Analyzing Public School Education Inequalities in the Dallas-Fort Worth Metroplex

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Abstract. Purpose: This paper investigates the influences of racial and socioeconomic factors on public schools' performance in the Dallas-Fort Worth (DFW) Metroplex. Research Methods: I obtained data from the Texas Education Agency (TEA) and the American Community Survey (ACS), representing 366,568 students attending 239 public high schools in the DFW Metroplex, which included public schools located in Colin County, Dallas County, Tarrant County, and Denton County. I measured public school performance based on graduation rate metrics and average SAT scores from graduating students. Findings: I found a significant correlation between racial and socioeconomic factors on public school performance. I found that the percent composition of socioeconomically disadvantaged students was the highest correlator to decreased academic performance. Further, I found a positive correlation between the percentage of socioeconomically disadvantaged students attending a given high school in relation to the percentage of African-American and Hispanic students attending a given high school. Notably, I found that public schools in the DFW Metroplex were highly segregated by racial and socioeconomic factors. Implications: This study highlights the necessity for policy pushes to diversify public school districts. Many public schools in the DFW Metroplex remain extensively segregated by racial and socioeconomic factors, and our findings underscore the importance of ensuring equitable resource distribution amongst public schools, specifically in school systems with large percentages of African-American, Hispanic, and socioeconomically disadvantaged students.

Keywords. Education, Race, Public Policy, Racial Inequality, Socioeconomic Inequality

Introduction

Racial and income inequality has been discussed for centuries in America. One of the most profound indicators of wealth and success in modern America is education. However, recent research shows that race and income play a role in the quality of education one receives, even in public schools. Rotberg cites over 1000 examples in 42 states where divisions of public school districts have been drawn deliberately to limit students from poorer minority communities from attending wealthier, majority-white public schools (Rotberg 2020). Using Montgomery County, Maryland, as a case study, Rotberg found that from 2002-03 to 2017-18, racial segregation in public school districts had substantially increased, with nine public schools in 2017-18 having Latino populations between 70.4%-83%, with most of these schools having high poverty rates amongst their student body (Rotberg 2020). In contrast, Rotberg found that
in wealthier areas, diversity had increased, but Asian students comprised the bulk of the minority population as opposed to Hispanic and Black students. Equity in education has been at the forefront of goals to revitalize minority communities affected by the deep trenches of slavery since the beginning of the historical civil rights movement. In the words of W.E.B. DuBois, "[T]he Negro needs neither segregated schools nor mixed schools. What he needs is education...A mixed school with poor and unsympathetic teachers, with hostile public opinion, and no teaching of truth concerning black folk, is bad. A segregated school with ignorant placeholders, inadequate equipment, poor salaries, and wretched housing, is equally bad" (W.E.B. DuBois 1935). Education is vital in uplifting African-American and lower-income communities to higher social classes. Yet, equal educational opportunities have repeatedly been denied to minority and low-income students, beginning when they are children and attending public schools. Howell and Casey argue that residential segregation is a significant cause of education inequality impacting African-American students. Though public policy and school district lines have affected the racial segregation of neighborhoods and public schools, citizens have also socially separated themselves from other races (Howell and Casey 2019). After the desegregation of public schools following the 1968 Supreme Court decision to desegregate public schools, bussing and other programs were implemented to diversify schools within their jurisdictions, and school segregation was approximately halved (Howell and Casey 2019). However, noticing the increasing diversity of their children's public schools, many white parents fled to the suburbs in attempts to keep their children away from education with black and other marginalized minority children (Howell and Casey 2019). At the same time, banks heavily restricted access to lending opportunities in suburban areas for African-Americans and other minorities (Grigoryeva and Ruef 2015), further attracting white families to Suburban areas where they intentionally segregated themselves from minority families (Krysan 2002). Through a combination of white families flocking to suburban areas and the reorganization of urban school districts to maintain racial segregation, the resegregation of public schools continued through the 1970s (Fiel 2013; Orfield and Frankenberg 2014; Reardon and Owens 2014). Though academics disagree on whether current school segregation exceeds racial school segregation in the 1970s, scholars almost entirely agree that racial segregation in public schools is widespread and increasing (Howell and Casey 2019; Orfield et al 2016).

