



RESEARCH REPORT

# School Choice and Commuting

## How Far New York City Students Travel to School

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# Executive Summary

New York City (NYC) offers considerable public school choice at all levels of schooling. Options include traditional neighborhood zoned schools, magnet and gifted and talented programs, dual language schools, charter schools, exam-based specialized high schools, and a citywide high school choice program. The city's density and public transit system put many of these options within reach, and the NYC Department of Education provides half- or full-fare MetroCards to subsidize pupil transportation by bus and subway.

While school choice provides opportunities for families to seek out the best school for them, it can lead to more time commuting to school. In this report, I use geographic student and school location data to estimate commuting times for NYC elementary, middle, and high school students. These estimates assume students walk or take public transportation to school, an assumption I believe holds for most students. I also quantify the number of school options available to families within a given commute and calculate the time it would take them to reach the nearest "high-quality" school. Using high school application data, I examine eighth-grade students' *willingness* to travel to school and how this compares with their actual commuting time. Finally, I examine one unexplored implication of school choice: the diffusion of students across schools, or the propensity to attend school where none of one's peers come from the same neighborhood or previous school.

Because subgroup-level differences in commuting time, access to school options, and diffusion are of interest, all my results are reported by race or ethnicity, gender, eligibility for free and reduced-price lunch (FRPL), enrollment in a charter or traditional school, borough of residence, and prior achievement on state tests. All data come from the 2013–14 and 2014–15 academic years.

Key findings include the following:

- The average commuting time to school on foot or by public transportation increases from 10.3 minutes in kindergarten to 17.4 minutes in sixth grade and 31.3 minutes in ninth grade.
- At all levels, black students travel significantly farther to school than students from other racial or ethnic backgrounds. Girls travel farther than boys in middle and high school, and higher-achieving students travel farther than lower-achieving students. Students attending charter schools travel farther to school than students attending traditional public schools in kindergarten and sixth grade, but in ninth grade, charter school students attend schools closer to home.

- Group differences in travel time are related to residential segregation and the uneven distribution of students across neighborhoods served by public transportation, but some important differences remain after controlling for students' residential school districts.
- The average NYC student can access many school options within a short commute on foot or by public transit. The typical ninth grader can reach 14 schools within 20 minutes and 105 schools within 45 minutes. Traditionally disadvantaged students—low-income, black, and Hispanic students, for example—tend to have *more* school options within a given commuting time than less disadvantaged students.
- Not all proximate schools are high-quality choices. The average commuting time to the nearest high-quality school, defined as being in the top quartile citywide in student performance and growth (for kindergarten and sixth grade) or graduation rates (for ninth grade) is systematically higher for black and FRPL-eligible students.
- In high school, longer commuting times are not the result of a matching process that forces some students to travel farther than they would like to. Rather, group differences in commuting times among ninth graders are evident in their high school choices. Students who do not receive their first choice ultimately match to a school that is *closer* to home, not farther.
- As they progress through school, NYC students are increasingly unlikely to attend school with peers from their neighborhood (census tract) or from their previous school. Fourteen percent of kindergarten, 20 percent of sixth-grade, and 41 percent of ninth-grade students attend a school where no student in their cohort resides in the same census tract as they do. Likewise, 9 percent of sixth-grade and 20 percent of ninth-grade students attend a school where none of their peers attended the same school the prior year (i.e., the same elementary or middle school).
- Student diffusion across schools varies by student background and location. Black and Hispanic students are more likely to attend schools where no other student in their cohort is from the same neighborhood or previous school.

I do not address whether longer commutes or diffusion across schools are good or bad. Families may be willing to send their child on a longer bus or subway ride to a school that helps them succeed. But long commutes may take time away from schoolwork or decrease student engagement. I leave these as open questions for future research. My aim here is to provide a rich descriptive analysis of how far students travel (and are willing to travel) and the number and variety of options that public transportation affords NYC families.

# School Choice and Commuting

## 1. Public School Choice and Student Transportation Policy in New York City

### **A Brief History of School Choice in New York City**

New York City (NYC) has a long history of providing extensive school choice.<sup>1</sup> In the desegregation era following *Brown v. Board of Education*, the city began an open enrollment program and free transfer policy, which allowed students from high-minority schools to attend any school with an available seat. In 1969, the city was divided into 32 community school districts (CSDs), each responsible for its elementary and middle schools. (The city's Department of Education maintained control of high schools.) Community School District 4 in East Harlem was an early pioneer in school choice, creating middle schools open to all District 4 families. It eventually eliminated middle school attendance zones and required every family to make an active school choice. CSD boards were dissolved in 2002, but elementary and middle school enrollment policies continue to vary by district.

Before 2003, rising ninth graders could apply to up to five high school programs citywide. Students could receive multiple (or no) offers, and most had a neighborhood zoned school default. In 2003–04, the system was replaced by a mandatory applications process in which students apply to up to 12 programs but receive only one offer (Abdulkadiroğlu, Agarwal, and Pathak 2017). The 1990s and early 2000s saw a large increase in the number of high school choices, as many large high schools were replaced by new small high schools, often with distinctive themes. Between 1999 and 2010, the number of high school options rose from 212 to 409 (Kemple 2013).

Finally, NYC offers nine selective specialized high schools that admit students citywide and are highly competitive. The oldest, Stuyvesant High School, opened in 1904. These schools are described below.

## School Choice Opportunities Today

### ELEMENTARY SCHOOL

Families are required to apply for kindergarten in January before school entry.<sup>2</sup> They can list up to 12 choices on their application. Options vary by district but typically include zoned and nonzoned schools. Families within a zoned school's catchment area are usually guaranteed a seat in that school. Nonzoned schools are open to all district or borough residents. Districts 1 (in Manhattan), 7 (in the Bronx), and 23 (in Brooklyn) are open choice districts with no zoned elementary schools. Applications are accepted at Family Welcome Centers or online, and offer letters are distributed in early spring. Waiting lists are maintained for families who do not get their top choice.

### GIFTED AND TALENTED

Children applying for kindergarten can take the citywide gifted and talented (G&T) test in the fall before school entry.<sup>3</sup> Top-scoring students are eligible for admission to citywide or district G&T programs. Citywide G&T programs are schoolwide programs that typically admit students at the 97th percentile or above. District G&T programs are located within select neighborhood elementary schools and give priority admission to high-scoring students living in the district. They typically admit students at the 90th percentile or above. Offer letters for G&T programs are also distributed in early spring.

### MIDDLE SCHOOL

Families are required to apply for middle school in December before school entry.<sup>4</sup> They can list up to 12 choices on their application. Options vary by district, but students are typically eligible for multiple types of schools, including schools that admit students from across NYC, boroughwide schools that admit students from the borough, and district schools that are open only to students in their CSD or zone. Districts 1, 7, and 23 do not have zoned middle schools. Many schools or programs within schools use academic or other screens (e.g., an audition) for admission. Screened middle schools can see how students ranked them on their application; screened high schools cannot. Offer letters are distributed in April.<sup>5</sup>

### HIGH SCHOOL

Every rising ninth grader must apply for high school in December before school entry.<sup>6</sup> They can list up to 12 choices on their application. Students choose from more than 750 programs in 435 high schools citywide. Each program has an admissions method and admissions priorities that affect which applicants are admitted. Some programs rank applicants using academic or other criteria (e.g., an audition or essay)

while others do not. Many programs give admissions priority to students who live in the same borough, district, or zone. A “deferred acceptance” algorithm centrally matches students to schools using students’ rankings of schools, schools’ rankings of students, and admissions priorities (Abdulkadiroğlu, Pathak, and Roth 2005). Offer letters are distributed in March. Students who do not match in the first round—and those unhappy with their initial match—may apply again in the second round in April.

### **SPECIALIZED HIGH SCHOOLS**

Eighth graders can also take the Specialized High Schools Admissions Test in October to qualify for one of eight selective high schools that admit students based on this exam (Corcoran and Baker-Smith 2018). A ninth specialized high school, LaGuardia High School, admits students via an audition and review of other academic criteria. Admission to these nine schools is conducted separately from the main high school admissions process, and students who receive an offer to one of these schools can accept this offer or their main high school match.<sup>7</sup>

### **CHARTER SCHOOLS**

The application process for NYC charter schools is separate from that for traditional public schools, as families must apply directly to the school or via the NYC Common Online Charter School Application. More than 75 percent of NYC charter schools use the common application.<sup>8</sup> The number of charter schools has increased from 16 in 1998 to 98 in 2002 to 227 in 2017–18. Today, more than 114,000 students are enrolled in NYC charter schools (NYC CSC 2017). Historically, charter schools served primarily K–8, but the number of charter high schools has surged.

## **Pupil Transportation Policy in New York City**

New York City generously subsidizes school transportation and relies heavily on the public transit system (Urban Institute Student Transportation Working Group 2017). General education student eligibility for transportation depends on grade level and the shortest walking distance from home to school. Transportation options include a school bus or a half- or full-fare MetroCard for use on the city’s transit system (the Metropolitan Transportation Authority, or MTA). School buses are available only in a subset of schools and are more common in boroughs less well served by public transportation. As in most school districts, students with special needs are provided transportation according to their Individualized Education Plan.

Kindergarteners, first graders, and second graders receive half-fare transportation if they live less than 0.5 miles from their school or receive full-fare (or school bus) transportation if they live beyond

this distance (table 1). Students in grades 3–6 are offered half-fare transportation if they live 0.5 miles or more but less than one mile from school or full-fare (or school bus) transportation if they live 1 mile or more from school. Finally, students in grades 7–12 are eligible for half-fare transportation if they live 0.5 to 1.5 miles from school or full-fare transportation if they live 1.5 miles or more from school. Students without an Individualized Education Plan in grades 7–12 are not eligible for school bus transportation.

**TABLE 1**  
**Student Transportation Eligibility in New York City**

Grade	Distance to School (miles)			
	< 0.5	0.5–1.0	1.0–1.5	≥ 1.5
K	Half fare	School bus or full fare	School bus or full fare	School bus or full fare
1	Half fare	School bus or full fare	School bus or full fare	School bus or full fare
2	Half fare	School bus or full fare	School bus or full fare	School bus or full fare
3	--	Half fare	School bus or full fare	School bus or full fare
4	--	Half fare	School bus or full fare	School bus or full fare
5	--	Half fare	School bus or full fare	School bus or full fare
6	--	Half fare	School bus or full fare	School bus or full fare
7	--	Half fare	Half fare	Full fare
8	--	Half fare	Half fare	Full fare
9	--	Half fare	Half fare	Full fare
10	--	Half fare	Half fare	Full fare
11	--	Half fare	Half fare	Full fare
12	--	Half fare	Half fare	Full fare

**Source:** Reproduced from the New York City Department of Education’s Office of Pupil Transportation (“General Education Transportation,” New York City Department of Education, accessed October 8, 2018, <http://www.optnyc.org/ServicesAndEligibility/gettransportation.htm>).

**Note:** Applies to general education students only.

School staff distribute subsidized MetroCards to eligible students. The half-fare MetroCard is valid only on MTA buses, not the subway. Full-fare cards are valid on both subways and buses. Student cards are valid only on school days and allow for three trips and one transfer per day (OPT, n.d.).

Bus transportation is available only to students in K–6 and is provided to students living in the same district as their school, as long as they live a sufficient distance from school. NYC also provides bus transportation to students attending citywide G&T programs and to some prekindergarten, private, and charter school students if they reside in the same borough as their school. Schools must opt in to bus transportation through the New York City Department of Education Office of Pupil Transportation.

I used student and school data from 2013–14 to estimate the number and share of students in kindergarten, sixth grade, and ninth grade that were eligible for subsidized transportation in that year, based on their distance from home to school.<sup>9</sup> Transportation options (bus or subsidized MTA care) vary

by school, but all eligible students can receive one of these. Forty-one percent of kindergarteners lived 0.5 miles or more from school and were eligible for full-fare or school bus transportation. More than half of these were Brooklyn and Queens residents (not shown). Fifty-one percent of sixth graders were eligible for full-fare or bus transportation, and an additional 27 percent were eligible for half-fare support. Seventy-five percent of ninth graders lived 1.5 or more miles from school and were eligible for full-fare MetroCards. Another 20 percent were eligible for half-fare transportation, and 5 percent lived close enough to school to be ineligible for a MetroCard.

**TABLE 2**

**Estimated Number and Share of Students Eligible for Subsidized Transportation, 2013–14**

	Distance to School (miles)			
	< 0.5	0.5–1.0	1.0–1.5	≥ 1.5
Kindergarten	42,679 (59.2%)	14,732 (20.4%)	5,237 (7.3%)	9,427 (13.1%)
Sixth grade	14,805 (22.8%)	17,200 (26.5%)	11,003 (16.9%)	22,030 (33.9%)
Ninth grade	4,064 (5.4%)	6,848 (9.1%)	8,225 (10.9%)	56,371 (74.7%)

**Source:** Author’s calculations using 2013–14 data from the New York City Department of Education.

**Notes:** Methods for calculating distance are described in the appendix. For this table, the minimum of walking or driving distance was used. Blue-shaded cells indicate eligibility for half-fare MetroCards; yellow-shaded cells indicate eligibility for full-fare MetroCards. All other cells are ineligible for subsidized transportation.

## Summary

New York City offers many public school choices at all levels of schooling. These include traditional neighborhood zoned schools; bilingual, magnet, and G&T programs; charter schools, and specialized high schools. The Department of Education’s policy of subsidizing student transportation on the city’s buses and subways facilitates families’ access to these options. Data from 2013–14 show that a majority of sixth- and ninth-grade students (and about 40 percent of kindergarteners) live far enough from their school to qualify for subsidized transportation. In the next section, I look at how far public school students travel to school.

