alumnos y maestros racialmente desproporcionadas en la escuela secundaria

Resumen: La segregación racial ha sido un problema constante en la educación estadounidense y uno de los principales contribuyentes a la brecha de rendimiento racial. Antes de la decisión *Brown v. Board* de 1954, los afroamericanos estaban legalmente relegados a escuelas y oportunidades educativas deficientes. Después de *Brown*, la segregación racial continúa manifestándose como resultado de la segregación de facto y la segregación de segunda generación. Además, la fuerza docente predominantemente blanca, una consecuencia negativa de la desegregación, se ha relacionado con peores resultados para los estudiantes negros y latinos. Nuestro estudio examina las tendencias en la asignación racialmente desproporcionada de estudiantes negros y latinos a maestros con menos experiencia que sus contrapartes blancos. Específicamente, nuestro análisis ilustra tendencias estadísticamente significativas en la asignación de maestros con menos experiencia a estudiantes negros y latinos en matemáticas de secundaria durante varios años. Este análisis contribuye al fenómeno de investigación reciente de medir el patrón acumulativo de asignaciones de maestro-alumno racialmente desproporcionadas a lo largo del tiempo como un medio particularmente eficaz para comprender los efectos de las desigualdades sistemáticas y sostenidas en el rendimiento académico. En varios grados y áreas de contenido de instrucción, encontramos que la raza de los estudiantes estaba relacionada con la experiencia docente de sus maestros. Nuestros hallazgos ilustran los impactos negativos de la segregación racial en los estudiantes de color y respaldan la necesidad de más intervenciones e intenciones administrativas con respecto a las asignaciones de maestros y estudiantes y la equidad racial en las escuelas.

Palabras clave: brecha de rendimiento académico; segregación racial; desproporcionalidad; asignación maestro-alumno

Segregação dentro das escolas integradas: Atribuições de alunos-professores racialmente desproporcionais no ensino médio

Resumo: A segregação racial tem sido um problema constante na educação americana e um dos principais contribuintes para a lacuna de desempenho racial. Antes da decisão *Brown v. Board* de 1954, os negros americanos foram legalmente relegados a escolas e oportunidades educacionais abaixo do padrão. Depois de *Brown*, a segregação racial continua a se manifestar como resultado da segregação de fato e da segregação de segunda geração. Além disso, o corpo docente predominantemente branco - uma consequência negativa da dessegregação - tem sido associada a resultados piores para alunos negros e latinos. Nosso estudo examina tendências na atribuição racialmente desproporcional de alunos negros e latinos a professores menos experientes do que seus colegas brancos. Especificamente, nossa análise ilustra tendências estatisticamente significativas na atribuição de professores menos experientes a alunos negros e latinos em matemática do ensino

médio ao longo de vários anos. Esta análise contribui para o recente fenômeno de pesquisa de medir o padrão cumulativo de atribuições de professor-aluno racialmente desproporcionais ao longo do tempo como um meio particularmente eficaz de compreender os efeitos das desigualdades sistemáticas e sustentadas no desempenho acadêmico. Em várias séries e áreas de conteúdo de ensino, descobrimos que a raça dos alunos estava relacionada à experiência de ensino de seus professores. Nossas descobertas ilustram os impactos negativos da segregação racial nos alunos de cor e apóiam a necessidade de mais intervenção e intenções administrativas em relação às atribuições professor-aluno e à igualdade racial nas escolas.

Palavras-chave: lacuna de desempenho acadêmico; segregação racial; desproporcionalidade; atribuição professor-aluno

An Investigation of Teaching Experience across Racial Groups of Students

The achievement gap between students of color and White students has been a widely studied phenomenon in recent decades, especially in the era of accountability and high-stakes testing. While there has yet to be an accurate diagnosis and effective remedy to the problem, researchers have attributed the cause to a wide array of variables and relationships. A clear majority of this research on the gaps in achievement between students of color and White students frames either outside of school factors or individual educators' interactions with students as probable root causes of differential outcomes by race. Some posit that wealth disparities are a causal factor, with Black families statistically over-represented among low-income households (Anyon, 2014; Reardon, 2015; Yeung & Conley, 2008). Others have argued and found that teachers' perceptions of the abilities of students of color create low academic expectations that, in turn, produce low levels of student motivation, reduced productivity, and negative self-perceptions of intelligence (Sue et al., 2008; Torres et al., 2010; Valdes, 1996). Disproportionate representation among students suspended and expelled from school has also been identified as a major source of lagging student achievement among Black and Latino students (Bradshaw et al., 2010; Okonofua & Eberhardt, 2015; Schott Foundation, 2012; Skiba et al., 2002). Even studies informed by critical race theory, which examine the racial gap in achievement more on a systemic or interpersonal level, tend to examine the phenomenon using theoretical or qualitative methodologies (Gillborn, 2015; Joseph et al., 2016; Kohli et al.; Powell et al., 2020; Vasquez Heilig et al., 2012). As a result, they are missing the opportunity to provide useful quantitative data about the effects of *structural racism* over a particular group of students over time.

Structural racism has been defined as “the normalization and legitimization of an array of dynamics—historical, cultural, institutional and interpersonal—that routinely advantage Whites while producing cumulative and chronic adverse outcomes for people of color” (Lawrence & Keleher, 2004, p.1). Contemporary literature has identified structural racism operating both between and within schools. In racially segregated schools—defined as schools where Black and Latino students are in the majority—scholars have noted the over-representation of novice teachers compared to racially integrated schools, where White students are in the majority (Adamson & Darling-Hammond, 2012; Peske & Haycock, 2006). Within these latter schools, Mickelson (2001) has identified a phenomenon known as “second-generation segregation,” characterized by Black and Latino students experiencing barriers to higher level courses and lack of exposure to highly experienced teachers. Further research has confirmed her findings (Clotfelder et al., 2006; Clotfelder et al., 2020; Grissom et al., 2017; Hodge, 2019; Kalogrides & Loeb, 2013). While this work has identified the presence of disproportionate teacher-student assignment by race within schools, there is a need to examine the persistence of these patterns over time to highlight how the cumulative

effects of continually assigning students of color the most novice teachers contribute to the achievement gap.