Research has been published to display the racial diversity of public schools differing in financial resources (Perez and Socias 2008), and research has found correlators between race, income, and public school performance (Owens). Owens explores the explanation for educational gaps between high and low-income students and black and white students. She finds that income segregation creates inequality in the economic and social resources available in advantaged and disadvantaged students’ school contexts. From 1990 to 2010, income segregation between public school districts increased by over 15 percent (Owens 2018). Other researchers find that white and black students are highly segregated in public schools (Fiel, 2013; Stroub and Richards, 2013). The gap between high- and low-income students' test scores is 40 percent larger among children born in the 2000s than those born in the 1970s, showing that educational disparities between racial minorities and white students has increased in the past 30 years (Reardon 2011). Additionally, Owens finds that lines have been deliberately drawn between school districts to segregate high-income and low-income students, leading to advantaged public schools that are predominantly white and causing enormously disadvantaged schools that have high black and Hispanic populations. Income segregation of schools creates an educational gap boosting high-income, predominantly white students’ school achievement and lowering low-income, predominantly black and Hispanic students’ school achievement.
Lower test scores and decreasing educational achievement among minority students ultimately leads to lower college enrollment, job attainment, and lower-income amongst students in predominantly African-American, Latino, and socioeconomically disadvantaged schools (Owens 2018).

Further research shows how residential segregation and exposure to poverty impacts the success of minority students in under-resourced public schools, while also showing that white families of similar or even lower social classes than minority families are more likely to send their children to higher-resourced, low-poverty public schools (Reardon 2016; Simms and Talbert 2019). Reardon finds that academic achievement gaps between races are strongly correlated with the high disparity in average poverty rate between predominantly white public schools and predominantly black public schools. School and residential segregation are firmly linked because many children attend schools near their homes. Therefore, in lower-income neighborhoods that are predominantly African-American and Hispanic, students will be more likely to attend under-resourced schools with high racial segregation. However, wealthier, predominantly white neighborhoods will have highly-resourced public schools that comprise a majority white population and educate fewer minorities. School and residential racial segregation collectively work to create public school performance inequalities amongst students of varying racial and socioeconomic backgrounds (Reardon 2016).

In this study, I will investigate how inequalities between public schools affect their performance. Using the Dallas-Fort Worth Metroplex as a case study, I will explore how these racial and socioeconomic factors correlate with academic performance variables such as high school graduation rate and average SAT scores. The Dallas-Fort Worth Metroplex, which includes Collin, Dallas, Denton, and Tarrant counties, is a highly relevant case study for this report because of its history and involvement in redlining and residential racial segregation. A 1937 Map of Dallas shows the extensive redlining banks used to determine whether areas were "safe" or "hazardous" investments (Macon 2017). Like other redlining cases, this map heavily discriminated against people of color, mainly targeting African-Americans and Hispanics in low-income communities, while favoring predominantly white, wealthier neighborhoods for loans and investments. The redlining practiced by banks in Dallas halted investments in minority areas and perpetuated racial segregation between poorer minorities and wealthier white citizens in Dallas (Macon 2017). The eminent racial segregation (Huynh and Kent 2015; Macon 2017) within Dallas-Fort Worth further proves its applicability as a case study to identify racial inequality in public education. Further, the Dallas-Fort Worth Metroplex is highly diverse, with a 2021 census reporting that 43% of residents are white, 30% are Hispanic, 16% are black, and 8% are Asian (TEA 2021). The diversity of the Dallas-Fort Worth metroplex allows for me to explore race as a correlate to public school performance variables with higher accuracy due to the large amounts of ethnic minorities in Dallas-Fort Worth's public education system.

I will explore how demographic variables such as percent Hispanic, percent African-American, and percent white are correlated with the academic performance of public schools. I will also look at how socioeconomic factors such as the percent economically disadvantaged of a public school’s student body are associated with the academic performance of public schools. Further, I will measure how factors such as percent economically disadvantaged correlate with racial factors such as percent African-American, percent Hispanic, and percent white in public school student bodies.
Methods

I obtained the data for our analysis from the Texas Education Agency (TEA 2021), which publishes demographic and performance data on all public schools in Texas. I analyzed data for all public high schools in four counties comprising the Dallas-Fort Worth metroplex, including Collin County, Tarrant County, Dallas County, and Denton County. In total, I measured data from 239 schools, representing 366,568 students. To measure school performance, I used data on the average SAT score and the school dropout rate in 2021. I also included student enrollment data in our analysis, specifically: percent white, percent Hispanic, percent African American, percent Asian, percent immigrant, and percent economically disadvantaged. The TEA identifies a student as “economically disadvantaged” if they qualify for free or reduced lunch or federal assistance programs.

