

Exploring Student Achievement Gaps in School Districts Across the United States

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Abstract

This study examined factors contributing to achievement gaps between White and African American students in 2,868 diverse school districts across the United States. Using pooled data across five school years (2008-2013), six grade levels (grades third to eighth, which typically include students aged 8 years-14 years) and two different subjects (math and English language), descriptive, correlational, and multiple linear regressions were used to identify relevant factors in predicting an achievement gap. Achievement gaps were largest in the south and southwest United States. In addition, results indicate that economic inequality, racial inequality, and household adult education attainment are strongly associated with Black/White student achievement gaps. School-based factors such as per pupil expenditures and teacher/student ratios were not significant predictors. Household adult education attainment was the most significant contributor to achievement gaps, with higher levels of adult education associated with larger achievement gaps, implying that high resource communities may create additional barriers for minority students.

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achievement gap, adult education, social stratification, opportunity gap

Introduction

In the era of U.S. education policy shifts, such as No Child Left Behind (NCLB) and the more recent Every Student Succeeds Act (ESSA), a common aim was to reduce the achievement gap among students, particularly between White students and Students of Color. An achievement gap exists when a group of students significantly outperforms other student groups on average in their educational achievement. Educational achievement here is assessed through standardized test scores and/or grade point average. The literature on achievement gaps often compares these test scores across groups of students with differing attributes of interest, such as race. Achievement gaps have long been a concern of educational researchers and practitioners because education is often referred to as the great equalizer, a sentiment stated by education pioneer Horace Mann in 1848 and repeated recently by past U.S. Secretary of Education, Arne Duncan, in 2011. Education is often seen as the great equalizer in the face of structural inequalities that fall along racial, ethnic, and income lines (V. E. Lee & Burkam, 2002). This article explores achievement gaps, with attention to the underlying elements of opportunity gap, or differences in the opportunities available to groups of people.

The primary goal of this article is to analyze recent evidence of achievement gaps and to examine factors or opportunity gaps that contribute to differences in educational attainment between White and African American students in school districts across the United States. We will explore how structural and academic opportunity gaps lead to achievement gaps for students in the United States.

Opportunity Gap Instead of Achievement Gap

Achievement gaps have long been discussed and researched in education. Achievement among groups often differ on various identifiers such as low-income status, mobility, gender, race, and/or ethnicity (Ladson-Billings, 2006). Achievement gaps have been found between male and female students, among different socioeconomic groups, among racial categories, and along parental education attainment lines (Goldsmith, 2004; J. Lee, 2008; Orfield, Frankenberg, & Lee, 2003). Such achievement gaps have numerous explanations such as structural, societal, and economic elements. Often achievement gaps can be understood by recognizing the differences in

resources (e.g., financial or academic opportunities) between groups (Talbert-Johnson, 2004). The difference in educational attainment (i.e., the achievement gap) between White and African American students has long been an issue of concern (Jones, 1984). Ladson-Billings (2006) argued for the need to look at “education debt” or “the historical, economic, sociopolitical, and moral components” that lead to gaps among groups (p. 3).

The recognition of structural inequalities in society along racial, gender, socioeconomic, and identity lines has translated into a discussion that the education system actually presents an opportunity gap that leads to unequal outcomes, such as achievement gaps (Ladson-Billings, 2013). Flores (2007) investigated the opportunity gap in high school math education. Flores (2007) found that African American, Latina/o, and low-income students had fewer opportunities to learn math and less access to qualified teachers. Therefore, students start off behind their White peers because they do not have similar access or opportunity to resources that would contribute to their learning. Similar opportunity gaps have been identified in K-12 math and science (Akiba, LeTendre, & Scribner, 2007), higher education (Johnson-Ahorlu, 2012), advance placement courses (Taliaferro & DeCuir-Gunby, 2008), and across education in general (Ladson-Billings, 2006). Scholarship is increasingly recognizing that student achievement does not operate in a vacuum and is affected by societal factors related to inequality.