Only in the last few years have a series of studies emerged examining the “cumulative and chronic adverse effects” that make structural racism so pervasive and hard to eliminate (Lawrence & Keleher, 2004, p.1). Using the Longitudinal Study of American Youth (LSAY) conducted from 1987-1994, Lee (2018) and Lee and Mamerow (2019) determined that students exposed to a series of more experienced and more effective teachers had higher short- and long-term educational success. Using more recent data, Goldhaber et al. (2018) found that gaps in teacher quality existed across time in both North Carolina and Washington State, with the largest gaps between race, not poverty level. Our study similarly examines the persistence of structural racism in racially integrated schools, as identified by differential teacher-student assignment over time. Unlike Lee and Mamerow (2019), which focuses on multiple STEM subjects, and Lee (2018), which does not separate each subject matter for closer inspection, we focus on middle school math, in the knowledge that performance in middle school math heavily influences student ability group, or tracking, at the high school level (Domina et al., 2016; Fitzpatrick & Mustillo, 2020; Jeffries, 2018). Our work is grounded in what is known about teacher effectiveness and assignment, racial segregation and achievement, teacher experience and achievement, and ability grouping.

Review of Literature

Racial Segregation Past and Present: Inter- and Intra-District Segregation

While the 1954 Brown decision made intentional school segregation illegal, K-12 segregation by race has continued in *de facto* forms as varied as residential segregation (Owens, 2016), student assignment and school choice policies (Billingham & Hunt, 2016; Kotok et al., 2017), and case law (Rothstein, 2017), among others. Moreover, as immigration from Mexico and Central and South America increased in the decades following Brown, what has traditionally been seen as segregation between White and Black students is now understood as segregation affecting Latino students as well. The stagnation of Latino student achievement over the last couple of decades—what Gándara (2019) calls the “Latino education crisis”—is particularly pronounced in Western states, but researchers have also found it in “new destination” states including North Carolina, the state in which this study is conducted (Clotfelder et al., 2020; Dondero & Muller, 2012).

The most visible forms of such segregation to the general public are inter-district and intra-district racial segregation. The former term refers to the formation or existence of racially homogenous school districts, whereas the latter refers to the formation or existence of racially homogenous schools *within* a district. Inter- and intra-district racial segregation contribute to disproportionate teacher-student pairing in a variety of ways. First, in studies about the desirability of certain school districts, researchers find that teacher retention is relatively high in school districts that have high student test scores, small class sizes, better salaries, and low proportions of students of color and students from low-income households (Djonko-Moore, 2016; Scafidi, Sjoquist, & Stinebrickner, 2008). Second, even in cases where experienced teachers choose to stay in schools with less than preferred conditions, principals often opt to assign these teachers to classes that have the lowest numbers of low-income students and students of color (Clotfelder et al., 2006). And third, parents of students who have the option to leave the public school system for private schools exert immense pressure on school principals to place their students in classrooms with the most highly-experienced teachers with the threat to leave the school district if their wishes are not granted (Lareau, 1987). These three factors, on a school and district scale, sustain racially disproportionate teacher-student assignments.

Second-Generation Segregation: Ability Grouping and Resource Distribution

While inter- and intra-district segregation significantly impact the recruitment and retention of high-quality teachers (Ingersoll, 2004), the more latent intra-school segregation ensures that any high-quality teachers who are retained are concentrated in smaller, more advanced, majority White classes. This *second-generation segregation* is accomplished by tracking students within a desegregated school into pathways with less rigorous instruction, lower level courses, and less experienced teachers (Domina et al., 2016; Mickelson, 2001; Oakes et al., 2000). Domina et al. (2016) identifies five key forms this separation can take: grouping based on skills; providing different curricula across tracks; isolating rigorous academic material to higher tracks alone, or track exclusiveness; limiting the opportunities to move between tracks, or track stability; and subjecting students to high- or low-level instruction across all subject areas, or track scope. Often, more than one form of separation occurs within a school, further entrenching second-generation segregation into its culture.

Tracking, also referred to as *ability grouping*, is the practice of homogeneous grouping of students together in one classroom based on assessments of student academic performance (Braddock, 1990). Tracking can undermine the potential gains of desegregation efforts by re-segregating students within racially heterogeneous schools and thereby limiting Black and Latino students' access to the higher-quality education more often available to Whites (Mickelson, 2001). In a high school that groups students into different courses (i.e. standard, honors, advanced placement) or career tracks (post-secondary versus vocational/technical), *second-generation segregation* manifests itself whereby students of color are being disproportionately assigned to lower tracks and relatively absent from the accelerated, college-preparatory tracks (Clotfelder et al., 2020; Grissom & Redding, 2016; Grissom et al., 2017; Hodge, 2019). As a result, students of color have fewer opportunities to receive higher-quality education and more experienced teachers, contributing to these students' lower achievement in mathematics and science (Ferguson, 1998; Oakes, 1990). In a newly published cumulative study of North Carolina, Clotfelder et al. (2020) found extensive within-school segregation at the middle and high school levels for both Black and Latino students, to the degree that "Black and Hispanic students in North Carolina are exposed to a qualitatively different curriculum than are White students" (p. 23).