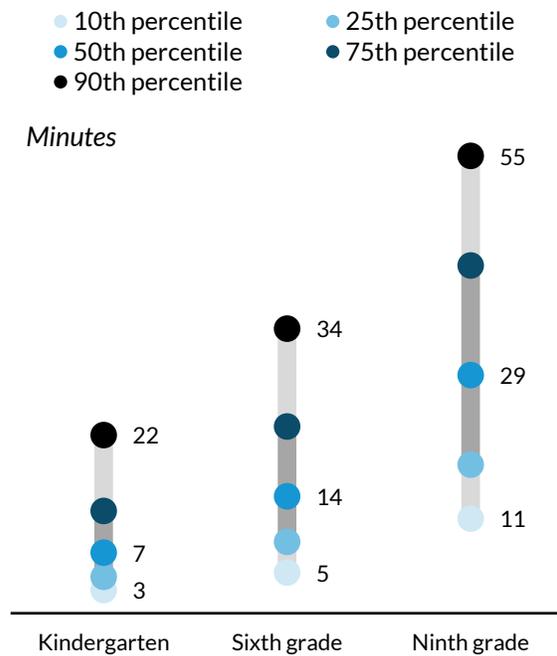
## 2. How Far Do New York City Students Travel to School?

This section uses geocoded data on students and schools to estimate how far the average public school student in New York City travels to school. Given the predominant use of public transportation, the commute time assumes students walk or travel by bus, subway, or ferry along the fastest route. Results are reported for three grade levels corresponding to elementary, middle, and high school and by race or ethnicity, gender, free and reduced-price lunch (FRPL) eligibility, charter enrollment, borough of

residence, and prior achievement. All results are for the 2013–14 academic year, the most recent year of geocoded data available at the time of this analysis. Details on the construction of my analytic dataset and the calculation of travel time are in the appendix.

Figure 1 shows the 10th, 25th, 50th, 75th, and 90th percentiles of travel time by public transportation for students in kindergarten, sixth grade, and ninth grade. Travel times increase with student age, reflecting the spatial location of schools at each level and greater opportunity and willingness to attend school farther from home. In 2013–14, the average kindergarten student lived 10.3 minutes from school by foot or public transportation, while the average sixth grader lived 17.4 minutes away and the average ninth grader lived 31.3 minutes away. Variability in travel time increases with age, as does the propensity to travel long distances. The 75th percentile of travel time, for example, was 12.4 minutes for kindergarteners, 22.5 minutes for sixth graders, and 41.9 minutes for ninth graders. The 90th percentiles show that a meaningful number of students have long commutes. The 90th percentile among ninth graders is a 55-minute trip in one direction. (This assumes they use public transit and do not have access to a faster mode of transportation.)

**FIGURE 1**  
**Minutes of Travel Time to School Attended, by Public Transportation**



**Source:** Author’s calculations using 2013–14 data from the New York City Department of Education.

**Notes:** Methods for calculating travel time on foot or by public transit are described in the appendix. *N* = 74,617 for kindergarten; *N* = 65,717 for sixth grade; *N* = 75,481 for ninth grade.

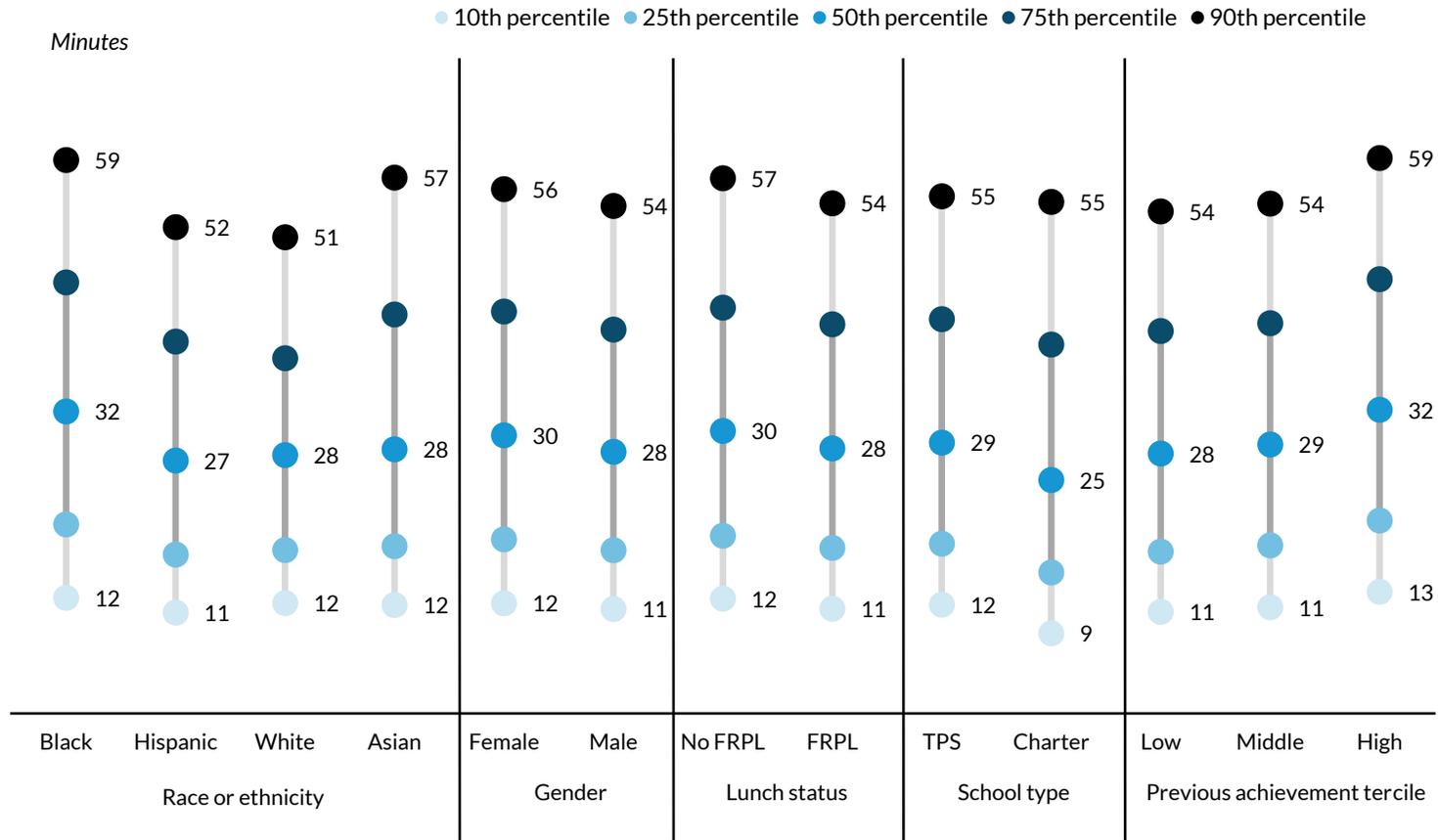
## How Does Commuting Time Vary by Subgroup?

Figures 2 through 4 show mean travel time to school for subgroups of students. At all grade levels, black students travel significantly farther than do students of other racial and ethnic backgrounds. The average black kindergartener lived 12.4 minutes from school, more than the average white (10.6 minutes), Asian (9.4), and Hispanic (9.1) kindergarten student. The average black sixth grader lived 20.0 minutes from school, more than the average white (18.0 minutes), Asian (17.4), or Hispanic (15.4) sixth grader. The average black ninth grader lived 34.2 minutes from school, more than the average Asian (31.8 minutes), Hispanic (29.5), or white (29.4) ninth grader.<sup>10</sup> In all three grades, the 90th percentile of travel time for black students exceeds that of other racial or ethnic groups. In ninth grade, for example, the 90th percentile for black students was 59 minutes, compared with 52 minutes for Hispanic students and 51 minutes for white students. (Notably, the right tail for Asian students is longer in ninth grade than in earlier grades, with 10 percent of Asian ninth graders traveling 57 minutes or more to high school.)

Although there are no gender differences in mean travel time among kindergarteners, girls travel farther to school in sixth grade (17.6 minutes for girls versus 17.2 minutes for boys) and ninth grade (32.0 versus 30.6 minutes). At all three grade levels, FRPL-eligible students tend to live closer to school than noneligible students. Finally, students attending charter schools typically travel farther to school than students in traditional public schools, at least in kindergarten (19.0 versus 9.2 minutes) and sixth grade (22.7 versus 16.9 minutes). In ninth grade, the pattern is reversed, with charter school students living *closer* to home than students attending traditional high schools (28.7 versus 31.4 minutes).

Figures 3 and 4 reveal that higher-achieving students travel farther to school than do lower-achieving students. For this comparison, I categorized sixth- and ninth-grade students into three equally sized groups (terciles) based on their state test scores in math and English language arts (ELA) in the prior year. On average, sixth-grade students in the highest tercile traveled 19.4 minutes to school, compared with 16.1 minutes for students in the lowest tercile. In ninth grade, students in the highest tercile traveled 34.7 minutes, on average, compared with 30.3 minutes for students in the lowest tercile.

**FIGURE 2**  
**Minutes of Travel Time to School by Subgroup, Kindergarten**

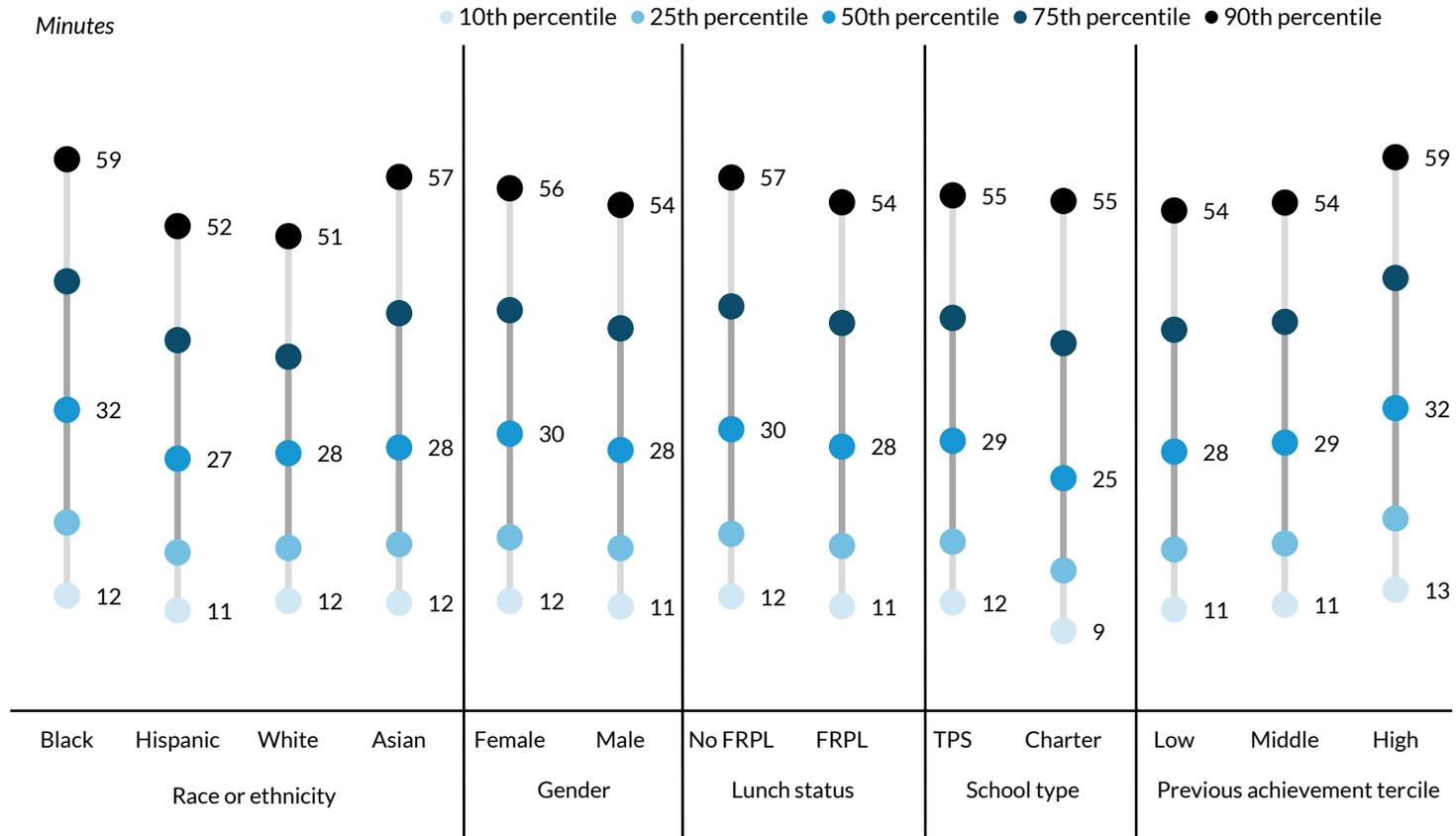


Source: Author’s calculations using 2013–14 data from the New York City Department of Education.

Note: FRPL = free and reduced-price lunch; TPS = traditional public school. Methods for calculating travel time by foot or by public transit are described in the appendix.