Literature

The progress in reducing achievement gaps has not been steady or evenly paced. Black–White gaps in U.S. student achievement consistently declined until 1988, but then began an upward trend (J. Lee, 2002) and has since stabilized. Despite many measures taken, a recent review suggested that ongoing socioeconomic and social stratification differences are at the root of the achievement gap (Robinson, 2016). There is strong evidence that income opportunity plays a role in racial achievement gaps, particularly with evidence that the achievement gap is increasing between low- and high-income earners as well as along racial lines (Reardon, 2013). In addition, there is strong evidence that points to the role of racial differences in socioeconomic status as a primary contributor to achievement gaps (Fryer & Levitt, 2004; Rothstein & Wozy, 2013). Racial differences in socioeconomic levels likely account for a major aspect of U.S. geographic differences in achievement gaps, as racial disparities in income vary regionally (Reardon, Kalogrides, & Shores, 2016a).

As White/Black achievement gaps stubbornly bounce around a flat trajectory in recent years, there have been efforts to look into potential causes (J.-S.

Lee & Bowen, 2006). Benefiting from the critiques of the Moynihan and Coleman reports of the 1960s, an in-depth analysis by Barton and Coley (2010) looked beyond the traditional explanations which had pointed to deficits in early childhood opportunity that might have been resolved by adequate nutrition and improved school quality. They found that despite increases between US\$10 billion to US\$25 billion in spending on Head Start, Title 1, and childhood nutrition programs during a single decade from 1990 to 2000, there was no progress in the achievement gap (Barton & Coley, 2010). The report cited sociological issues as potential factors with challenges facing African American children and more specifically African American males; the lack of early childhood education opportunities, perceived economic and social capital in communities, and the disruption of the Black family structure by societal forces (Alexander, 2012). These are potential factors that may sustain an achievement gap and echo the sociological concerns presented in the highly criticized Moynihan report (Moynihan & Barton, 1965).

In attempting to understand the achievement gap from the perspective of inequality, a recent multifactor analysis found that segregation (defined as areas where Black students attend higher poverty schools than White students) resulted in higher achievement gaps (Reardon et al., 2016a). This contribution of segregation to the achievement gap shows that the effect is not simply related to socioeconomic (living in a high poverty area), but indicative of an opportunity gap resulting from separated and disparate social conditions (living in a high poverty area that is also segregated).

Prior research has found a consistent relationship between parental education and achievement of their children (Reardon, 2013), reminding us of the importance of affordances and opportunity provided by parents. As parents earn greater levels of education, their children are less likely to live in poverty and also have greater levels of education as they become older (Carnevale, Rose, & Cheah, 2013). Research demonstrates that as early as kindergarten, children from low socioeconomic backgrounds demonstrate lower literacy scores and math competencies that leads to academic underpreparation and the widening of the achievement gap (Dahl & Lochner, 2005; V. E. Lee & Burkam, 2002). Research also demonstrates that parents transfer a wealth of knowledge to their children, both formal and informal (Cantwell & Milem, 2010; Johnson, McGue, & Iacono, 2007; Yosso, 2005). Some studies have found that the educational attainment of the mother was a predictor of academic achievement (Halpern-Felsher et al., 1997; Peters & Mullis, 1997). It has been suggested that a key to closing the achievement gap can be found in addressing structural inequities rooted in housing discrimination, discrimination in employment opportunities, job training, racism, and providing resources to families that are in the greatest need (Ladson-Billings, 2006).

Furthermore, it is key to take an asset-based approach to addressing the gap that does not fall into the trap of stereotyping groups and populations (Boykin & Noguera, 2011). As the effectiveness of traditional methods and programmatic efforts to decrease the gap are being questioned, a broad national look at the achievement gap and the many potential impact factors are warranted.

Method

Data

The data for this study were obtained from the Stanford Education Data Archive (<https://cepa.stanford.edu/seda/download?nid=1727&destination=node/1717>), which was derived from several publicly available data files (Reardon, Kalogrides, & Shores, 2016b). We utilized the archive's pooled data across five school years (2008-2013), six grade levels (grades third to eighth, which typically include students aged 8 years-14 years) and two different test subjects (math and English language). The pooled data provided a single composite score for achievement for each individual local education agency (LEA) or district. Charter schools, while often treated as independent LEA's, were identified by location and combined with the geographically appropriate LEA in this data archive.