More often than not, these lower non-special education tracks (standard), populated with disproportionately Black and Latino students, are much more likely to be taught by unlicensed, inexperienced instructors who are teaching outside of their field (Lee, 2018; Lee & Mamerow, 2019). Mickelson (2001) notes,

Among the CMS high school principals I interviewed about tracking, race, and opportunities to learn, the consensus is that students in the lower tracks *may* have fully licensed and experienced teachers with advanced degrees, but those in the highest tracks *always* do.

Such patterns of teacher-student assignment likely contribute to the racial academic achievement gap (Bosworth & Li, 2013; Clotfelder et al., 2006). Multiple studies have found that Black students were more likely to be assigned to a less advanced class with a less experienced teacher than their White counterparts (Clotfelder et al., 2006; Kalogrides & Loeb, 2013; Goldhaber, 2018). Particularly troublesome is the fact that White teachers and administrators are less likely to recommend Black and Latino students for accelerated tracks than Black and Latino teachers. Grissom & Redding (2016) and Grissom et al. (2017) draw upon the political science theory known as *bureaucratic representation* to explain this disconcerting phenomenon. *Bureaucratic representation theory* posits that

populations of color receive more equitable treatment from public organizations like governments and schools if these organizations employ a more diverse workforce. Simply put: more Black and Latino teachers and administrators in a school means more Black and Latino students in gifted programs; in fact, Grissom et al. (2017) indicates that a “critical mass” of educators of color are necessary for higher representation to occur (p. 396). These observations, moreover, remind us that desegregation post-Brown had the harmful consequences of putting caring and competent Black teachers and administrators out of work, which in turn led to White teachers exercising the implicit biases that in part exclude students of color from gifted tracks (Horsford, 2019; Walker, 2013). To fully understand the effects of these patterns, it is important to examine the literature on the relationship between individual teacher effectiveness and student achievement.

Teacher Effectiveness, Experience, and Assignment

Teacher Effectiveness

Teacher effectiveness has been noted by researchers as “a major determinant of student academic progress” (Sanders & Horn, 1998, p. 247). Lee (2018) defines “effectiveness” as “a teacher's contribution to growth in student achievement” (p. 360). Such effectiveness has been measured by several variables across the literature, including: students’ test scores, type of certifications, years of experience, and Value Added Measures. However, there is much debate on how to accurately measure teacher effectiveness (Chingos & Peterson, 2011; Rice, 2003). Some school districts rely heavily on Value Added Measures, rating teachers based on student performance on standardized tests, while others rely more on a balanced combination of student performance and classroom observations (Bacher-Hicks et al., 2017). There are also proponents of a third method of determining teacher effectiveness, use of student surveys (Ferguson & Danielson, 2014; Swanson & Ritter, 2018).

Teacher Experience. For this study, we chose to evaluate teacher effectiveness based on years of experience because of the well-documented correlation between teacher experience and teacher effectiveness (Kini & Podolsky, 2016; Podolsky et al., 2019; Rice, 2003). Recent research has shown notable differences between novice and experienced teachers (Rice, 2003; Rivkin et al., 2005; Rockoff, 2004). Experienced teachers have a greater ability to prioritize tasks and are more effective at managing the unpredictable nature of a classroom (Unal & Unal, 2019). Novice teachers, in contrast, have been shown to be “more hesitant, less flexible...and sometimes less capable of working with speed, fluidity, and flexibility” (Unal & Unal, 2019, p. 3). In a study of teacher effectiveness and its impacts on elementary school students, Subedi (2017) found that academic degrees, teacher ratings, and years of teaching experience correlated to student reading achievement. At the high school level, Mohr-Schroeder, Ronau, Peters, Lee, & Bush (2017) found a correlation between teachers’ years of experience in the classroom and student achievement in geometry. These findings highlight the significant impact of teacher quality and experience on student achievement.

While years of experience do not guarantee an increase in teacher effectiveness, research suggests that, as with many professions, more time in active practice improves performance on the job. A study conducted in Washington State looked at the relationship between teacher assignment between fourth and eighth grade and teacher effectiveness based on eighth grade math test scores and high school course taking with the goal of estimating “the extent to which student achievement gaps would change if we could make the assignment of teachers completely equitable” (Goldhaber et al., 2018, p. 16). Their research found that the math test achievement gap between students of color and White students decreased by 15% when they controlled directly for teacher assignment. The impact of teacher effectiveness was seen to an even greater degree in high school, with a 33% reduction in the gap between students of color and their White peers. Goldhaber et al. (2018) also

found that teacher quality has a significant impact on students' long-term academic attainment. While some studies contest the notion that experience improves achievement (Aaronson et al., 2007; Hanushek & Rivkin, 2006), and others suggest the benefits of experience taper off after the first few years (Chigos & Peterson, 2011; Goldhaber, 2002; Rockoff, 2004), researchers have nevertheless generally agreed that more experienced teachers are more effective than novice teachers.

Teacher Assignment. Administrators and teachers play a critical role in determining student assignments to classrooms. Whether teacher experience leads to teacher effectiveness or not, school administrators frequently use teacher experience as a means of “rewarding” senior teachers with more “desirable” students and settings. As Lee (2018) notes, “number of years of experience is, by far, the most important proxy of teacher qualification, playing a key role in determining the salary schedule and tenure for many teachers” (p. 361). This phenomenon is a major driving force in sustaining racially disproportionate teacher-student assignments at the district level. In elementary schools, administrators tend to group similar students, and teachers may influence teacher-student assignment via recommendations for special education and gifted classes (Bosworth & Li, 2013; Elhoweris et al., 2005; Sullivan & Bal, 2013). In a study of 10 elementary schools in the state of Florida, for example, researchers found that principals often give teachers considered to be highly effective their choice of classes and students to teach as a reward and method of retention (Cohen-Vogel & Osborne-Lampkin, 2007). In middle and high schools, students are often placed on remedial, standard, or advanced learning tracks based, in part, on the assessment of their ability by classroom teachers (Alexander & Entwisle, 2018). While these tracking practices are commonly accepted, teacher bias, specifically negative biases of students of color, often fuels racially disproportionate teacher-student assignment (Glock et al., 2013). Even after the recent institution of the Common Core State Standards (CCSS), a program designed to level the educational field between learning tracks, teachers continue to rely heavily on the logic of tracking (Hodge, 2019).