FIGURE 3

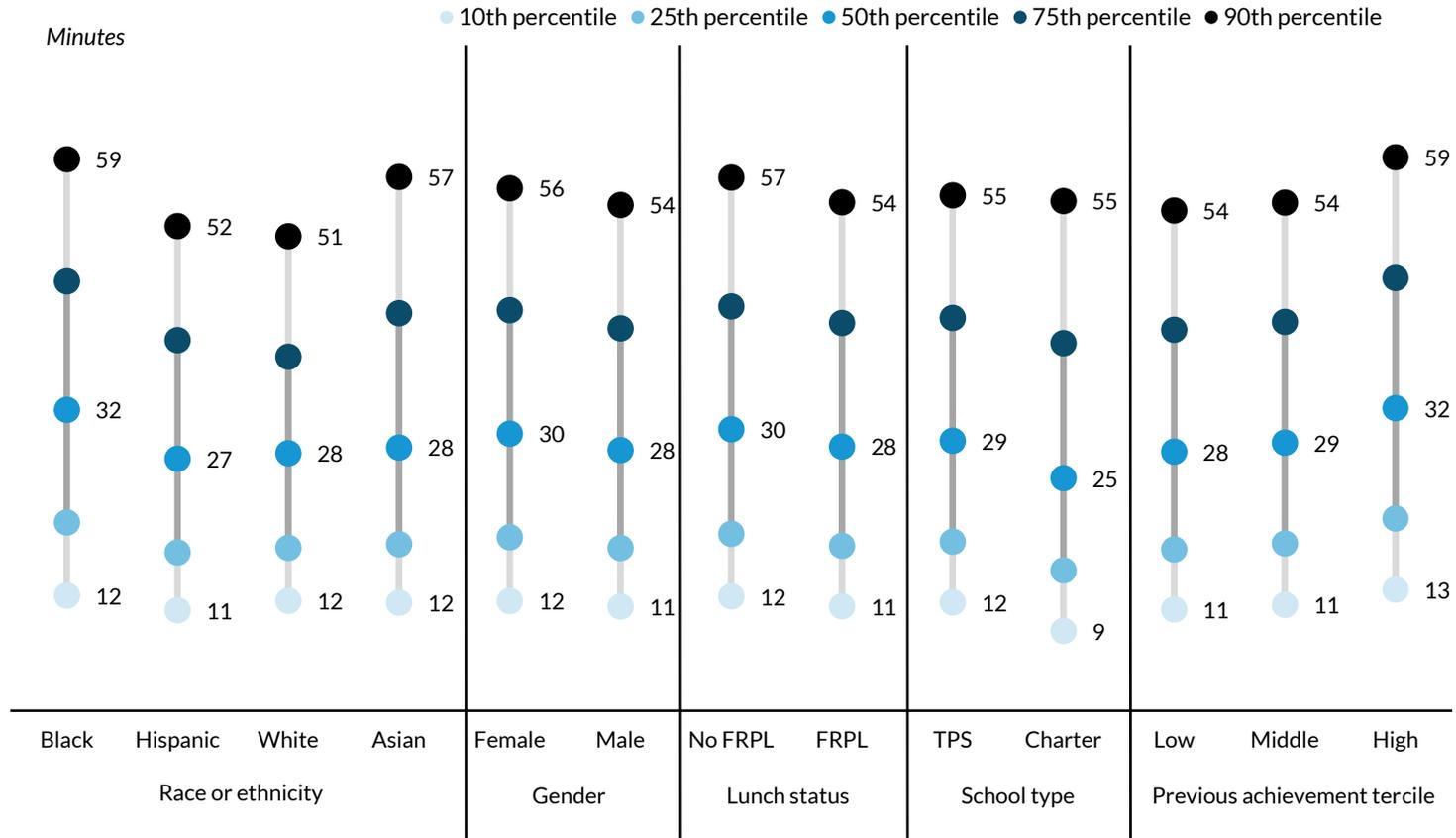
Minutes of Travel Time to School by Subgroup, Sixth Grade



Sources: Author's calculations using 2013–14 data from the New York City Department of Education.

Note: FRPL = free and reduced-price lunch; TPS = traditional public school. Methods for calculating travel time by foot or by public transit are described in the appendix.

**FIGURE 4**  
**Minutes of Travel Time to School by Subgroup, Ninth Grade**



Source: Author’s calculations using 2013–14 data from the New York City Department of Education.

Note: FRPL = free and reduced-price lunch; TPS = traditional public school. Methods for calculating travel time by foot or by public transit are described in the appendix.

Figures 3 and 4 reveal that higher-achieving students travel farther to school than do lower-achieving students. For this comparison, I categorized sixth- and ninth-grade students into three equally sized groups (terciles) based on their state test scores in math and English language arts (ELA) in the prior year. On average, sixth-grade students in the highest tercile traveled 19.4 minutes to school, compared with 16.1 minutes for students in the lowest tercile. In ninth grade, students in the highest tercile traveled 34.7 minutes, on average, compared with 30.3 minutes for students in the lowest tercile.

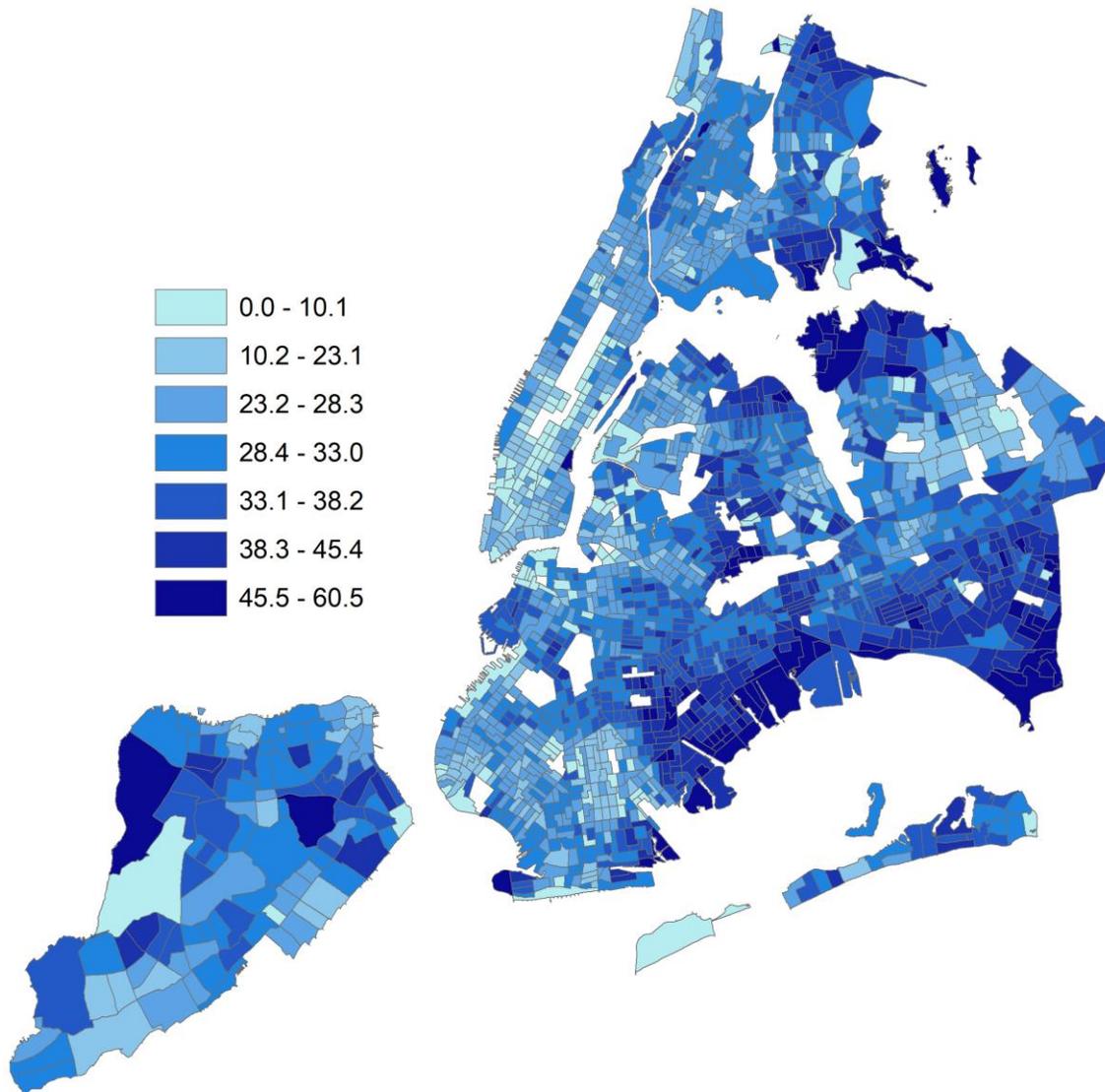
### **Are Group Differences in Travel Time Explained by Residential Segregation?**

To some degree, group differences in commuting time reflect residential segregation, the tendency for students of different racial or ethnic or income groups to live in different neighborhoods. The five boroughs of NYC and their many neighborhoods vary in population density and access to public transportation, which may explain why some groups have longer travel times. For example, white kindergarten students may have longer trips to school than Hispanic students if the former live in less dense areas, such as Queens and Staten Island, while the latter live in more dense areas proximate to public transportation, such as Manhattan and the Bronx. Figure 5 illustrates geographic differences in mean travel time for ninth graders by census tract.<sup>11</sup>

Certain neighborhoods have systematically longer commute times to school by public transportation. These include remote neighborhoods in the Bronx (e.g., Eastchester and Co-op City, Soundview and Castle Hill), Queens (College Point, Ozone Park, and Whitestone), Brooklyn (Canarsie, East New York, and Marine Park), and Staten Island (Bloomfield). These areas have less accessibility to public transit—in particular, subways—and families may rely more on transportation by car or school bus. To the extent families have access to a faster mode of transportation, my estimates may overstate students' actual time to school.

FIGURE 5

Minutes of Travel Time to School for Ninth Graders Using Public Transportation, by Census Tract



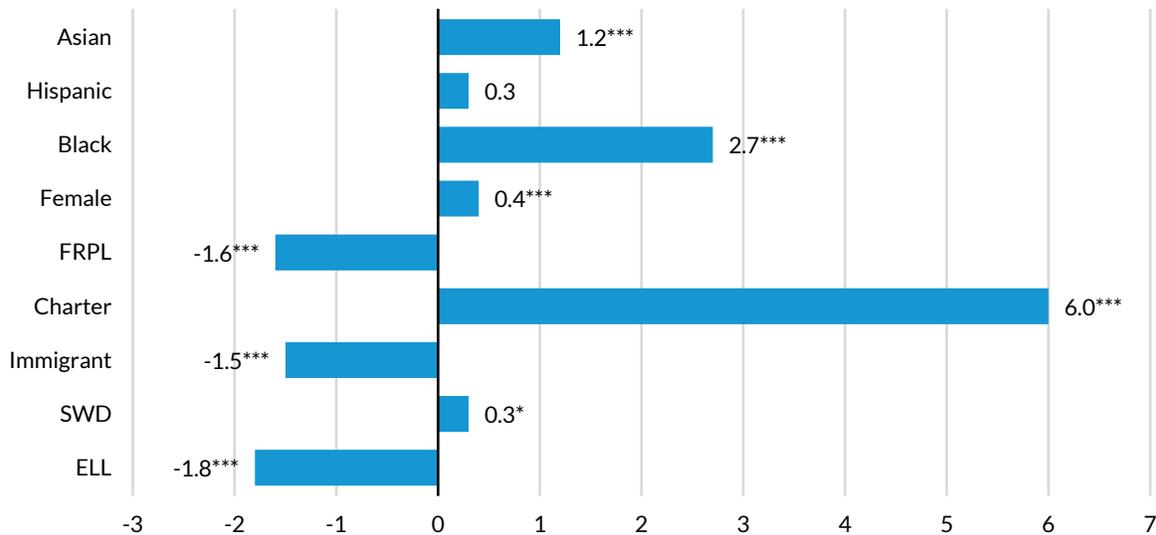
Source: Author's calculations using 2013-14 data from the New York City Department of Education.

Note: Methods for calculating travel time by foot or by public transit are described in the appendix.

I used multiple regression to quantify group differences in commuting time to school that remain after controlling for students' residential location (CSD) and charter attendance. This method helps explain whether, for example, racial or ethnic differences in travel time merely reflect where students from different racial or ethnic backgrounds live. The regression results are reported in appendix table A.3 and illustrated in figure 6 (for sixth graders).<sup>12</sup>

Regression adjustments show that many group differences in travel time to school persist, even when controlling for residential location and charter attendance (although the gaps are sometimes smaller). For example, black sixth graders travel an average of 2.7 minutes longer to school than otherwise similar white students, the category's reference group (figure 6). In ninth grade, the black-white gap is 2.3 minutes. Gender differences in travel time also persist with regression adjustments. In both sixth and ninth grade, girls commute 0.4 and 1.1 minutes farther, on average, than boys. Similarly, English language learners (ELLs), immigrants, and FRPL-eligible students make shorter trips to school, on average, than non-ELLs, native-born students, and students not eligible for subsidized meals.<sup>13</sup> Students with disabilities tend to travel farther to school in kindergarten and sixth grade than students without disabilities but have shorter commutes in ninth grade. Finally, consistent with earlier findings, kindergarten and sixth-grade students in charter schools travel significantly farther than students enrolled in traditional public schools (by 10.4 and 6.0 minutes, respectively, after regression adjustment). The pattern is reversed in ninth grade, where charter school students attend schools an average of 2.9 minutes *closer* to home.