In addition to TEA data, I used data from the American Community Survey (ACS 2021) to include neighborhood economic variables. The ACS included information about census tracts, which are small and can be viewed as capturing neighborhoods. The TEA data included geographic coordinates of each school which I matched to Census tracts using spatial packages in R. I analyzed the median household income and median home value in each tract.

I used linear regression to quantify the relationship between school demographics and neighborhood home values on the performance of public schools. Linear regression allowed us to estimate the slopes for each variable. The slope in this study measures the change in the outcome variable changes with each unit increase in the independent variable, holding the other independent variables constant. Unlike a simple correlation measure, these slope estimates measure the strength of association in the same units as the outcome variable. Furthermore, correlation is only measured between two variables but with multiple linear regression, the individual slopes adjust for the effect of multiple variables. I ran the regression and created figures using R Statistical Software.

Results

From the regression analysis (Table 1), I find that a one percent increase in percent black students is associated with a 1.23 point decrease in school average SAT score. Percent Hispanic was also negatively associated with SAT scores (estimate: -0.14), though less strongly than with percent black. The median home value in the neighborhood surrounding a public school had almost no relationship with the school’s SAT score, which is why the slope and uncertainty for median home value is almost zero. The indicator I measured as the strongest correlate of low SAT score was the percent of economically disadvantaged students enrolled at a high school. There was a 3.25 percent decrease in average SAT score with each percent increase of economically disadvantaged students in public schools in the Dallas-Fort Worth Metroplex. The uncertainty for the association of each variable relationship is also listed. Statistical uncertainty is the margin of error in which a quantity can logically be considered accurate (Scott). The standard error estimate reflects the precision of the slope (ie the effect) we calculated. With a different sample of public schools with similar characteristics to those in Dallas, I would expect the effect estimate for that sample to be within 1-2 standard errors of the effect estimate in Table 1.

SAT scores were strongly associated with the racial and socioeconomic composition of the high school’s student body. Figure 1A shows a strong negative correlation between the African-American composition of a high school and average SAT score of the high school. Figure 1B shows another strong negative correlation between the percent Hispanic composition and the average SAT score of these high schools. Adversely, Figure 1C shows that when the
percentage of white students increases, average SAT scores also increases. However, in Figure 1D when I purely measured the percent economically disadvantaged composition of high schools, there was a very strong negative correlation to performance on the SAT. In Figure 1E, when I combined percent African-American and percent Hispanic, there was a negative correlation towards average SAT score for public high schools; however, this negative correlation is weaker than the negative correlation when both races are measured individually.

Among the 239 public schools in the study, 14 had over 75% African American or Hispanic enrollment, while 68 had over 75% percent economically disadvantaged students. These heavily segregated schools show the strongest associations with the performance variables. Generally, when schools have a high percentage of white students and have a student body consisting of low percentages of African-American and Hispanic students, racial factors are more strongly associated with positive public school performance. Conversely, when the percentage of African-American and Hispanic students comprises over 75 percent of a school’s population, public schools generally show strong racial correlations to negative public school performance.

Overall, public schools in the Dallas-Fort Worth metroplex have consistently low dropout rates, and generally, there is little correlation between racial and socioeconomic factors on dropout rates. When I measured dropout rate in Figure 2A, there was a very weak correlation between percent African-American or Hispanic and dropout rate amongst high schools in the DFW Metroplex. This is due to the dropout rate at most public high schools in the DFW metroplex being less than five percent. Similarly, in Figure 2B, there is a very weak correlation between percent economically disadvantaged and dropout rate. In this figure, I found that the public school we measured with a dropout rate of almost 30 percent had a student population that was almost 90 percent socioeconomically disadvantaged, and every school with a dropout rate higher than 10 percent had a student body that was at least 50 percent economically disadvantaged.

In earlier figures, there were strong negative correlations between percent Hispanic and average SAT score, percent economically disadvantaged and average SAT score, and percent African-American and Hispanic and average SAT score. Figures 3 shows the correlations between race and the percent of students who are economically disadvantaged at public high schools in the DFW metroplex. Figure 3A shows a strong positive correlation between the percent of Hispanic students in a student body and the percent of economically disadvantaged students in a public school. Figure 3B shows that there is also a strong positive correlation between percent African American plus percent Hispanic with the percent economically disadvantaged of a public high school.