Researchers are increasingly finding that allowing more experienced teachers to choose which classes they teach has an even more powerful effect on student achievement when taken cumulatively (Grissom et al., 2017; Lee, 2018; Lee & Mamerow, 2019). Goldhaber et al (2018) found that “Teacher Quality Gaps” of experience and expertise increased from 1988 to 2013, with students of color twice as likely to face a disadvantage than students of low socio-economic status. Moreover, these TQGs existed for every school year. Thus, what may initially appear to be a “small” gap in years of experience between two teachers over one academic year adds up to decades of unequal years of experience when taken cumulatively. That is why Lee (2018) claims that “measuring the combined effects of many teachers, over many years, may be a more effective means for understanding teacher quality and effectiveness” (p. 374). This is also why we have elected to conduct this cumulative study.

Method

We investigated the extent to which teachers' experience was similar across racial groups of students in grades 5, 6, 7, and 8. We addressed the following research questions:

To what extent did White, Black, and Latino students have English teachers with similar years of experience?

To what extent did White, Black, and Latino students have Mathematics teachers with similar years of experience?

To what extent did White, Black, and Latino students have Science teachers with similar years of experience?

To what extent did White, Black, and Latino students have Social Studies teachers with similar years of experience?

Participants and Setting

Our initial sample of 373 fifth-grade students was drawn from a racially integrated, mid-sized, urban school district located in the southeastern region of the United States. While there is no uniform consensus on the definition of, or well-defined numerical thresholds to identify, a racially integrated school, for the purposes of our study, we define a racially integrated school as one where no one race of students represents more than 50% of the student population. With the 25% attrition rate, the analytical sample size was 280 middle school students who matriculated from the fifth grade through eighth grade between 2013 and 2017. The students who subsequently enrolled in either the sixth, seventh, or eighth grades were not added to the study. The percentage of White, Latino, and Black students was 37.5, 36.0, and 26.5, respectively. During the 2015–2016 school year, the district served 5,424 students in prekindergarten through the 12th grade, and employed approximately 387 full-time teachers (National Center for Educational Statistics [NCES], N.D.). In school year 2015–2016, of the nearly 5,500 students, approximately 29% were Black, 28% were Latino, 36% were White, and 7% were other races (Youth Justice Project, N.D.). The years of experience among our teacher sample ranged from under one year to over 25 years.

Procedure

The data on students' grade, students' teacher assignments by subject, students' race, and teachers' experience were provided by the school district. The information was organized by school year and was received deidentified from a third party curator. Students were then selected based on those who stayed within the district for four years (i.e., the time duration outlined in our study). We combined the information by using student identifiers and merged the data set that included teacher hire date. We then inspected the data for outliers and homogeneity while also exploring the descriptive statistics. Student race and grade level were independent variables, and teachers' experience was the dependent variable.

Racial designations accounted for in this study were White, Black, and Latino. The racial designations for our study were assigned by the school district through a process of voluntary parent identification of student race on the student enrollment form. The racial categories included on the student enrollment form were: American Indian, Asian, Black, Hispanic, Pacific Islander, two or more races, and White. Students who were coded as not identifying as White, Black, or Latino were excluded from the study because they were too small in number to yield relevant, statistically-significant results adequate for analysis. We also wanted to focus on Black and Latino students, widely considered the two groups most negatively affected by school segregation. Teachers' experience in months was computed based on a state hire date of January 1 in order to ensure consistency. Teachers' experience was computed independently for each grade and school year, as teachers gain more experience over time. One of the limitations of this study is that we were unable to control for teachers who had previously taught in other states. However, since our intention in doing this analysis was to confirm or deny the existence of a discrepancy in years of experience between teachers of White students versus teachers of Black and Latino students, we were less concerned with the exact number of years than whether a discrepancy existed.

Design and Data Analysis

We used a non-experimental descriptive study with longitudinal data over four years. Descriptive statistics were used to summarize teacher experience (in months) for English Language Arts (ELA), Math, Science, and Social Studies based on the following student groups: Black, Latino,

White, and all students. Also, we drew line graphs to visualize the teacher experience patterns among student groups. Doubly Multivariate Analysis of Variance (Doubly MANOVA) treats both multiple dependent variables and the repeated measure factors multivariately (Schultz & Gessaroli, 1987). Thus, doubly MANOVA analysis allowed us to examine the differences between teachers' years of experience in ELA, math, science, and social studies across students' race simultaneously. An alpha level of 0.05 was used to evaluate statistical significance. Since doubly MANOVA analysis presented the statistically significant result, the follow-up, Mixed ANOVA, was conducted to detect disparity in teacher experience and disparity between student groups. It was hypothesized that there would be no significant differences in teacher experience across grade, ethnic group, and content area of instruction.

Results

Table 1 presents the descriptive statistics of teacher experience (in months) for each subject, grade level, and student groups. Teacher experience across grade and ethnicity for each subject is illustrated in Figures 1, 2, 3, and 4. On average, Black and Latino students attending this school from fifth through eighth grades were exposed to a series of teachers who, on average, possessed two fewer years of classroom experience in math than the teachers of their White counterparts. The line graphs (Figures 1, 3, and 4) indicate that teacher experiences are similar for Black, White, and Latino students.