**FIGURE 6**  
**Regression-Adjusted Differences in Mean Travel Time to School, Sixth Grade**



**Source:** Author’s calculations using 2013–14 data from the New York City Department of Education (N = 65,663).

**Notes:** ELL = English language learners; FRPL = free and reduced-price lunch; SWD = students with disabilities. Differences for Asian, Hispanic, and black students are relative to white students. Methods for calculating travel time by foot or by public transit are described in the appendix. Complete regression results are reported in appendix table A.3. Includes controls for students’ residential community school district.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

Generally speaking, students living in the Bronx, Brooklyn, Manhattan, and Queens CSDs had significantly shorter commutes to elementary and middle school than did otherwise similar students in Staten Island. This is unsurprising given greater population density, neighborhood walkability, and access to subways. In high school, these patterns reverse—at least for three boroughs—with the average trip length *longer* in Bronx, Brooklyn, and Queens CSDs than for similar students in Staten Island. (Trips in Manhattan remained shorter, on average.) This finding reflects the tendency for many ninth graders outside Staten Island to travel long distances to high school, often beyond their home borough. I examine this behavior more closely in section 4.

### Who Makes Long Trips to School?

The preceding analyses described the *average* student. I also examined characteristics of students who made unusually long trips to school, which I define as those with commutes above the 85th percentile for their grade level (a trip longer than 17.1 minutes for kindergarteners, 29.2 minutes for sixth graders,

and 49.6 minutes for ninth graders). Descriptive statistics for these students are shown in table 3, along with statistics for other students for comparison.

Several groups are overrepresented among those making long trips to school. These include black students (in all three grades), girls (in sixth and ninth grades), students not eligible for FRPL (all grades), Brooklyn residents (all grades), Queens residents (ninth grade only), and charter school students (kindergarten and sixth grade). Groups underrepresented among students making long trips to school include Hispanic students (all grades), Asian students (kindergarten and sixth grade), boys (ninth grade), Manhattan residents (all grades), and English language learners (all grades). Students making long commutes are also higher achieving, on average, than students not making unusually long trips. Students making long trips to school scored about one-fifth of a standard deviation higher on state tests in math and ELA.

TABLE 3

## Characteristics of Students Making Long Trips and All Other Students

	Kindergarten		Sixth Grade		Ninth Grade	
	Long trips	Others	Long trips	Others	Long trips	Others
N	11,181	63,436	9,853	55,864	11,310	64,171
Distance (miles)	2.03	0.30	3.20	0.72	5.81	2.17
In same borough	92.4%	100.0%	82.5%	98.7%	57.6%	90.7%
Transit distance	3.0	0.4	5.0	1.0	9.0	3.0
Transit time	28.8	7.0	41.6	13.1	61.1	26.0
Black	37.2%	22.5%	40.0%	25.7%	40.3%	28.2%
Hispanic	31.1	42.6	28.8	42.1	34.0	43.6
White	16.6	16.3	15.0	15.0	8.7	12.7
Asian	12.4	16.4	14.8	16.2	16.1	14.6
Female	49.3	49.3	52.0	50.1	51.2	46.9
Male	50.7	50.7	48.0	49.9	48.8	53.1
Not FRPL	32.7	26.0	38.5	29.8	26.6	23.0
FRPL	67.3	74.0	61.5	70.2	73.4	77.0
Brooklyn	37.0	30.7	37.9	30.2	33.5	31.6
Manhattan	8.8	13.4	5.1	12.4	3.5	11.8
Queens	24.7	28.6	26.8	28.8	37.5	25.8
Staten Island	8.6	5.1	9.4	5.7	3.5	7.1
Bronx	20.9	22.2	20.8	23.0	22.1	23.6
Noncharter	65.3	92.9	82.9	92.2	95.2	94.5
Charter	34.7	7.1	17.1	7.8	4.8	5.5
ELL	11.4	21.9	6.0	13.7	7.5	15.5
SWD	11.4	11.2	15.4	14.7	13.4	16.2
Foreign born	3.7	8.0	10.0	15.9	17.2	23.8
ELA z-score	-	-	0.267	0.067	0.275	0.018
Math z-score	-	-	0.258	0.057	0.259	0.029

Source: Author's calculations using 2013–14 data from the New York City Department of Education.

Notes: ELA = English language arts; ELL = English language learners; FRPL = free and reduced-price lunch; SWD = students with disabilities. "Long trips" are defined as those above the 85th percentile of travel time. The 85th percentile was 17.1 minutes for kindergarten, 29.2 minutes for sixth grade, and 49.6 minutes for ninth grade. Z-scores are measured in the prior year (fifth or eighth grade) and have a mean of 0 (based on the citywide average) and standard deviation of 1.

## Summary

My descriptive analysis of commuting time to school by public transportation finds notable differences across grade levels, student populations, residential boroughs, and neighborhoods. The average travel time increases from 10.3 minutes in kindergarten to 17.4 minutes in sixth grade to 31.3 minutes in ninth grade. Commuting times become more variable as children progress through school.

In every grade level, black students travel significantly farther to school than other racial or ethnic groups. The gap between black students and other racial or ethnic groups ranges from 1.8 to 3.3 minutes in kindergarten to 2.4 to 4.8 minutes in ninth grade. Girls travel farther than boys in sixth and ninth grade, as do comparatively higher-achieving students. Students enrolled in charter schools travel farther than do students attending traditional public schools in kindergarten and sixth grade, but

charter students in ninth grade attend school closer to home than do traditional high school students. Regression analysis suggests these group differences are not driven simply by residential segregation or the uneven distribution of students across CSDs.

One might ask whether two-to-five-minute differences are meaningful differences. There are several reasons to think so. First, these are travel times in one direction and thus apply to and from school. Second, these minutes accrue every school day and accumulate over time. An additional 2 to 5 minutes one way would translate into 12 to 15 hours of additional commuting time over a 180-day school year. Third, two-to-five-minute differences are large relative to the overall distribution of travel time. In kindergarten, sixth grade, and ninth grade, 1 standard deviation in the distribution of commuting time is 9.7, 13, and 14 minutes, respectively. Fourth, these travel times are best-case scenarios. Delays and service changes can significantly extend a commute. Trips that involve transfers and multiple lines are at even greater risk for delays.

Parents may be willing to send their child farther to school when there are few nearby schools, particularly few schools one might consider high quality. In the next section, I examine variability in access to school options via public transportation.

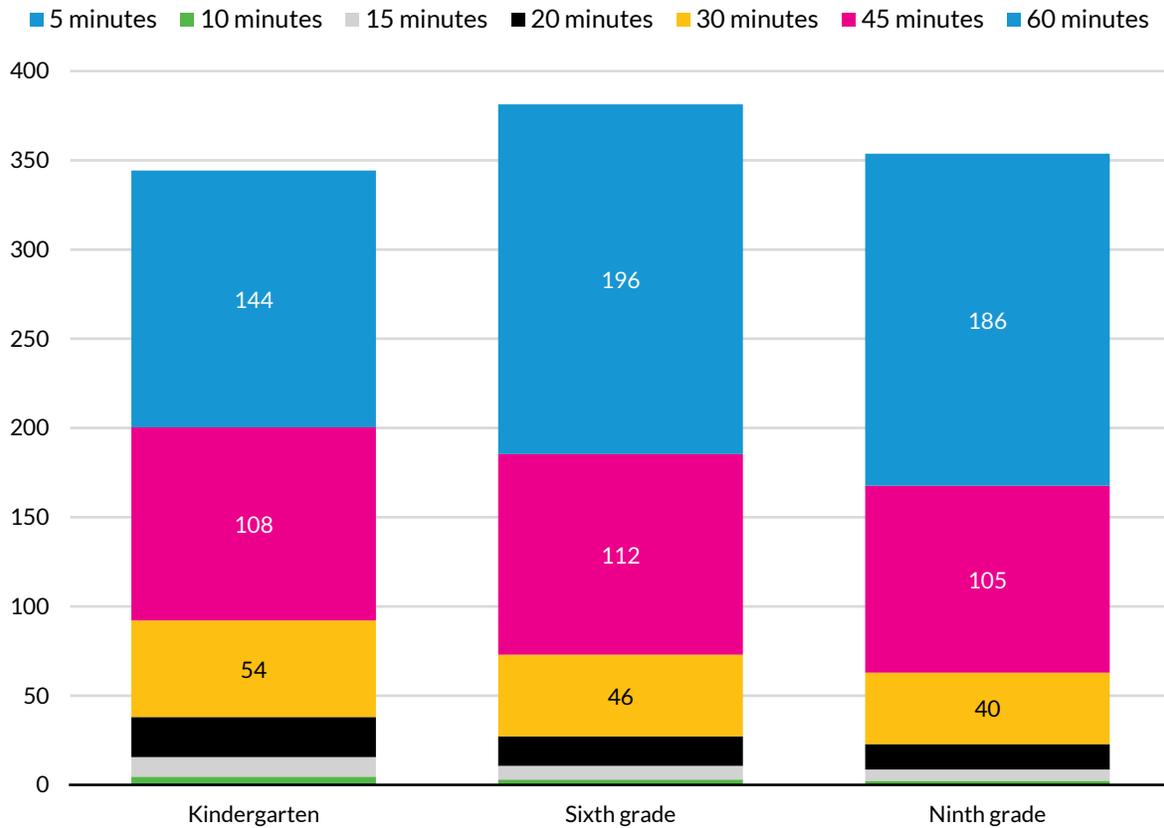
### 3. How Many Nearby School Options Are Available to New York City Students?

Section 2 showed considerable variability in travel time to school, both within and between grade levels. This variability is possible given the city's urban density, extensive public transit system, and the sheer number of school choices. In this section, I use geocoded student and school data to quantify for each student the number of schools within a given commute by public transportation that offer his or her grade. I average these by grade level (kindergarten, sixth grade, and ninth grade) and for the student subgroups investigated in section 2. These are raw *counts* of schools within a given commuting distance. I do not account for other constraints—such as academic selectivity or geographic priorities—that can affect students' access to these schools. I also initially ignore any differences in quality between schools.

A total of 907 NYC schools offered kindergarten in 2013–14, 591 offered sixth grade, and 521 offered ninth grade. These counts include charter schools but exclude special education and alternative schools. Figure 7 shows the cumulative count of schools accessible to the average kindergarten, sixth-grade, and ninth-grade student in 2013–14 via a 5-to-60-minute commute by public transportation. The average kindergartener could reach 23 elementary schools within 20 minutes by foot or by public

transit, 54 schools within 30 minutes, and 108 schools in 45 minutes. The average sixth- and ninth-grade student could reach 46 and 40 unique schools, respectively, within 30 minutes. Within 45 minutes, the typical sixth or ninth grader can reach 112 and 105 schools. Although it may be rare for sixth graders to venture this far, it is more common in high school (figure 1 and table 2.1).

**FIGURE 7**  
**Schools within x Minutes by Public Transportation, by Grade Level**



**Source:** Author’s calculations using 2013–14 data from the New York City Department of Education.

**Notes:** Methods for calculating travel time by foot or by public transit are described in the appendix. Calculations for kindergarten exclude schools in other boroughs and schools more than five miles from home. N = 74,070 for kindergarten; N = 66,204 for sixth grade; N = 79,343 for ninth grade.

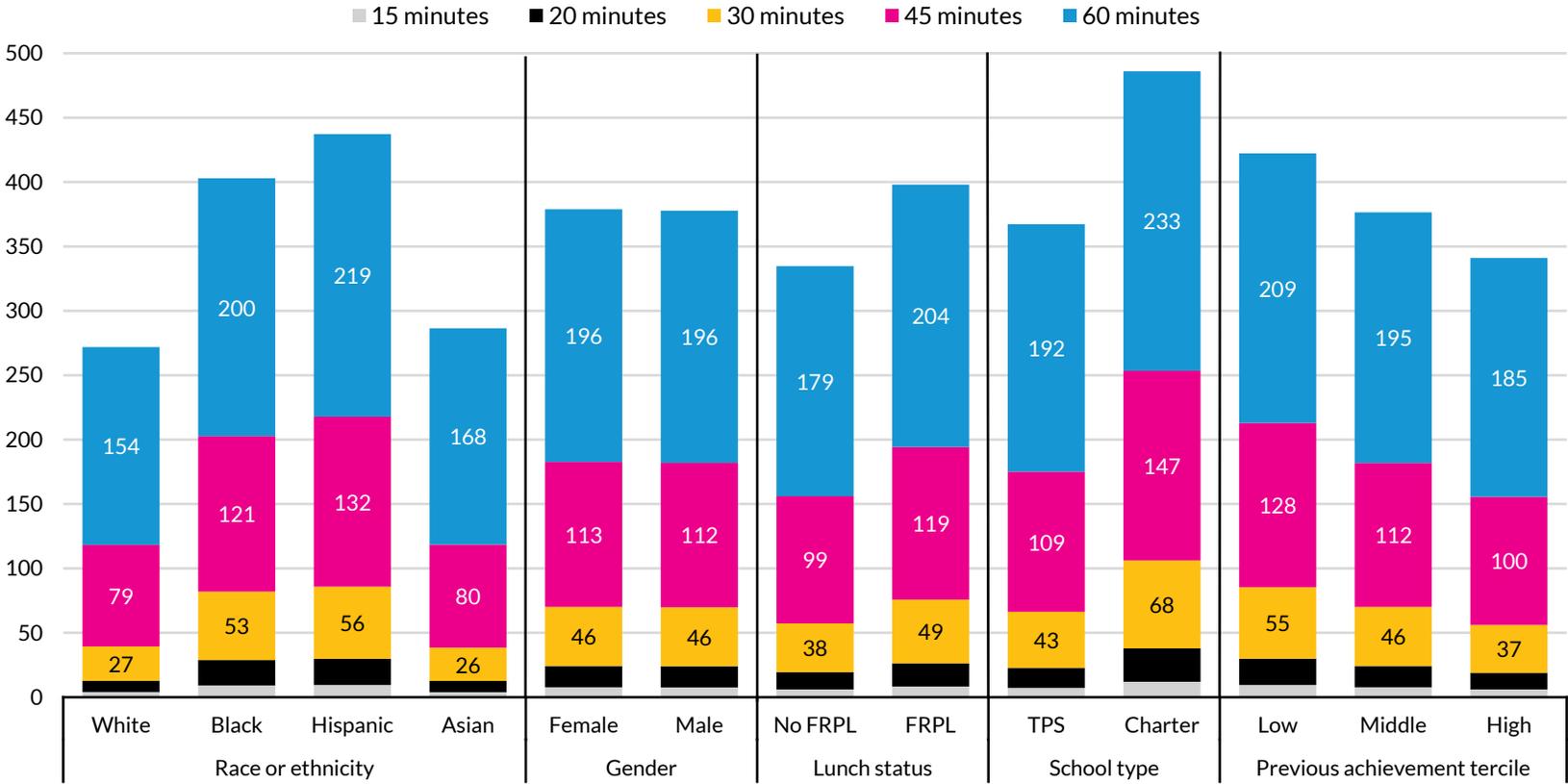
### How Does the Number of Nearby School Options Vary by Subgroup?