Analytical Methods

Student academic performance was operationally defined by standardized test scores, in which the individual unit of analysis was the average test score of students in a school district in the United States. Descriptive statistics were computed to describe the composition of the school districts. Maps were constructed to examine test scores and achievement gaps across the United States with particular attention to the previously identified key achievement impact factor of parent education. We then examined additional information and factors that contribute to the Black/White student achievement gap from regression analysis.

We performed correlational analyses based on the individual data from each LEA including percent of students considered English language learners, percent of students receiving special education services, the student/teacher ratio of the LEA's, total and current per-pupil expenditures and revenues, metro status or micro status, city/urban locale, average per grade enrollment, percent of students in charter schools within the LEA, information index, Gini index, the percentage of adults holding bachelor's degrees, the percent unemployed, and standardized socioeconomic status as well as percent with income

at the 50th percentile or above, percent of students receiving free lunch, and percent of households receiving Supplemental Nutrition Assistance Program (SNAP) benefits. SNAP is a U.S. federal assistance program intended to help low-income individuals and families buy food and household needs.

The Gini index is an economic inequality indicator and ranges from 0 to 1, with 1 being complete economic inequality and with 0 being the absence of economic inequality. The information index is a racial segregation indicator and also ranges from 0 to 1, with the higher the information index, the higher the racial segregation or racial inequality. A metro area contains a core urban area of 50,000 or more population, and a micro area contains an urban core of at least 10,000 (but less than 50,000) population. Each metro or micro area consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work times) with the urban core.

The factors relating to income were highly correlated, overlapping categories (i.e., percentage of households receiving SNAP benefits, income at the 50th percentile, and percentage of students receiving free lunch), as a result only adult education level, unemployment, and Gini index were included in the final analysis. Each factor was correlated with White/Black achievement gap and significant factors were considered for further analysis. We utilized multiple linear regressions to explore related factors underlying the achievement gaps found between White and Black students. The regression analyses were run with the district students' achievement gap as the dependent variable and those factors that showed significant correlations with White/Black achievement gap as the independent variables.

Of the 13,403 school districts, only 2,868 districts had at least one grade-year-subject pool with greater than 20 White and 20 Black students, a sample size sufficient for reliably calculating the White/Black achievement gap. Independent samples *t* tests were conducted to examine whether there were differences in school or social factors between the 2,868 school districts that were included in the White/Black achievement gap calculation and those that were not. All statistical tests were set at an alpha level of .01 (two sided). IRB (institutional review board) review was not applicable for this study as publicly available, deidentified data sets were exempted per 45 CFR 46.

Results

Descriptive Statistics

There were a total of 13,403 school districts, with 2,868 districts for which a White/Black achievement gap could be calculated, with at least one

grade-year-subject pool of greater than 20 White and 20 Black students. Among them, 339 metropolitan areas were represented, with 10.6% rural and 89.4% urban, 85.7% metro and 14.3% micro. 6.7% were English language learners, 50th percentile income averaged US\$60,146 (range = US\$17,999-US\$202,675), 17.8% of school districts had students whose family were on SNAP benefits with 44.6% receiving free school lunch. The average per-grade enrollment was 923 and per pupil expenditures averaged US\$12,261. These and other descriptive variables are included below (Table 1). Figure 1 depicts the school districts' average student test scores across the United States. These scores were in the standard deviation unit with 0 being the average across all districts in the United States. It appears that most of the underperforming states were located in the south or the south west regions. Figure 2 shows that the achievement gaps between White and Black students based on parental education. Except in Montana, Indiana, and West Virginia, White students with higher parental education generally outperformed African American students in standardized testing.