Table 1

Descriptive Statistics of Teachers Experiences among Students' Grades and Race

Grade	Race	ELA	Math	Science	Social studies	
		<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>N</i>
5th	White	76.77 (53.4)	112.88 (75.49)	73.58 (63.97)	73.47 (63.95)	105
	Black	82.49 (65.45)	85.08 (66.4)	82.49 (65.45)	82.49 (65.45)	74
	Hispanic	71.48 (57.33)	80.56 (65.14)	69.76 (58.05)	69.76 (58.05)	101
	Total	76.37 (58.14)	93.88 (70.84)	74.56 (62.29)	74.51 (62.28)	280
6th	White	102.06 (70.14)	113.72 (74.92)	89.86 (56.08)	108.44 (73.75)	105
	Black	104.18 (78.46)	72.38 (58.24)	81.49 (58.74)	116.77 (76.43)	74
	Hispanic	94.59 (76.26)	79.72 (59.38)	91.87 (56.96)	113.38 (74.52)	101
	Total	99.93 (74.47)	90.53 (67.64)	88.37 (57.06)	112.42 (74.55)	280

Table 1 cont.

Descriptive Statistics of Teachers Experiences among Students' Grades and Race

Grade	Race	ELA	Math	Science	Social studies	
		<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>N</i>
7th	White	139.63 (33.56)	156.51 (50.74)	141 (63.87)	188.69 (44.73)	105
	Black	128.22 (35.26)	153.19 (65.32)	128.16 (67.5)	181.23 (41.18)	74
	Hispanic	131.35 (36.78)	152.34 (66.86)	139.75 (65.13)	183.91 (42.27)	101
	Total	133.63 (35.4)	154.13 (60.68)	137.16 (65.29)	184.99 (42.88)	280
8th	White	163.55 (64.08)	148.1 (65.61)	179.85 (96.3)	180.9 (75.08)	105
	Black	153.8 (67.97)	127.78 (69.22)	176.46 (100.89)	176.23 (76.37)	74
	Hispanic	163.9 (67.58)	148.1 (65.6)	176.5 (97.34)	169.98 (80.61)	101
	Total	161.1 (66.3)	134.89 (67.22)	177.75 (97.56)	175.73 (77.32)	280

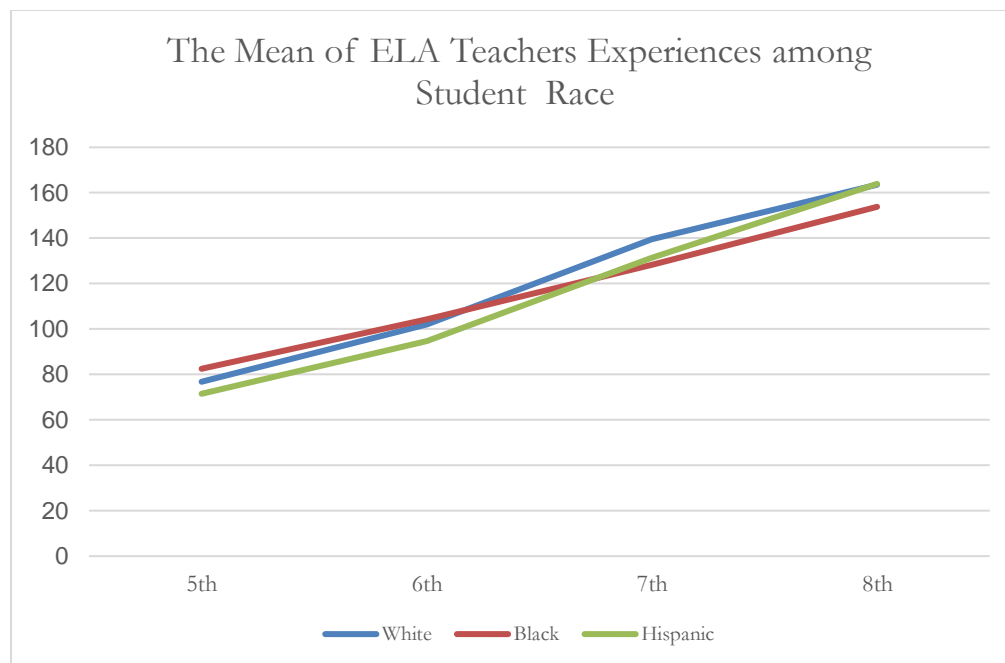
Note. Teachers' experiences are presented in months.

A Doubly MANOVA was performed on teacher experience over the four time periods of fifth through eighth grade. Students' race was the between-subjects factor: White, Black, and Latino. The within-subjects factor was time periods: fifth grade, sixth grade, seventh grade, and eighth grade. The data were screened for outliers and normality. There were no multivariate outliers based on Mahalanobis Distance, and all variables were relatively normally distributed. Cell sample size, cell means, and standard deviations for the four dependent variables across all periods and students' race are reported in Table 1. There was a statistically significant between-subjects effect, race, $F(8, 548) = 3.57, p < .001$, partial $\eta^2 = .05$. Teachers' experience by period interaction were also statistically significant $F(24, 532) = 1.70, p = .02$, partial $\eta^2 = .07$. There was a further statistically significant within-subjects effect for time $F(12, 266) = 151.16, p < .001$, partial $\eta^2 = .87$. These results indicated that there is a statistically significant difference in teacher experience among student groups and grades.

Four follow up univariate mixed ANOVAs were run, one for each dependent variable. For ELA teachers' experience, univariate mixed ANOVA results indicated that there was not a statistically significant interaction effect between grades and students' race, $F(5.19, 719.89) = .76, p = .58$ partial $\eta^2 = .01$, but there was a significant within-subjects effect, time, $F(2.6, 719.89) = 104.40, p < .001$, partial $\eta^2 = .27$. There was not a significant difference between-subjects effect, students' race, $F(2, 277) = .7, p = .5$, partial $\eta^2 = .01$. In other words, there was not a statistically significant difference in ELA teacher experience among student groups, Black, Latino, and White (Figure 1).