Figure 7 suggests the typical student has many school options within a reasonable commute by public transportation. But students are not uniformly distributed around the city, suggesting access to schools may vary by student background. Figures 8 and 9 show the cumulative counts of schools within 5 to 60 minutes for sixth- and ninth-grade students, by subgroup.

On average, black and Hispanic students at all grade levels have *more* proximate school options within each commuting threshold than white and Asian students. This is particularly true in the upper grades, where (for example) the average black and Hispanic student could reach 108 and 122 high schools within 45 minutes, respectively. This can be compared with an average of 73 and 76 high schools for white and Asian students. This finding likely reflects the concentration of black and Hispanic students in sections of the city—such as the Bronx and Manhattan—where small-high-school reforms have increased the number of schools available (see section 1).

As might be expected, there are no gender differences in the number of schools accessible within each commuting distance. (Unlike race or ethnicity, boys and girls are evenly distributed spatially.) Students eligible for FRPL, lower-achieving students, and students attending charter schools had more options accessible within each commuting distance than students not eligible for subsidized meals, higher-achieving students, and students attending traditional public schools. These patterns reflect the overrepresentation of these students in denser areas of the city with more accessible school options.

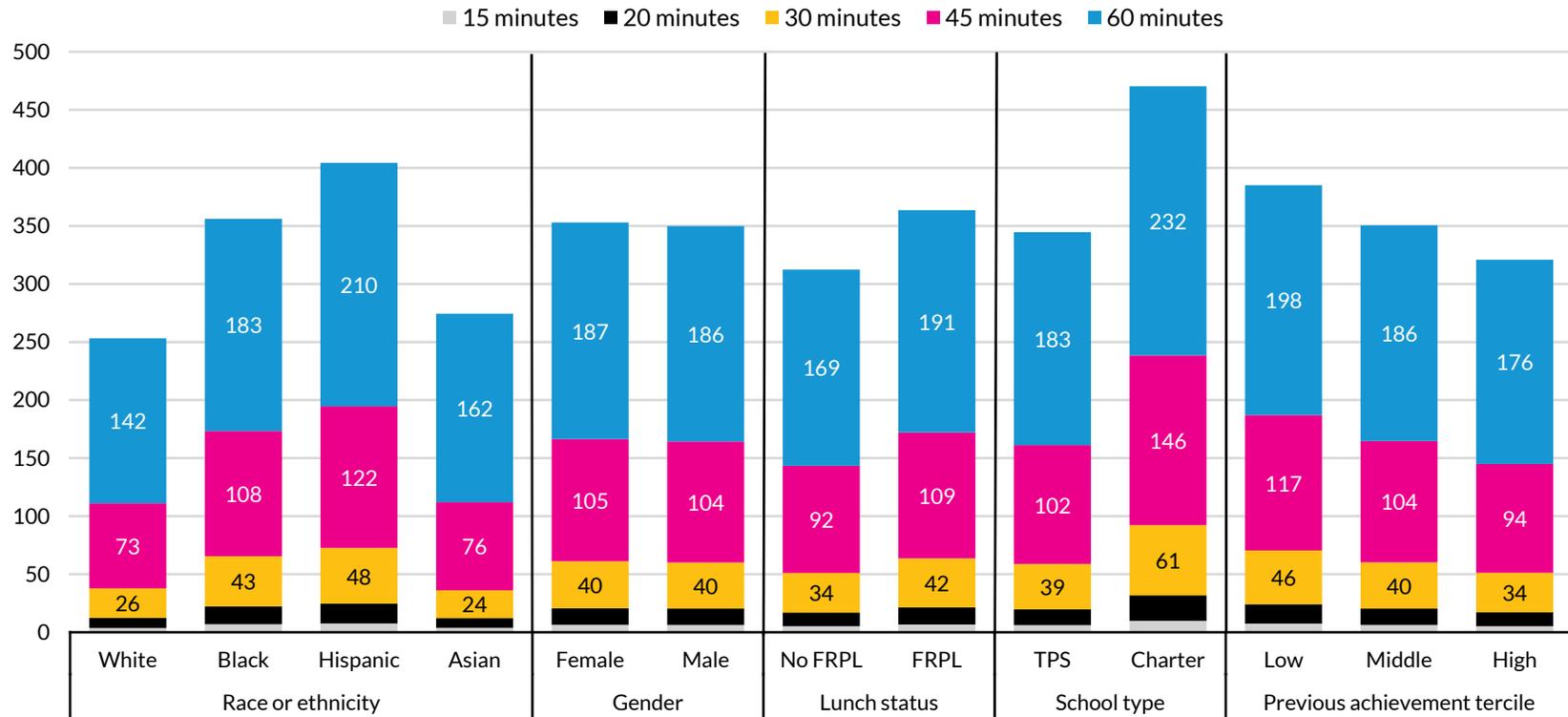
**FIGURE 8**  
**Schools within x Minutes by Public Transportation, by Subgroup, Sixth Grade**



**Source:** Author’s calculations using 2013–14 data from the New York City Department of Education.  
**Note:** FRPL = free and reduced-price lunch; TPS = traditional public school. Methods for calculating travel time by foot or by public transit are described in the appendix.

FIGURE 9

Schools within x Minutes by Public Transportation, by Subgroup, Ninth Grade



Source: Author's calculations using 2013-14 data from the New York City Department of Education.

Note: FRPL = free and reduced-price lunch; TPS = traditional public school. Methods for calculating travel time by foot or by public transit are described in the appendix.

## Do Students Attend Their Geographically Closest School?

The abundance of options within a reasonable commuting distance allows many students to attend a school that is not their geographically closest school. Table 4 reports the share of students by grade level and subgroup who attend their closest school. For these calculations, I used shortest *driving distance* rather than transit time, as this measure was more likely to identify the geographically closest school. Transit time is more sensitive to bus and subway schedules and the location of transit lines and stops.

Only 51 percent of kindergarten students, 37 percent of sixth graders, and 12 percent of ninth graders attended their geographically closest school in 2013–14 (table 4). Among racial and ethnic groups, black students were least likely to attend their closest school in all grade levels (40 percent among kindergarteners, 27 percent among sixth graders, and 9 percent among ninth graders). White students were most likely to attend their geographically closest school in sixth grade and ninth grade. Asian students were most likely to attend their closest school in kindergarten but were less likely to do so in ninth grade.

Consistent with my findings in section 2, girls were less likely than boys to attend their geographically closest school in sixth grade and ninth grade, and students in less dense boroughs such as Staten Island and Queens were more likely to attend their closest school. Only 6 percent of Manhattan ninth graders and 10 percent in the Bronx attended their closest school. In sixth grade, higher-achieving students were more likely to attend their closest school—perhaps reflecting their overrepresentation in less dense sections of the city—while in ninth grade, the propensity to attend one’s closest school did not vary strongly with prior achievement.

TABLE 4

## Share of Students Attending Their Geographically Closest School, by Grade and Subgroup

	Kindergarten	Sixth Grade	Ninth Grade
All students	50.9	37.2	12.4
<b>Race or ethnicity</b>			
Black	40.4	26.9	9.1
Hispanic	50.7	35.2	11.1
White	58.4	52.6	22.3
Asian	60.1	48.4	14.8
<b>Gender</b>			
Female	50.9	36.9	11.5
Male	50.9	37.6	13.3
<b>FRPL status</b>			
Not FRPL	52.6	39.1	15.1
FRPL	50.3	36.5	11.6
<b>Borough</b>			
Brooklyn	47.8	30.8	11.2
Manhattan	41.2	20.3	6.2
Queens	58.7	49.3	14.9
Staten Island	61.0	77.9	27.7
Bronx	47.8	31.7	9.8
<b>Charter status</b>			
Noncharter	55.9	39.9	12.7
Charter	10.5	13.1	8.0
<b>By prior achievement tercile</b>			
Low	--	34.5	11.5
Middle	--	37.3	13.0
High	--	38.5	11.4

Source: Author's calculations using 2013–14 data from the New York City Department of Education.

Notes: FRPL = free and reduced-price lunch. Methods for calculating travel time by foot or by public transit are described in the appendix.  $N = 70,092$  for kindergarten;  $N = 53,461$  for sixth grade;  $N = 75,401$  for ninth grade.

## Do Students Enroll in Their Zoned Neighborhood School?

The geographically closest school might not be a student's *zoned* school, if he or she has one. Most elementary school students are assigned a zoned school. Some middle school students have a zoned school, and most high school students do *not* have a zoned school. In elementary and middle school, Districts 1, 7, and 23 all have open enrollment without zoned schools.

I mapped kindergarten students in my analytic sample to their elementary zone boundaries in 2013–14 to determine the share who attended their *zoned* school (table 5). Overall, 65 percent of kindergarten students attended their zoned school. This is higher than the share who attended their *geographically* closest school (table 4), which indicates the latter is not always a useful proxy for one's zoned school. It is notable, however, that 35 percent of kindergarteners did *not* attend their zoned school: 10 percent attended a charter, 5 percent lived in an open-choice district or had multiple zone

assignments, 15 percent attended a different school in the same district (in a district that did not have open choice), and 6 percent attended a school outside of their district.<sup>14</sup>

Table 5 also reports rates of kindergarten zoned school attendance by subgroup. Black students (47 percent) and residents of Manhattan (54 percent) and Brooklyn (58 percent) were least likely to be enrolled in their neighborhood zoned school and were most likely to be enrolled in a charter school. Kindergarten residents of the Bronx, Brooklyn, and Manhattan were among the most likely to be enrolled in a school that was part of a districtwide choice program (Districts 1, 7, and 23); Queens and Staten Island do not offer such programs.

**TABLE 5**  
**Share of Kindergarteners Enrolled in Their Zoned or Other School, 2013–14**

	In KG zone	Charter school	Choice district or multiple	Same district	Other district	N
All students	64.6	10.0	4.7	15.1	5.6	75,793
<b>Race or ethnicity</b>						
Black	47.3	22.9	7.7	14.7	7.4	18,732
Hispanic	66.4	8.1	5.6	14.4	5.4	30,996
White	74.4	3.5	1.2	16.5	4.4	12,400
Asian	77.1	1.7	1.2	16.3	3.7	11,886
<b>Gender</b>						
Female	64.4	10.1	4.7	15.2	5.6	37,351
Male	64.8	9.9	4.7	15.1	5.5	38,442
<b>FRPL status</b>						
Not FRPL	66.5	8.1	2.0	17.3	6.2	20,551
FRPL	63.9	10.8	5.7	14.4	5.3	55,242
<b>Borough</b>						
Brooklyn	58.0	14.0	4.9	15.6	7.6	23,894
Manhattan	54.0	15.7	7.8	17.2	5.3	9,612
Queens	76.9	3.9	0.0	14.9	4.4	21,264
Staten Island	80.0	1.3	0.0	18.0	0.7	4,273
Bronx	60.7	11.2	9.7	13.0	5.5	16,750

**Source:** Author's calculations using 2013–14 data from the New York City Department of Education.

**Notes:** FRPL = free and reduced-price lunch; KG = kindergarten. Methods for calculating travel time by foot or by public transit are described in the appendix.