Examination of Factors

Bivariate analyses showed that the percent of special education students in a school district, total per pupil expenditure, average per grade enrollment, city/urban locale, economic inequality between the White and Black, the degree of racial segregation in schools, household unemployment status, and household adult educational attainment are all significantly correlated with the student achievement gaps between the White and African Americans across school districts (Table 2). Following the bivariate analyses, we conducted linear multiple regression to examine the relationship between the student achievement gap and the various school and contextual factors (Table 3). The results indicated that the economic inequality ($\beta = .162, p < .001$), racial inequality ($\beta = .134, p < .001$) and household adult education attainment ($\beta = .481, p < .001$) are strongly associated with student achievement gaps. Even after adjusting for racial and economic inequalities, household adult education attainment remained as the most significant contributor to student achievement gaps between the White and African American students.

Our sample of districts in which a gap could be calculated had total per pupil expenditure, current per pupil instructional expenditure, and revenue per pupil that were substantially lower than averages in the remaining districts. As might be expected from the calculation format, these districts were also more racially diverse, had higher percentages of English language learners, higher household unemployment rates, and lower household incomes

Table 1. Characteristics of School Districts That Showed Achievement Gaps in the United States (Total $n = 2,846$).

Variables	n	M	SD	Minimum	Maximum	Percentage
Achievement gaps (White/Black)	2,846	0.624	0.229	0.008	1.818	
Free lunch (%)	2,846	44.7%	20.5%	0.0%	99.1%	
English language learner (%)	2,846	6.8%	8.8%	0.0%	65.6%	
Special education student (%)	2,846	13.3%	3.9%	0.0%	47.8%	
Total per pupil expenditure	2,840	US\$12,265	US\$3,760	US\$4,979	US\$35,182	
Current per pupil instructional expenditure	2,840	US\$6,308	US\$2,059	US\$1,802	US\$18,920	
Revenue per pupil	2,840	US\$12,147	US\$3,747	US\$6,743	US\$35,008	
Status	2,570					
Metro	2,204					85.8
Micro	366					14.2
City/urban locale	2,846					
Urban	2,538					89.2
Rural	308					10.8
Information index (White/Black)	2,846	0.084	0.099	0.000	0.794	
Gini index (Black)	2,821	0.375	0.107	0.000	0.710	
Average per grade enrollment	2,846	924	2,271	33	70,623	
Public school students in charters (%)	2,846	2.8%	7.7%	0.0%	96.5%	
Household with snap benefits (%)	2,843	17.8%	11.4%	0.0%	61.1%	
Household with adults having bachelor degree or above (%)	2,846	27.0%	15.0%	2.6%	85.0%	
Household unemployed (%)	2,846	5.0%	1.8%	0.5%	15.6%	
Household income at 50th percentile	2,843	US\$60,127	US\$25,530	US\$17,999	US\$202,675	

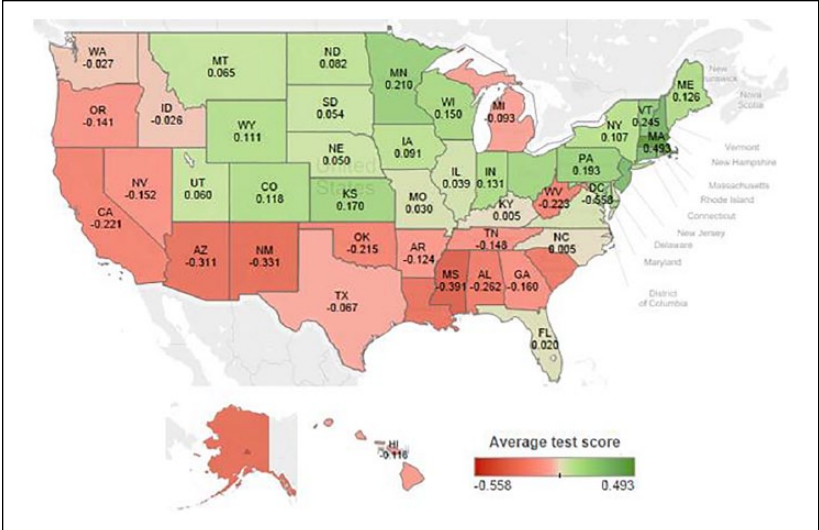


Figure 1. Average test score (in SD unit) across states.