Figure 1

The mean of ELA teachers experiences and students' race



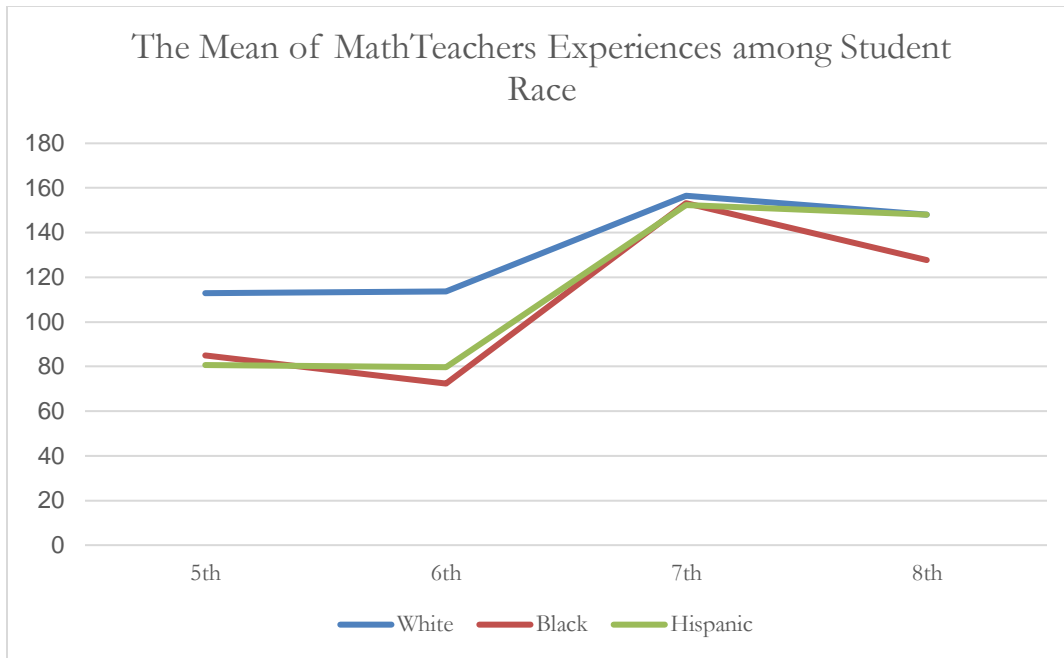
Note. Teachers' experiences are presented in months.

For math teachers' experience, univariate mixed ANOVA results indicated that there was not a statistically significant interaction effect between grades and students' race, $F(5.93, 822.14) = 1.9, p = .08$ partial $\eta^2 = .01$, but there was a significant within-subjects effect, grade, $F(2.96, 822.14) = 71.31, p < .001$, partial $\eta^2 = .21$, and there was a significant difference between-subjects effect, students' race, $F(2, 277) = 12.6, p < .001$, partial $\eta^2 = .08$. This means there was a statistically significant difference between math teacher experience among student groups, Black, Latino, and White (Figure 2). In order to find the pattern for the math teachers' experience, post hoc pairwise comparisons were performed using the Games-Howell procedure due to the violation of homogeneity of variance. According to math teachers' experience, there was a significant difference between White and Latino students, and White and Black students, $p < .001$ and $p < .001$, respectively, but there was no significant difference between Black and Latino students $p = 1.00$. While there was a significant difference in math teacher experience between Black and White students, on the one hand, and Latino and White students, on the other, there was no difference in math teacher experience between Black and Latino students.

For science teachers' experience, univariate mixed ANOVA results indicated that there was not a statistically significant interaction effect between grades and students' race, $F(5.23, 724.69) = .58, p = .72$ partial $\eta^2 = .004$, but there was a significant within-subjects effect, grade, $F(2.62, 724.69) = 114.42, p < .001$, partial $\eta^2 = .29$. There was not a significant difference between-subjects effect, students' race, $F(2, 277) = .26, p = .77$, partial $\eta^2 = .002$. This means there was not a statistically significant difference in science teacher experience among student groups, Black, Latino and White (Figure 3).

Figure 2

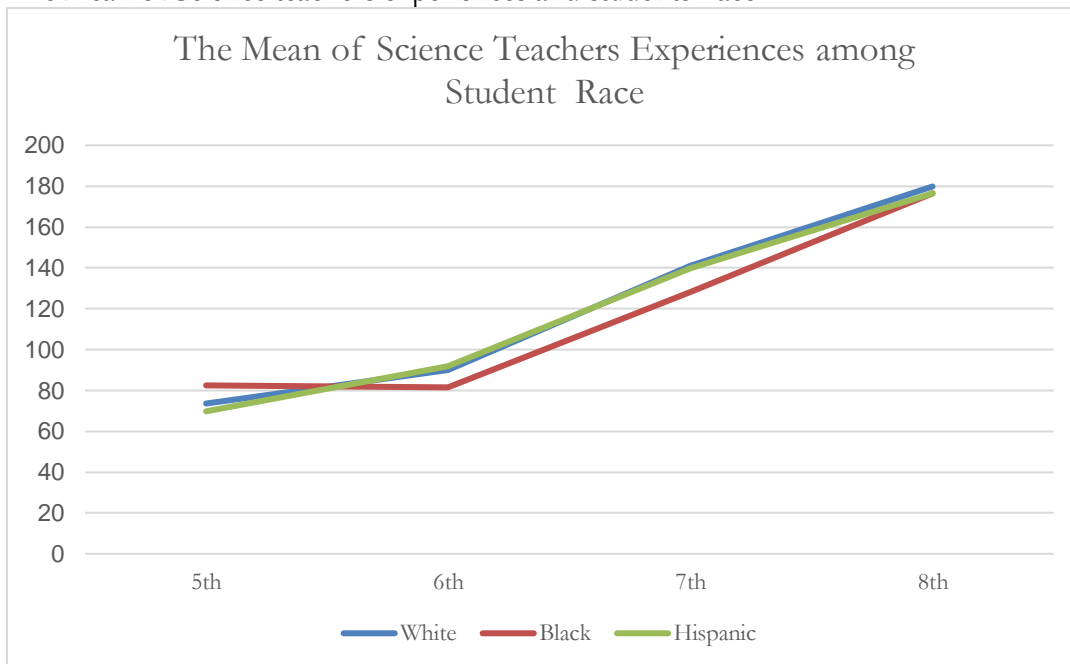
The mean of Math teachers experiences and students' race



Note. Teachers' experiences are presented in months.