## How Far Is the Commute to the Nearest High-Quality School?

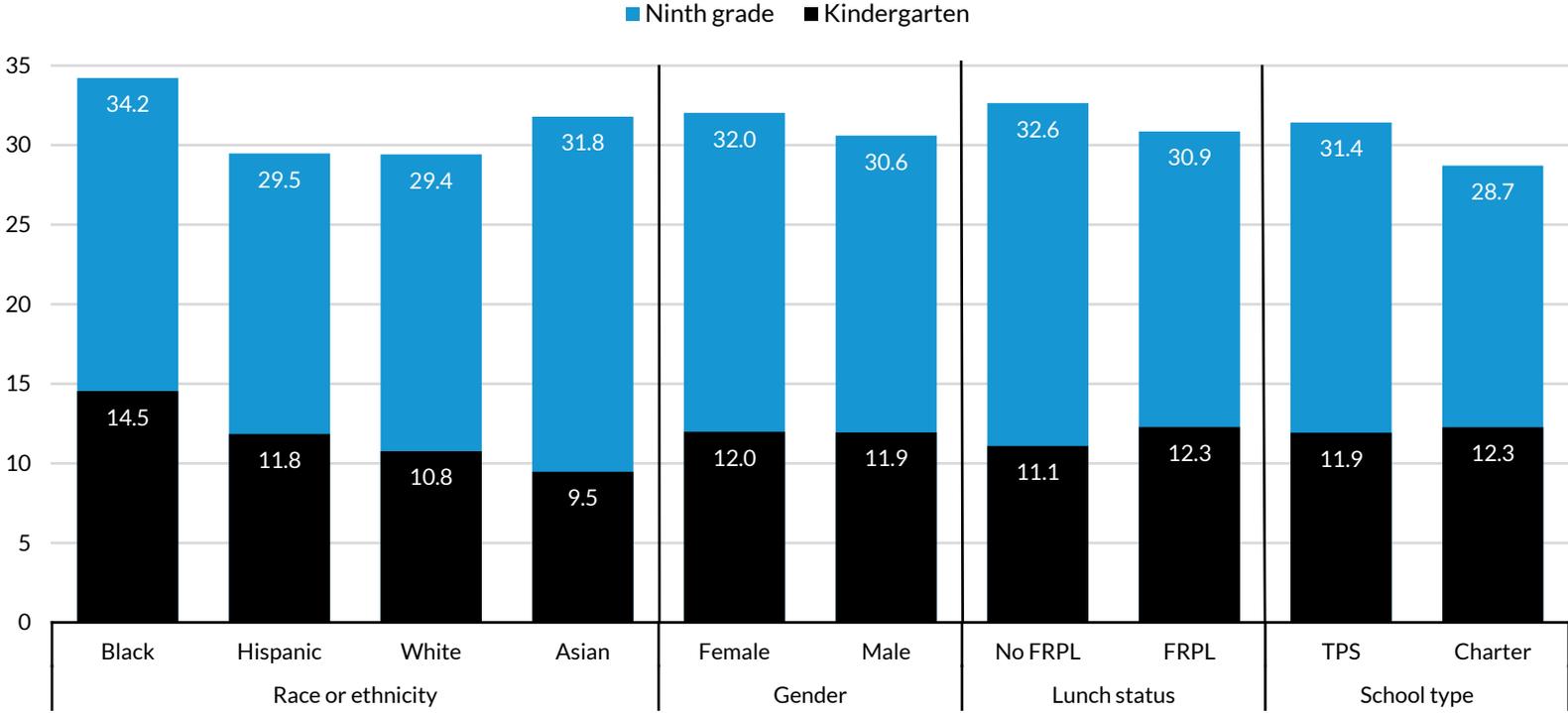
Figures 8 and 9 showed that traditionally less advantaged populations (e.g., black, Hispanic, and low-income students) have *more* proximate school options via public transportation than do more advantaged groups. Not all proximate schools are high-quality options, however. Lack of access to high-performing schools nearby may be one force behind some students' propensity to travel to a school that is not their geographically closest or zoned school.

Using data on students and schools in 2013–14, I calculated the average time it would take each student in the sample to travel to their nearest high-quality school. I defined “high-quality” schools as those within the top quartile of performance citywide according to their levels of and growth in achievement in math and ELA (for kindergarten and sixth grade) or their graduation rate (for ninth grade).<sup>15</sup> The results are reported by student subgroup in figure 10. For brevity, I show the results only for kindergarten and ninth grade.

Notably, black students had the longest travel time to the nearest high-quality school in all grade levels. In kindergarten, the average black student would need to travel 14.5 minutes on foot or by public transportation to reach the nearest school in the top quartile of performance. This exceeds the average for Hispanic students (11.8 minutes), white students (10.8 minutes), and Asian students (9.5 minutes) by 2 to 5 minutes each way. Similarly, black ninth graders would need to travel 34.2 minutes to reach a high school in the top quartile of my quality measure, compared with 29.4 minutes for white students and 31.8 minutes for Asian students.

Kindergarten students eligible for subsidized meals have longer travel times to the nearest high-quality school than kindergarteners from higher-income families. Interestingly, in ninth grade, higher-achieving students are farther from the nearest high-quality school than are lower-achieving students (not shown), which may reflect their uneven spatial distribution around the city. In sixth grade, there is no strong relationship between student test performance and travel time to the nearest high-quality school.

**FIGURE 10**  
**Minutes of Travel Time to the Nearest High-Quality School, Kindergarten and Ninth Grade**



**Source:** Author’s calculations using 2013–14 data from the New York City Department of Education.  
**Notes:** FRPL = free and reduced-price lunch; TPS = traditional public school. Methods for calculating travel time by foot or by public transit are described in the appendix.

## Summary

New York City’s urban density and extensive public transit system put many schools within reach of most students. In 2013–14, the typical kindergarten and sixth-grade student could access 23 and 17 schools, respectively, within 20 minutes by foot or public transportation. The typical ninth grader could access 14 schools within 20 minutes and 105 schools within 45 minutes. These counts are as large as or larger than the *total* number of high schools operating in many US school districts.

Traditionally disadvantaged populations—black and Hispanic and low-income students, for example—have *more* school options within a nearby commuting distance than traditionally less disadvantaged groups. Despite having *more* choices, however, black students must travel farther than all other groups to reach a school ranked among the top quartile citywide. This may explain why black students are least likely to attend their geographically closest school, are least likely to attend their kindergarten zoned school, and are the racial or ethnic group with the highest average travel time to school. This analysis likely understates the scarcity of high-quality schools in some areas because I focused on the *closest* high-quality school rather than the number of such options, or the number of high-quality schools accessible to all students (e.g., that are not academically screened).

There are obvious limitations to the school quality measures I used. Graduation rates, test scores, and growth percentiles are not the only (or the best) indicators of quality, and families choose schools for reasons beyond student achievement. I chose these dimensions of quality for illustrative purposes. Although my findings may differ somewhat using other measures, I suspect the broader patterns hold.

In the next section, I turn to middle school students’ high school *choices* to understand whether the differences I observe in ninth-grade commutes are reflected in their preferences or are an unintended outcome of the high school matching process.

## 4. How Far Are New York City High School Students Willing to Commute to School?

Commuting time to school depends on supply and demand. On the supply side, where families live, where schools are located, and accessibility to public transportation shape the feasible choice set for families. Section 3 showed that the typical NYC student in 2013–14 had many school options within a reasonable commuting distance, and the city’s policy of providing subsidized MetroCards put many of

these schools within reach.<sup>16</sup> On the demand side, families vary in their willingness and ability to send their child on a long trip to school.

I used high school application data from the 2014–15 admissions cycle to examine how far rising ninth graders *preferred* to travel to school and the relationship between students' preferences and actual travel time to school. The data include up to 12 ranked high school choices for each applicant and the identity of their matched school. I used census block locations and the same procedures from earlier sections to calculate travel time by foot or by public transportation to each of the student's ranked choices and from home to their matched school. This analysis can offer additional insight into *why* some groups travel farther than others. Specifically, it shows how well travel times reflect differences in students' preferences versus differences in their ultimate match.

Figure 11 shows how travel times to school vary across student choices. The average commute time from home to a high school choice was 39.4 minutes, and the median was 36.2 minutes. Commuting time to choices varied significantly, with a standard deviation of 19.4 minutes and a 26-minute difference between the first quartile (24 minutes) and third quartile (50 minutes). The long right tail shows that some students were willing to travel more than 80 minutes to school. (Alternatively, they may have been poorly informed about how far away these choices were.)

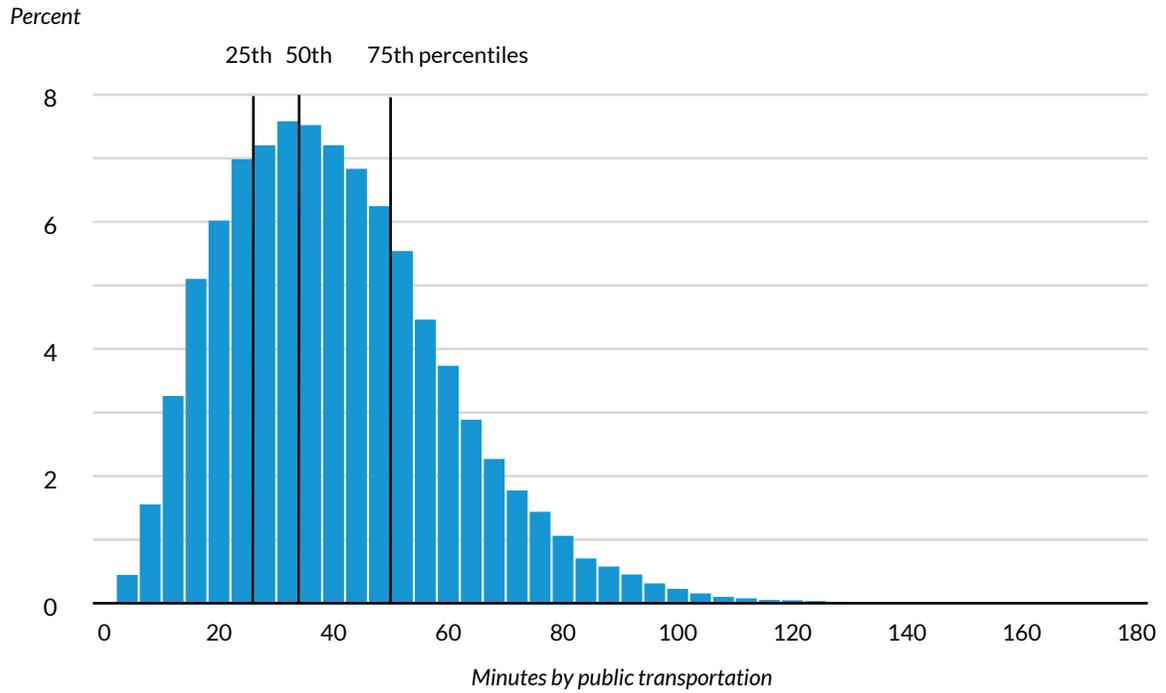
## Do Students Prefer Schools Closer to Home?

Students' first-choice schools were typically *closer* to home than their less preferred choices (figure 12 and table 6). On average, students' first-choice schools were 35.5 minutes from home, compared with 37.7 minutes for their third choices and 38.9 minutes for their fifth choices. The average travel time to students' top three choices was 36.0 minutes, and the average time to all schools appearing on students' applications was 36.4 minutes.<sup>17</sup>

Many of the group differences in commuting time to ninth graders' *enrolled* schools (figures 2 to 4) are evident in their initial choices (table 11). For instance, black students applied to schools that were 6.0 to 8.3 minutes farther from home than schools appearing on other students' applications. This was true for all choices 1 through 12 (figure 13). Similarly, girls applied to schools that were farther from home than did boys, by 1.4 to 1.9 minutes, and students scoring in the top third on state tests applied to schools that were farther from home than lower-scoring students. Students eligible for FRPL, English language learners, and special education students all tended to apply to schools closer to home.

FIGURE 11

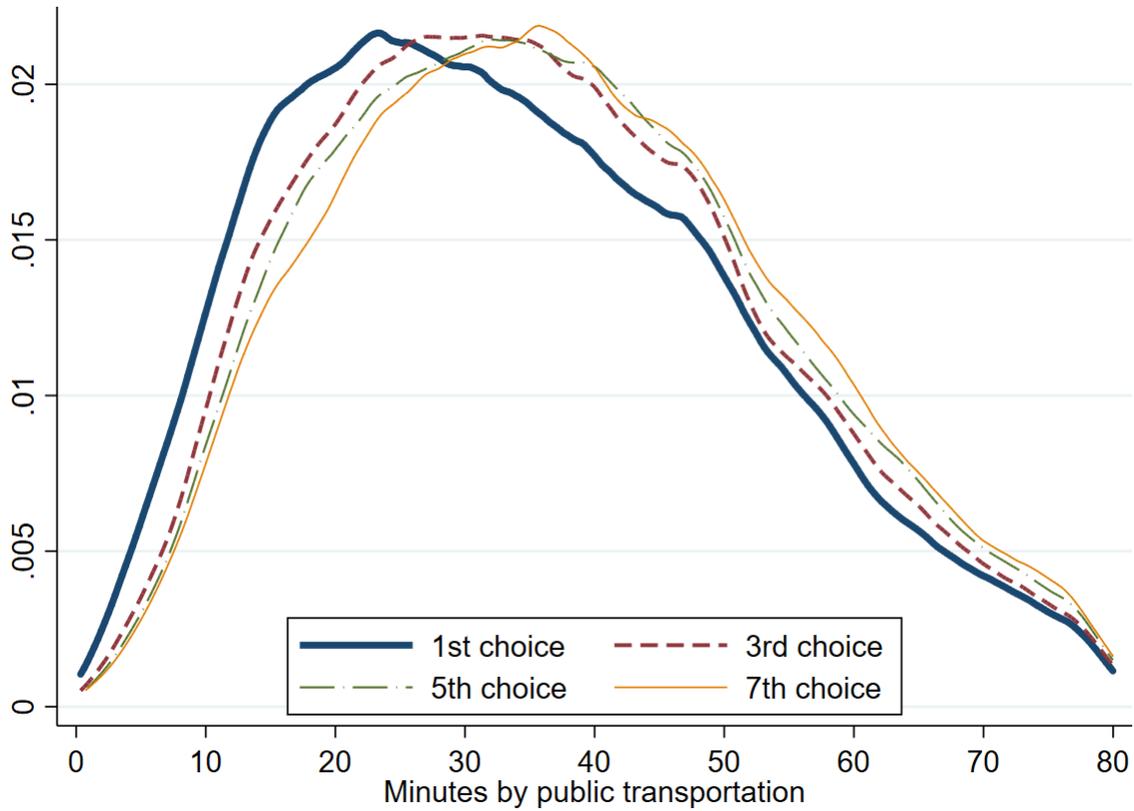
Distribution of Travel Time from Home to High School Choices, 2014–15



Source: Author’s calculations using 2014–15 high school application data from the New York City Department of Education.  
Notes: N = 459,584 student-choice combinations from 66,873 student applicants. Methods for calculating travel time by foot or by public transit are described in the appendix.