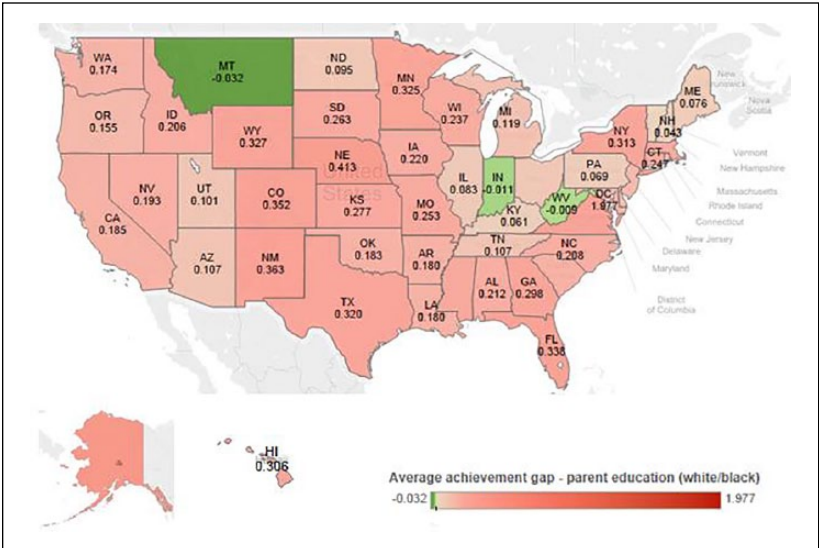


Figure 2. Average achievement gap across states based on parental education (White/Black).

Table 2. Correlations of Student Achievement Gaps (White/Black) in School Districts With Various Factors.

Factors	White/Black <i>r</i>	Achievement gap <i>p</i> value
English language learner (%)	-.009	.621
Special education student (%)	-.096	<.001
Pupil/teacher ratio	.036	.055
Total per pupil expenditure	.112	<.001
Information index (White/Black)	.140	<.001
Gini index (Black)	.115	<.001
Metro/micro status	-.027	.169
City/urban locale	.078	<.001
Average per grade enrollment	.100	<.001
Public school students in charters (%)	.004	.846
Free lunch (%)	-.221	<.001
Household unemployed (%)	-.169	<.001
Household with adults having bachelor degree or above (%)	.456	<.001

Table 3. Factors Contributing to White and Black's Student Achievement Gap in School Districts.

Factors	β	White/Black achievement gap ^a		
		95% CI for β	<i>b</i> (SE)	<i>p</i>
Special education student (%)	-.071	[-.623, -.191]	-0.415(.110)	<.001
Total per pupil expenditure	-.017	[.000, .000]	-1.049E ⁻⁶ (.000)	.469
Information index (White/Black)	.134	[.223, .399]	0.311(.045)	<.001
Gini index (Black)	.162	[.273, .413]	0.343(.036)	<.001
City/urban locale	-.022	[-.042, .010]	-0.016(.013)	.230
Average per grade enrollment	-.039	[.000, .000]	-6.445E ⁻⁶ (.000)	<.05
Household unemployed (%)	-.017	[-.664, .232]	-0.261(.229)	.345
Household with adults having bachelor degree or above (%)	.481	[.660, .787]	0.729(.030)	<.001

^aModel $R^2 = .254$.

(Table 4). Furthermore, in school districts with calculated achievement gaps, the percent of household adults with college degrees was much higher in the average White students' school (27.0%) than the average Black students' school (19.7%; $p < .001$).

Table 4. Comparison of School Districts That Had Achievement Gaps ($n = 2,846$) Versus No Achievement Gaps ($n = 10,535$).