Figure 3

The mean of Science teachers experiences and students' race

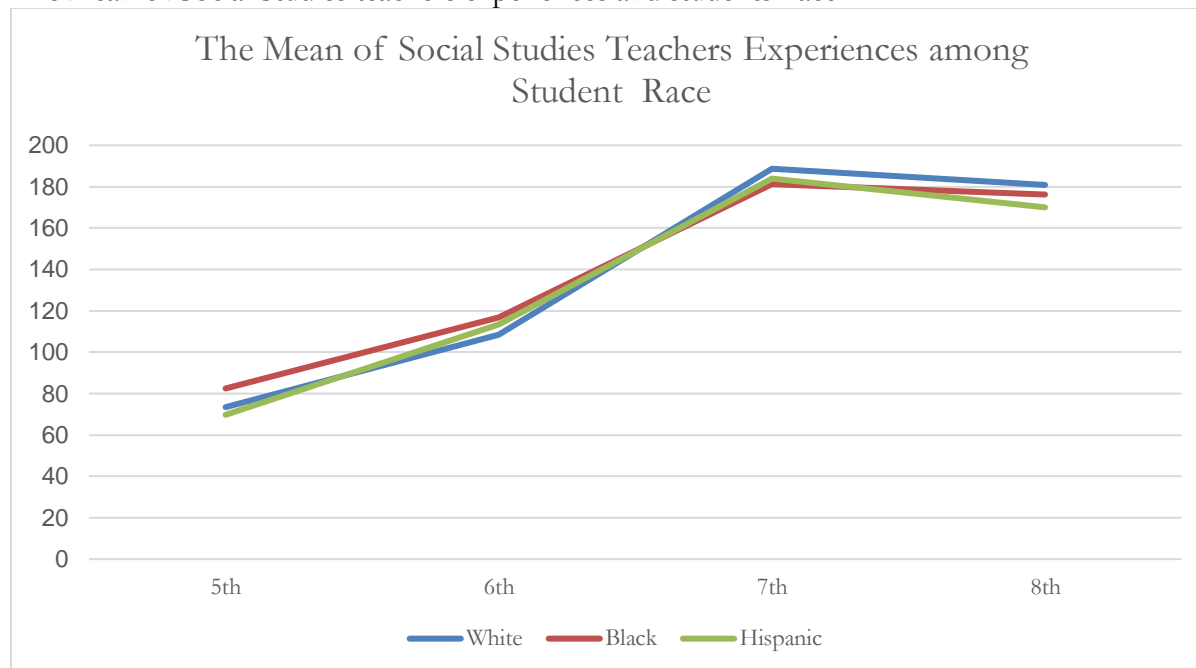


Note. Teachers' experiences are presented in months.

For social studies teachers' experience, univariate mixed ANOVA results indicated that there was not a statistically significant interaction effect between grades and students' race, $F(5.56, 770.07) = .54, p = .76$, partial $\eta^2 = .004$, but there was a significant within-subjects effect, grade, $F(2.78, 719.89) = 169.91, p < .001$, partial $\eta^2 = .38$. There was not a significant difference between-subjects effect, students' race, $F(2, 277) = .57, p = .57$ partial $\eta^2 = .004$. These results indicated that there was not a statistically significant difference in social studies teacher experience among student groups, Black, Latino, and White (Figure 4).

Figure 4

The mean of Social Studies teachers experiences and students' race



Note. Teachers' experiences are presented in months.

Based on the data we collected, we found several race-specific patterns of teacher-student assignment. First, in math, we found that White students, on average, were assigned to teachers with more years of classroom experience than their Black counterparts in grades 5 through 8. This discrepancy was statistically significant in grades 5 and 6. Figure 2 also demonstrates the difference in math teachers' experience based on students' race. We found in grade 5, White students were assigned to math teachers with an average of nine years of experience, while the math teachers of Latino students possessed an average of eight years, and seven years for Black students. In the sixth grade, White students were assigned teachers with an average of nine years of experience, while Latino students were paired with teachers with an average of 7.5 years of experience, and Black students were assigned to teachers with an average of six years of experience.

Although ELA, science, and social studies teacher experience were similar for Black, White and Hispanic students (Figure 1, 3, and 4), it is worth noting—though not statistically significant—the trend of consistently assigning more experienced teachers to White students in every other measured subject (ELA, Science, and Social Studies) in grades 7 and 8. The one exception was Latino students in 8th grade ELA, whose teachers had more experience than those of their White counterparts.

Discussion

Teacher effectiveness, as measured by Value Added Measures, classroom observations, and students' surveys, has been shown to affect student achievement. Teachers with more years of experience are, on average, more effective than novice teachers. Persistent racial segregation in desegregated schools, second-generation segregation, and student tracking have contributed to patterns of disproportionate teacher-student matching practices by race of student. Our study highlights an under investigated potential cause of the racial achievement gap, namely the persistent pattern of racially disproportionate teacher-student assignment over multiple years in schools. Through the design of our study we were able to establish that one cohort of Black and Latino students was assigned to less experienced teachers than their White counterparts over the course of four years in grades 5, 6, 7, and 8. These results study identify a probable source of the continued racial achievement gap—racially disproportionate teacher-student assignment in racially integrated schools—and point to actions school leaders can take to track and address this pattern below.