FIGURE 12

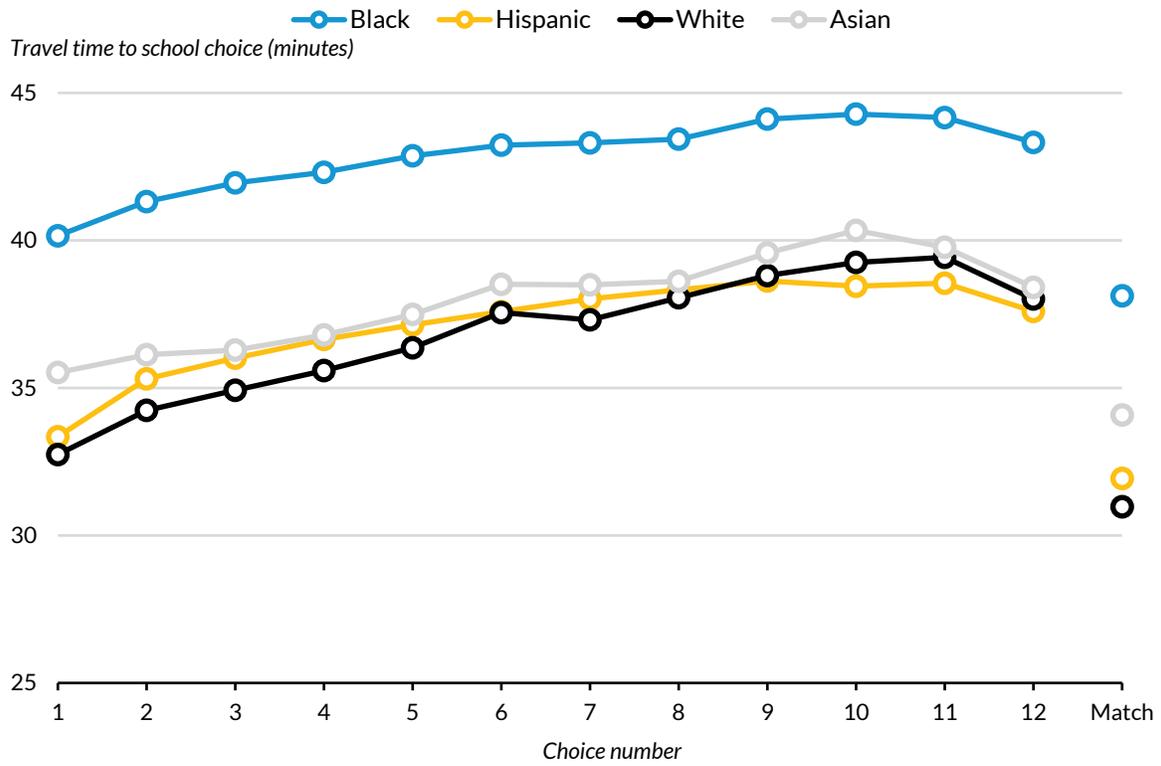
Distribution of Travel Time from Home to First, Third, Fifth, and Seventh High School Choices, 2014–15



**Source:** Author's calculations using 2014–15 high school application data from the New York City Department of Education.  
**Notes:**  $N = 459,584$  student-choice combinations from 66,873 student applicants. Methods for calculating travel time by foot or by public transit are described in the appendix. Includes 64,727 first choices, 57,259 third choices, 47,558 fifth choices, and 33,782 seventh choices. For visual clarity, trips longer than 80 minutes are excluded (fewer than 3 percent of all trips).

FIGURE 13

Commuting Time to High School Choices and Matched School, by Race or Ethnicity, 2014–15



**Source:** Author’s calculations using 2014–15 high school application data from the New York City Department of Education.  
**Notes:** N = 459,584 student-choice combinations from 66,873 student applicants. Methods for calculating travel time by foot or by public transit are described in the appendix.

TABLE 6

**Mean Commuting Time to First-Choice High School, Top Three Choices, and All Choices**

	<b>First choice</b>	<b>Top three choices</b>	<b>All choices</b>	<b>N</b>
All students	35.5	36.0	36.4	66,433
<b>Race or ethnicity</b>				
Black	40.2	40.7	41.2	18,341
Hispanic	33.3	34.2	34.7	27,102
White	32.7	32.9	32.9	9,596
Asian	35.5	35.3	35.2	10,612
<b>Gender</b>				
Female	36.5	36.8	37.1	32,788
Male	34.6	35.2	35.7	33,645
<b>FRPL status</b>				
Not FRPL	37.7	38.1	38.3	3,807
FRPL	35.4	35.9	36.3	62,626
<b>Borough</b>				
Brooklyn	35.7	36.1	36.4	19,418
Manhattan	27.2	28.1	28.7	7,049
Queens	39.1	39.6	39.9	19,694
Staten Island	34.9	35.0	34.8	4,364
Bronx	34.7	35.3	35.9	15,907
<b>Achievement tercile</b>				
Low	33.9	34.6	35.3	21,302
Middle	35.3	36.0	36.5	21,750
High	37.4	37.5	37.4	21,814
<b>Other characteristics</b>				
Immigrant	33.9	34.5	34.9	11,360
ELL	29.4	30.3	31.1	7,244
Special education	33.0	33.6	34.3	12,417
General education	36.1	36.6	36.9	54,016

**Source:** Author's calculations using 2014–15 high school application data from the New York City Department of Education.

**Notes:** ELL = English language learner; FRPL = free and reduced-price lunch. N = 459,584 student-choice combinations from 66,873 student applicants. Methods for calculating travel time by foot or by public transit are described in the appendix.

## How Do Preferred Commutes Compare with Actual Trips to School?

Not all applicants receive their top choice. Just over half of all students in 2014–15 were assigned to the school they ranked first on their application (table 7). (I included students admitted to a specialized high school among those receiving their first choice, even if they did not receive their first-choice nonspecialized school.) Success in matching to one's top choice varied considerably by residential borough, tercile of achievement, and other background characteristics. For example, 57 percent of students in the top achievement tercile received their first choice (including admission to a specialized school) while only 48 percent of those in the middle tercile and 54 percent in the bottom tercile received their top choice.

White and Asian students typically matched to their first choice at a higher rate (65 percent and 55 percent, respectively) than black and Hispanic students (50 percent and 51 percent). Residents of Staten Island were most likely to receive their first choice (76 percent), while Queens (48 percent) and Bronx residents (52 percent) were least likely. English language learners (55 percent) and special education students (59 percent) received their first-choice school at a higher rate than their non-ELL and general education counterparts. These differences reflect many factors, including space constraints, the selectivity of students' choices, geographic priorities, and competitiveness for screened programs.

Students' first-choice schools tended to be closer to home than their lesser-ranked choices (figure 12), but students were more likely to *match* to schools when they were closer to home. This is in part because high schools often give admissions priority to students who live in the same borough or district. This explains why mean travel times to students' *matched* schools are lower than the mean travel time to their first, second, third, and other choices (see tables 6 and 7 and the rightmost point in figure 12).

The average difference in travel time to a student's match and first-choice school are shown in the third column of table 7 for students who did not receive their first choice. On average, students not matched to their first choice were assigned a school 4 minutes *closer* to home than their first choice. The differential varied by subgroup, with unmatched white, Asian, and non-FRPL students reverting to closer matched schools (by 6 minutes) than black students (by 4 minutes), Hispanic students (by 3 minutes), and FRPL students (by 4 minutes). Similarly, higher-achieving students who did not get their first choice matched to comparatively closer schools (by 5.3 minutes) than did lower-achieving students who did not get their first choice (by 2.6 minutes).

Taken together, many of the gaps I observed in ninth-grade commuting times in section 2 appeared in students' initial choices. Black students, girls, and high-achieving students all applied to schools that were farther from home than did their nonblack, male, and low-achieving counterparts. Subgroups differed in their propensity to receive their first choice—and the gaps between their first choice and ultimate commute time differed as well—but differences in commuting time to their matched school remained.<sup>18</sup>

TABLE 7

**Mean Commuting Time to Matched School, Share Receiving First Choice, and Difference in Travel Time between First Choice and Matched School If Not Identical**

	Time to match (minutes)	Share receiving first choice	Difference between match and first choice (minutes)
All students	33.9	53.2%	-4.0
<b>Race or ethnicity</b>			
Black	38.1	49.5%	-3.8
Hispanic	31.9	50.9%	-2.8
White	31.0	65.1%	-6.8
Asian	34.1	54.8%	-6.0
<b>Gender</b>			
Female	34.6	52.6%	-4.5
Male	33.2	53.8%	-3.5
<b>FRPL status</b>			
Not FRPL	35.9	60.9%	-6.4
FRPL	33.8	52.8%	-3.9
<b>Borough</b>			
Brooklyn	33.8	54.4%	-4.2
Manhattan	27.6	53.7%	-0.5
Queens	37.1	48.2%	-5.5
Staten Island	32.8	75.8%	-8.5
Bronx	33.2	51.9%	-2.6
<b>Achievement tercile</b>			
Low	32.7	53.6%	-2.6
Middle	33.1	47.9%	-4.1
High	36.1	57.3%	-5.3
Immigrant	32.5	51.5%	-3.5
ELL	28.6	55.1%	-1.7
Special education	31.8	58.8%	-2.6

Source: Author's calculations using 2014–15 high school application data from the New York City Department of Education.

Notes: N = 459,584 student-choice combinations. Methods for calculating travel time by foot or by public transit are described in the appendix. Only students participating in the first round of the high school application process who were ultimately matched to a school are included. Students admitted to a specialized high school or the LaGuardia Performing Arts School are included among those who received their first choice.

TABLE 8

## Applications to High Schools by Borough of Residence and Location of High School

	Borough of High School Choices						Applied out of borough but attends MS there
	Brooklyn	Manhattan	Queens	Staten Island	Bronx	All	
<b>Borough of residence</b>							
Brooklyn	104,232 78.6%	22,360 16.9%	5,397 4.1%	186 0.10%	499 0.4%	132,674 100.0%	3,732 2.8%
Manhattan	702 1.3%	50,223 93.6%	1,039 1.9%	18 0.03%	1,678 3.1%	53,660 100.0%	776 1.4%
Queens	4,012 3.0%	14,554 10.9%	115,249 85.9%	43 0.03%	291 0.2%	134,149 100.0%	2,453 1.8%
Staten Island	494 2.8%	790 4.4%	73 0.4%	16,558 92.30%	34 0.2%	17,949 100.0%	568 3.2%
Bronx	1,302 1.1%	40,612 32.6%	1,299 1.0%	48 0.04%	81,200 65.2%	124,461 100.0%	8,446 6.8%
All	110,742 23.9%	128,539 28.8%	123,057 26.6%	16,853 3.60%	83,702 18.1%	462,893 100.0%	15,945 3.4%

**Source:** Author's calculations using 2014–15 high school application data from the New York City Department of Education.

**Notes:** MS = middle school. N = 462,902 student-choice combinations. Methods for calculating travel time by foot or by public transit are described in the appendix.

## How Often Do Students Apply to Schools outside Their Borough?

In addition to commuting time, I examined rising ninth graders' willingness to apply to high schools outside their residential borough, which can entail a longer commute. Table 8 shows the share of high school choices from each residential borough that were located in each of the five boroughs. (The top number in each cell is the count, while the bottom number is the percentage.) Seventy-nine percent of Brooklyn students' choices were high schools in Brooklyn, 17 percent were high schools in Manhattan, and 4 percent were high schools in Queens. The remainder were in the Bronx and Staten Island.

In all five boroughs, most high school choices were schools in the same borough. The share of same-borough choices ranged from 65 percent in the Bronx to 94 percent in Manhattan. The most common destination for students applying out of borough was Manhattan, representing 17 percent of Brooklyn student choices, 11 percent of Queens student choices, and 33 percent of Bronx student choices. The popularity of Manhattan high schools may be driven by a perception of school quality or safety, proximity to employment opportunities, or accessibility via subway. Interestingly, Manhattan residents do not appear to make “reverse commutes” to high schools outside Manhattan, despite similar accessibility by subway in the other direction. Fewer than 6 percent of Manhattan student choices were in the outer boroughs (table 8).

Students' willingness to commute to high schools in other boroughs likely contributes to longer commutes among certain subgroups. Notably, these students may also be disadvantaged in the admissions process when applying to schools that give priority to in-borough students. I examined whether students who applied to out-of-borough schools attended middle school in that borough because those students are given similar priority. Only 20 percent of student choices in other boroughs were from students who attended middle school in the destination borough (table 8 final column). This implies that 4 in 5 applicants to schools outside their borough do not have geographic priority at those schools.

## Summary

This section delved deeper into group-level differences in commuting time to school by examining rising ninth graders' ranked preferences on their high school applications. Students typically showed a preference for proximity, as their top-ranked choices were, on average, closer to home than their less preferred choices. Students were also more likely to *match* to schools when they were closer to home. As a result, average commute times to *matched* schools were lower than average commute times to students' ranked choices.

Although more than half of all high school applicants received their first choice, match rates varied by student background and residential location, which influenced their ultimate commuting times. Students who did not match to their top-ranked choice matched to a school that was *closer* to home, on average, than their first choice. Despite differences across subgroups in match rates, many group-level differences in travel times observed in section 2 were evident in students' initial applications. At a minimum, this suggests that differences in travel time to high school are not unintended consequences of a matching process that forces some students to travel farther than they preferred to.<sup>19</sup>

In the next and final section, I explore one implication of school choice and the widespread availability of school options in New York City: the dispersion of students from the same feeder schools and neighborhoods across schools.