Variable	M (SD)		p
	Gap	No gap	
Average test scores	-0.028 (.330)	0.050 (.330)	<.001
Free lunch (%)	44.7% (20.5%)	36.0% (20.2%)	<.001
English language learner (%)	6.8% (8.8%)	3.8% (9.0%)	<.001
Special education student (%)	13.3% (3.9%)	13.7% (5.2%)	<.001
Total per pupil expenditure	US\$12,265 (US\$3,760)	US\$14,028 (US\$8,603)	<.001
Current per pupil instructional expenditure	US\$6,308 (US\$2,059)	US\$6,978 (US\$3,534)	<.001
Revenue per pupil	US\$12,147 (US\$3,747)	US\$14,130 (US\$8,805)	<.001
Information index (White/Black)	0.084 (.099)	0.027 (.058)	<.001
Gini index (Black)	0.375 (.107)	0.141 (.172)	<.001
Average per grade enrollment			
All schools	924 (2,271)	104 (147)	<.001
Average White student schools	405 (607)	76 (93)	<.001
Average Black student schools	190 (682)	4 (25)	<.001
Public school students in charters (%)			
All schools	2.8% (7.7%)	0.8% (5.3%)	<.001
Average White student schools	3.1% (9.0%)	0.9% (5.6%)	<.001
Average Black student schools	3.3% (9.5%)	1.2% (7.5%)	<.001

(continued)

Table 4. (continued)

Variable	M (SD)		p
	Gap	No gap	
Household with snap benefits (%)			
All schools	17.8% (11.4%)	14.3% (11.3%)	<.001
Average White student schools	12.8% (9.6%)	12.4% (11.0%)	.044
Average Black student schools	30.1% (20.8%)	26.0% (36.7%)	<.001
Household with adults having bachelor degree or above (%)			
All schools	27.0% (15.0%)	22.9% (14.0%)	<.001
Average White student schools	27.0% (14.4%)	22.6% (13.5%)	<.001
Average Black student schools	19.7% (13.8%)	20.4% (29.0%)	0.078
Household unemployed (%)			
All schools	5.0% (1.8%)	4.3% (2.8%)	<.001
Average White student schools	5.3% (1.9%)	4.9% (3.0%)	<.001
Average Black student schools	8.8% (6.0%)	8.5% (1.9%)	.278
Household income at 50th percentile			
All schools	US\$60,127 (US\$25,530)	US\$63,222 (US\$27,027)	<.001
Average White student schools	US\$71,036 (US\$26,106)	US\$67,178 (US\$28,131)	<.001
Average Black student schools	US\$43,638 (US\$26,720)	US\$58,400 (US\$49,310)	<.001

Discussion

This study sought to investigate reasons for the Black/White achievement gap in the United States. Addressing and closing the achievement gaps have long been a concern of families, researchers, and policy makers (Anderson, 1988; Orfield et al., 2003). We have seen resegregation of schools in the United States, high African American unemployment since the 2009 recession, and raising racial tensions that cite inequality along Black/White lines (beyond education) as the source (Orfield, Kucsera, & Siegel-Hawley, 2012; O'Sullivan, Mugglestone, & Allison, 2014). Findings from this study demonstrate that although policy and programmatic efforts have been targeted at equalizing educational opportunity, the investments have not been able to further reduce the disparity as intended. The ineffective increases in spending highlight that the United States cannot just throw money at a problem, but rather must address the underlying issues that create and sustain achievement gaps, where inequality in opportunity may exist outside the classroom. Findings suggest that there is an underlying opportunity gap that leads to achievements gaps.

The results identified an influence of adult education attainment in the community on the White/Black achievement gap, which confirms previous research (J.-S. Lee & Bowen, 2006; Reardon, 2011). The findings suggest that there are real effects of being African American in the school system, particularly in districts with high levels of adult educational attainment. The strongest indicator of achievement gap between White and African American children in school districts across the United States was a higher percentage of households with adults holding a bachelor degree or higher education. Generally adult educational attainment is viewed as positive, and its role in reducing the student achievement gap has been discussed as an important structural issue in community differences (Kao & Thompson, 2003; J.-S. Lee & Bowen, 2006; Walsemann, Gee, & Ro, 2013), but in this analysis, adult education poses extra challenges for racial disparities. Reardon et al. (2016a) highlighted the potential that highly educated communities may also be high resource communities in which education is more competitive, has a higher value as a marker of success, and in which income-based economic indicators may not accurately capture the full wealth disparity. In this sort of high resource community, providing access to "good" schools may be insufficient in equalizing educational opportunity, as they may be insufficient in ameliorating the challenges of minority status in a competitive majority culture. Thus, living in a higher status area with higher education levels may not improve the opportunity gap. There was a strong observed relationship between academic achievement gaps and both the GINI index (economic

inequality) and the information index (segregation), stressing the ongoing role of cultural disparities in educational disparities.