Implications for Improvement of Practice

Our study builds on the current literature on a topic that seeks to understand how to measure the potential impact of these persistently disproportionate assignments. Our study also challenges contemporary notions that intra-district desegregation will contribute to shrinking the achievement gap. These findings are significant for policymakers, school district administrators, and school-level administrators, as they are responsible for the assignment of students.

Our study—which shows persistent disproportionate teacher-student assignment by race over time within a racially heterogeneous school—along with previous studies provide evidence that policymakers and state departments of education should collect and track this data over time. Policy makers should use this compiled data to investigate 1) how persistent these patterns are by district, 2) which districts have embedded these practices through policy, and 3) how to develop state policy requiring districts to monitor and reduce these patterns of disproportionate teacher-student assignment.

District administrators should consider examining the persistence of racially disproportionate teacher-student assignment when investigating the root causes of intra-district racial achievement gaps. Some districts have acted upon the literature regarding racially disproportionate rates of school suspension by implementing positive behavior incentive programs, restorative justice practices, and tiered intervention systems. Districts should consider eliminating racially disproportionate teacher-student assignment practices to disrupt barriers for students of color. Similar to how school districts track school-based data regarding student achievement, discipline, and attendance, they may also consider requiring school districts to monitor and report on teacher-student assignment practices as an indicator of achievement.

In most states, school-level administrators are the primary individuals involved in assigning teachers to specific courses. Without knowledge of the teacher-student assignment history of each student, school principals are completely in the dark about how much of a role they play in perpetuating racially disproportionate teacher-student assignment practices. Moreover, with decreasing rates of principal longevity and increasing rates of principal attrition, tracking teacher-student assignment practices may prove difficult without an established school-based system. School-level administrators may consider adding a notation of the years of experience per teacher to a student's cumulative folder, which travels with a student throughout their K–12 career, in order to better track teacher levels of experience a student is exposed to over time.

Specific to our results showing statistically significant differences in exposure to experienced math teachers between student racial groups, the importance of placing highly effective teachers in middle school math classes is particularly important to future math success and career aspirations. Years of experience as a teacher in middle school has shown to increase a teacher's ability to help students navigate a critical period of socioemotional and cognitive development which can influence future academic success (Ladd & Sorensen, 2017). Research has shown that equitable policies aimed at reducing barriers to access to high level math courses in middle schools increases representation of students of color and female students (Dougherty et al., 2015). With relation to student intentions to pursue a career in STEM, it has been found that middle school dispositions towards STEM affects future career aspirations to enter into a STEM-related field (Christensen & Knezek, 2017). While teachers' years of experience do not directly correlate to effectiveness, these studies highlight the importance of considering the role of teacher experience, especially when there are identifiable patterns of exposure to more or less experienced teachers by student race.

Conclusion

In this study, we explored differential teacher-student assignment by race in a medium-sized, racially diverse school district and highlighted persistent patterns of assigning students of color, specifically Black and Latino students, to less experienced teachers than their White counterparts. We found persistent patterns over four consecutive years of racially disproportionate teacher-student assignment, whereby White students in grades 5, 6, 7, and 8 were assigned to more experienced teachers than their Black and Latino counterparts.

Our work adds to the existing literature on the ongoing effects of structural racism in K–12 schools by identifying persistent patterns of more experienced teachers being assigned to White students over the course of four years in middle school. Our analysis suggests that a major contributor to the racial achievement gap may be produced within schools via embedded structural racism in the teacher-student matching process. Our findings are especially pertinent in the contemporary context of schools where districts across the nation consistently assert that racial integration may be the key to closing the achievement gap. Our research suggests that a critical step in the process of effectively leveling the academic playing field between different races must include consideration of teacher-student assignment through a racial equity lens at every grade level.

Reardon (2013) and Anyon (2014) make plain the potential threat of school segregation, marking it as a major cause of the great divide in achievement between White students and students of color. The rationale for school desegregation rests largely on claims that it improves Black and Latino youths' access to higher-quality education more often solely provided to Whites (Mickelson, 2001). Despite considerably unambiguous evidence that desegregation enhances the long-term outcomes of students of color (Johnson, 2019), such as educational and occupational attainment, the evidence regarding effects on short-term educational outcomes (e.g. achievement) is more ambiguous and more highly contested (Wells & Crain, 1994). Therefore, researchers have yet to reach a broad consensus that a direct correlation exists between increased racial desegregation and increased achievement and lifetime outcomes of students of color.

Our study provides evidence that student race is correlated with exposure to more experienced teachers over time, and White students, even in racially-heterogeneous schools, are more likely to be assigned to teachers with more years of classroom experience. However, future studies are still needed for more concrete policy implications. Our study focused on one cohort of students over the course of four middle school years in one school district. To better identify the persistence of this pattern of disparate teacher-student assignment by race, there needs to be a

broader study incorporating larger sample sizes and more grades. Other mitigating factors such as student socio-economic levels, special education status, and enrollment in classes only offered during certain times of the day should be accounted for as they can influence the ways in which students are scheduled and assigned to teachers.

Our study is not suggesting efforts to racially integrate school should be abandoned. Previous research has shown that students of color as well as White students have shown greater academic success in racially integrated schools (Ayscue et al., 2017). We do posit that racially integrated schools are a necessary step toward increasing the exposure of students of color to more experienced teachers. The next step after achieving greater levels of intra-school racial integration is to focus on racially integrating the teacher-student assignment process whereby race is not a factor that intentionally or unintentionally determines the level of experience of the classroom teacher assigned to a student.

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