Discussion
When looking at the racial and socioeconomic factors that relate to high school performance, I found that the percent African American, percent white, percent Hispanic, and percent economically disadvantaged variables were strongly associated with the average SAT scores of public schools. Many of these factors were correlated and thus showed similar trends. For example, each percent increase in African American students was associated with a 0.35 percent increase in economically disadvantaged students, and each percent increase in Hispanic students was associated with a 0.8 percent increase in African American students. At the same time, each percent increase in white students was associated with a 0.81 percent decrease in economically disadvantaged students. This result suggests that African-American and Hispanic students were at a severe disadvantage in terms of academic performance due to their higher
likelihood of being economically disadvantaged. We also see that African American and Hispanic students were more likely to attend the same, predominantly economically disadvantaged high schools. From the regression analysis, I found the percent economically disadvantaged factor to be the most profound indicator of low public school performance among the variables we studied, lowering average SAT score of a high school by almost twice as much as the percent African-American, which was the second highest indicator of low public school performance. However, because percent African-American and percent Hispanic are strongly related to the percentage economically disadvantaged in public high schools, the underlying cause of lower public school performance amongst racial minorities was strongly correlated with their overwhelmingly higher chance of being and attending economically disadvantaged high schools.

Further, I measured significant racial and socioeconomic segregation between schools. Despite the Dallas-Fort Worth metroplex having a reported Hispanic composition of 30 percent and African-American composition of 16 percent (ACS 2021), many high-performing public schools, especially in wealthier areas, had school compositions that were far from representing Dallas's true racial diversity. Fourteen of the schools I measured had African-American and Hispanic populations of over 75 percent, while an alarming 65 public schools (almost one-fourth of the public schools we measured) had student bodies that were over 75 percent economically disadvantaged. Among schools with SAT scores above 1200, the 75th percentile score as reported by College Board (College Board 2022), only 25% of students were economically disadvantaged, compared to 54% among the full set of public high schools in this study. In these high-performing schools, 35% of students were white, compared to 25% among all schools, and 10% were African American, compared to 19% across all schools. The disparities between these wealthy white public schools and economically disadvantaged African-American and Hispanic schools were striking, and as the segregation in public schools widened, the disparities in performance did as well.

The disparities in SAT scores between schools have long-lasting consequences on economically disadvantaged, African-American, and Hispanic students. Primarily, these students’ opportunities of attending college and receiving higher education are lessened due to lower performance on standardized testing (Yu and Kuncel 2018, Yatarth 2023). An article from Yatarth discusses the importance of SAT scores in college admissions. The article describes how SAT scores are an essential factor which colleges use to evaluate student’s academic performance and potential for academic success in college, and how SAT scores are used in conjunction with other factors such as grades, essays, extracurricular activities, and letters of recommendation to make final admissions decisions (Yatarth 2023).

Attending college has important ramifications for students’ future economic security (Carnevale et al 2011; APLU 2023). Research from the APLU shows workers with college degrees earn 36,000 dollars more per year or 84 percent more per year on average than their counterparts with only a high school diploma. In their entire lifetimes, college graduates earn 1.2 million dollars more on average than graduates with just a high school diploma (APLU 2023). The lower educational resources allocated to poorer public schools, and the lower performance of these high minority, economically disadvantaged high schools directly impacts the financial opportunities of low-income, African-American, and Hispanic students.

This study finds that widening school segregation caused by educational policies are widening academic achievement gaps between racial minorities and white students, as well as widening the academic success disparities between economically disadvantaged students and their wealthier counterparts. As discussed in the introduction, public school lines have been
deliberately drawn in many states to separate wealthier white students and lower-income minority students (Rotberg 2020). I found that the Dallas-Fort Worth Metroplex not only supports the reality of this educational policy-making but displays the adverse effects this public school racial segregation causes on lower-income minority students. This study finds that 25% of schools had student bodies with fewer than 30% economically disadvantaged students, while another 25% of schools had over 79% economically disadvantaged students. The public schools with the fewest economically disadvantaged typically had students with the highest SAT scores, indicating their students were more competitive college applicants. My results were also in line with Owens’ study showing income segregation is a major cause of educational gaps between racial groups. Like in Owens’ study (Owens 2018), I also found that white students and African-American students specifically were highly segregated between public schools, and my data shows high educational disparities between these schools.