But it is interesting to note the limited effect overall for total student expenditures and school enrollment size, with the minimal association seen for these school-based factors in contributing to the gap. Furthermore, student–teacher ratios did not show a significant correlation to White/Black student achievement gap. These findings support previous conclusions that factors related to the school environment may not account for the largest portion of achievement gap differences (Barton & Coley, 2010; Reardon et al., 2016a). Resolution to complex sociological issues may need to emerge from outside the classroom.

The present analysis improved upon prior models by accounting for the racial inequality indicator between Whites and African Americans (e.g., information index; Theil & Theil, 1972) and the economic inequality indicator of African Americans in schools (e.g., Gini index; Reardon & Firebaugh, 2002) as sociological factors that would contribute to an achievement gap even in the presence of similar educational opportunity. Findings demonstrate that racial inequality indicator is a way to quantitatively account for structural racism and inequality that is often missing from other studies (Stage & Wells, 2014). Analysis of longitudinal data has revealed that family and social capital had stronger effects on achievement than school capital, though effects were additive (Dufur, Parcel, & Troutman, 2013; Parcel & Dufur, 2001). Yet, in this study, community educational attainment does not appear to be a resource, but rather a potential barrier to closing the achievement gap, suggesting deeper sociological forces in play. In highly educated communities (high adult educational attainment), the hypothesized burden of “acting white” or attempting to achieve parity with the majority culture may place African Americans at an additional disadvantage (Palmer & Maramba, 2011). We did not find any evidence that supported the “acting white” theory. Instead, social factors, that were outside the control African American students, were the most significant issues impacting the opportunity gap. Too often, research studies do not ask critical questions about race, sex, gender, identity, and so on. Scholars can better represent the full picture of education and inequality by accounting for societal barriers that can lead to achievement gaps and other forms of inequality.

Limitations

The current study did not analyze parent education levels at the school district level, though descriptively we see a disparity. The contrast between parental and community education levels should be addressed in future research to

understand the role of adult education on achievement gaps. In addition, a limitation arises out of the data as schools with fewer than 20 children in a racial group could not be used to estimate achievement gaps due to the instability introduced with small cell sizes. This means there could be an underestimation of the effect of achievement differences in either smaller communities or areas with less racial integration. In addition, future research should consider achievement gaps among other racial/ethnic groups by gender.

Conclusion

Our findings indicate that the White/Black achievement gap varies widely by state and LEA. Furthermore, inequalities in school factors such as per pupil spending, school size, and student/teacher ratios may be critical, but do not play as large a role in the achievement gap as opportunity gap factors. Reardon et al. (2016a) similarly found that school characteristics explain the smallest amount of variance in achievement gaps among all the covariates included in their models. The strongest predictor of the achievement gap is the educational attainment of adults in the community, which may signal the presence of an opportunity gap.

Reframing the achievement gap as an opportunity gap suggests the role of systemic, structural barriers that make it harder to reach the same level of achievement or the same opportunities for all groups of students (Carter & Welner, 2013; Flores, 2007). Tate (2008) suggested that we must recognize the importance of geography and the geography of opportunities in our research interpretations. For instance, we would be disingenuous in our interpretation if we did not recognize that community social structures influence opportunities. This extends into the public–private partnerships that exist within certain communities and not others. Consequently, we share Tate’s concern that “An uneven geography of opportunity, left unaddressed, generally grows” (p. 409). Our findings suggest there is a real impact of racism and race in U.S. educational attainments—with relevant micro- and macro-level networks found influencing students disparately in highly educated communities.

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