However, this study’s findings slightly differed from Reardon’s paper on the effects of neighborhood home value on public school performance. While Reardon found that residential segregation caused poorer, mainly minority students to attend lower funded public schools that were closer to them, and wealthier, mainly white students were able to attend higher performing public schools in their neighborhood (Reardon 2016), this study found that in the Dallas-Fort Worth Metroplex, the median income of the surrounding neighborhood and the median home price of the neighborhood where a public school was located did not have a major relationship with public school academic performance. However, this may have been due to issues with my model, detailed below.

This study has several limitations. First, I measured income and home values in the neighborhood where a public school was located, not the neighborhood which the public school specifically serviced, which could explain why I found that the neighborhood surrounding a public school had no statistically significant impact on public school academic performance. Other studies referenced in this study such as Sean Reardon’s (Reardon 2016), as well as Howell and Casey’s (Howell and Casey 2019) studies could still display accurate results showing residential segregation was a major cause of public school inequality if they measured the home value of the neighborhoods which each public school specifically served, rather than the neighborhood in which the public school was physically located in, like how I measured in this study. In addition, the main metric I used to judge public schools’ academic performance was their average SAT score. Due to Covid-19 resulting in many colleges’ test optional policies (Lovell and Mallinson 2021; Vigdor and Diaz 2020), many students did not take the SAT, and thus, their scores were not reported (Moon 2020; Hess 2020). Likewise, many students opt to take other forms of standardized testing, including the ACT and CLT in Texas, so measuring SAT scores as a metric was not fully inclusive of all students’ performance (Jaschik 2022; Anderson 2022). Another issue with measuring testing is that standardized testing performance is largely determined by an individual student’s ability to afford resources, study materials, and tutoring to better prepare themselves for standardized exams (Paulson 2021; Rampell 2009).

**Conclusion**

This study analyzed data from 239 public high schools in the Dallas-Fort Worth Metroplex. Using a linear regression analysis, we examined the relationship between racial and socioeconomic factors towards school performance, which we measured by looking at a school’s average SAT score and graduation rate. We find high levels of racial and socioeconomic segregation between public schools, specifically showing many schools in the Dallas-Fort Worth Metroplex are predominantly African-American, Hispanic, economically
disadvantaged, or several of the above listed variables. Segregated high schools consistently had lower SAT scores, predominantly affecting public schools segregated with high percentages of Hispanic and African-American populations. Many of these schools also had the highest proportions of economically disadvantaged students, affecting African-American and Hispanic students more than students from other racial groups. The public schools that were segregated by racial and socioeconomic factors experienced lower graduation rates and far lower average standardized testing scores, harming their students’ future academic and career plans as well as financial prospects (Bonnie 2015). The two racial groups we found most likely to be economically disadvantaged and attend economically disadvantaged high schools were African-American and Hispanic students.

Recent studies have found that racial segregation in public schools is increasing (Howell and Casey 2019; Owens et al. 2022), and much literature (Reardon et al. 2019), including this paper, has shown school segregation is associated with wider disparities in the performance of public schools. Therefore, public policy-making should be implemented that addresses school segregation at the forefront of its goals. Due to the negative effects of widespread school segregation on students from lower socioeconomic and minority racial backgrounds, education policy and school zoning must prioritize racially diversifying public school student bodies and distributing public school funds evenly across school districts and public high schools, especially in areas with high amounts of economically disadvantaged students.

### Tables and Figures

#### Tables:

**Table 1: Multiple Linear Regression Coefficients with SAT score as outcome**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Slope</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent black</td>
<td>-1.23</td>
<td>0.68</td>
</tr>
<tr>
<td>Percent hispanic</td>
<td>-0.14</td>
<td>0.67</td>
</tr>
<tr>
<td>Percent economically disadvantaged</td>
<td>-3.25</td>
<td>0.62</td>
</tr>
<tr>
<td>Median home value</td>
<td>3e-5</td>
<td>5e-5</td>
</tr>
</tbody>
</table>
Figure 1C) [Graph showing the relationship between percent white and average SAT score.]

Figure 1D) [Graph showing the relationship between percent economically disadvantaged and average SAT score.]
Figure 2B)

Figure 3A)
References


Admissions officers use these scores, essays, and letters of recommendation.