## 5. School Choice and the Diffusion of Students across Schools

Urban density, extensive school choice, and subsidized public transportation create many opportunities for NYC families to seek out the best school for their child. The typical family is within reach of a dozen

or more schools within a short commute by public transportation. High school students can apply to schools throughout the city and frequently apply to schools outside their own borough. Charter schools are also increasingly available at all grade levels.

By design, school choice facilitates access to school options. Families can apply to schools they believe are higher quality, safer, or a better fit for their child. Choice may have other consequences, however, including longer commutes, segregation, and a diffusion of students from the same neighborhoods and feeder cohorts across schools.

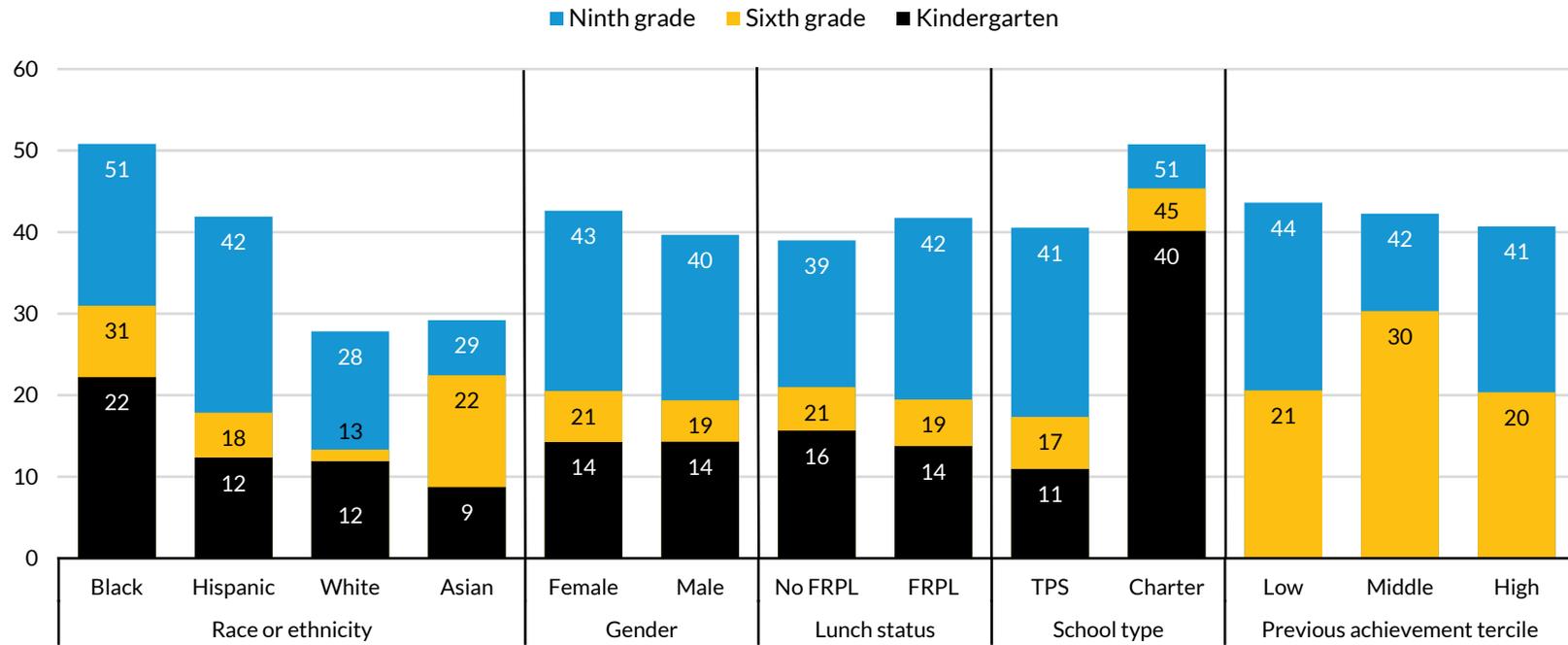
In this section, I measure how much NYC students are “diffused” across schools. Specifically, I calculate the share of students at each grade level who are the *only* student at their school from their neighborhood (defined by residential census tracts) or the *only* student who attended the same school in the prior year. NYC students typically transition from elementary to middle school in sixth grade and from middle to high school in ninth grade. These are pivotal moments in which students may or may not continue to attend school with their former peers.

I do not address whether diffusion of students from the same neighborhoods and feeder schools is positive or negative. One could hypothesize both types of effects, but I defer this question to future research. Rather, I present these findings as a previously undocumented feature of school choice. As students travel farther to schools beyond their neighborhood, they become increasingly less likely to encounter students from their own community and previous cohort. Moreover, this diffusion varies by subgroup.

Figure 14 shows the share of kindergarten, sixth-grade, and ninth-grade students who in 2013–14 were the only student in their school and grade from their neighborhood. In kindergarten, only 14 percent of students were “singletons” in this regard. This share increases to 20 percent in sixth grade and 41 percent in ninth grade.<sup>20</sup> In all grade levels, black students were least likely to attend school with peers from their neighborhood: 22 percent of kindergarteners, 31 percent of sixth graders, and 51 percent of ninth graders were singletons. In kindergarten, girls and boys were equally likely to be singletons, while in sixth grade and ninth grade, girls were more likely than boys to be singletons. In sixth grade, middle-achieving students were more likely to be singletons, while in ninth grade, lower-achieving students were most likely. Unsurprisingly, charter school students are less likely to attend schools with others from their home census tract than are students in traditional public schools.

FIGURE 14

Share of Students Who Are the Only Student from Their Residential Census Tract in Their Grade and School



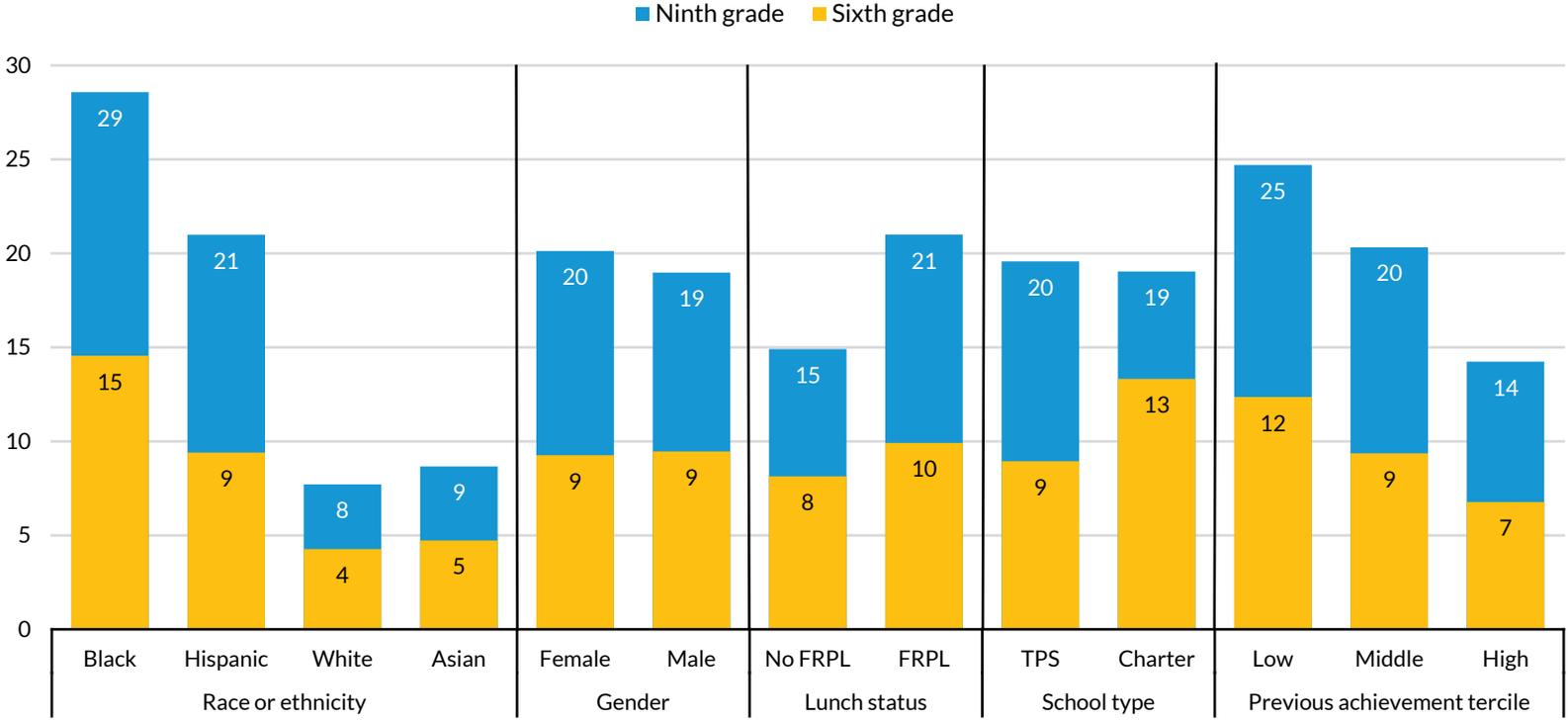
Source: Author's calculations using 2013-14 data from the New York City Department of Education.

Note: FRPL = free and reduced-price lunch; TPS = traditional public school.

Residential census tracts cover small areas in NYC and may not be the best definition of a neighborhood or may not reflect the communities students encounter most often. In figure 15, I show the share of sixth- and ninth-grade students who in 2013–14 were the only student in their school and grade who attended their *school* in the prior year. For all students, this was 9.4 percent in sixth grade and 19.5 percent in ninth grade. These are half the size of the neighborhood-based measure but still reflect substantial diffusion, with nearly 1 in 10 sixth graders and 1 in 5 ninth graders attending a school where they were the only student in their grade and school who attended their prior (elementary or middle) school.

Differences again emerge by student subgroup. Fifteen percent of black sixth graders and 29 percent of black ninth graders attended a school where they were the only student from their prior school. In comparison, only 4 to 5 percent of white and Asian sixth graders and 8 to 9 percent of white and Asian ninth graders were singletons. Similarly, lower-achieving sixth- and ninth-grade students were substantially more likely to attend schools where they were the only student from their prior school. Of ninth graders in the bottom tercile of achievement, 25 percent were enrolled in a school where they were the only student in their cohort from their prior school. Only 14 percent of top-tercile students were singletons at their school.

**FIGURE 15**  
**Share of Sixth and Ninth Graders Who Are the Only Student in Their Cohort from Their Previous School**



**Source:** Author's calculations using 2013-14 data from the New York City Department of Education.  
**Note:** FRPL = free and reduced-price lunch; TPS = traditional public school.

To be sure, factors other than school choice and enrollment decisions contribute to the diffusion of students described in this section. Disadvantaged students have higher residential and school mobility rates than more advantaged students, which would reduce the likelihood these students encounter the same peers in subsequent years (Schwartz, Stiefel, and Cordes 2017). Mobility would be less likely to explain my results based on current residential tract, however (figure 14).

This descriptive evidence on diffusion is broadly consistent with my findings in sections 2 through 4. For example, black students travel significantly farther to school, on average, than students from other racial or ethnic backgrounds and in kindergarten are least likely to attend their neighborhood zoned school. Perhaps as a consequence, they are most likely to attend schools where they are the only student from their neighborhood or previous school.<sup>21</sup> In the same way, students enrolled in charter schools in kindergarten and sixth grade travel farther to school and are more likely to be singletons in their school.

One pattern of results that differs with earlier findings are those by achievement tercile. On one hand, like black and charter school students, higher-achieving sixth and ninth graders travel farther to school than their peers who scored lower on state tests. But unlike black and charter school students, they are least likely to be separated from students who attended the same school in the prior year. This may be attributable to their spatial distribution across the city and academic screening that occurs in middle and high school. High-achieving students may travel farther to attend an academically selective middle school, and these same students continue to travel farther to an academically selective high school. If higher-achieving students are more likely to attend the same schools together, this would explain their lower levels of diffusion. I will address this question further in future research.

## Summary

This section examined a potential unintended consequence of choice and the abundance of nearby school options: the diffusion of student communities across schools. I measured diffusion in two ways: the share in a school-grade combination who were the only student from their census tract and (for sixth and ninth graders) the share in a school-grade combination who were the only student from their prior school. I found a surprisingly high amount of diffusion, particularly in the upper grades. In ninth grade, for example, 41 percent of students were singletons from their census tract, and nearly 20 percent were the only student from their previous school. The extent of diffusion varies by subgroup, with less advantaged and lower-scoring students most likely to be in school cohorts where they are the sole representative of their neighborhood or prior school.

These findings are intended only as a first look at diffusion across schools, and I take no position on whether this phenomenon is a net positive or negative. On one hand, the benefits of school choice may outweigh any social or developmental benefits to continuity or cohesiveness in student cohorts. Some students may be better off leaving their neighborhood peers behind. On the other hand, there may be a cost to frequent turnover in one's peer group or an isolating effect of diffusion. There has been little research on this subject.

Finally, my definition of diffusion is strict because I identify students who are the *only* student in their school and grade from their neighborhood or previous school. A less restrictive definition would increase the amount of diffusion I observe.

## 6. Discussion

New York City offers considerable public school choice at all levels of schooling. Choices include traditional neighborhood zoned schools, magnet and gifted and talented programs, dual language schools, charter schools, exam-based specialized high schools, and a citywide high school choice program. The city's urban density and public transit system put many of these school options within reach, and the NYC Department of Education subsidizes pupil transportation by providing half- or full-fare MetroCards.

While school choice provides opportunities for families to seek out the best school for them, it may lead to more time on the bus or subway. This report provides my best estimates of how far NYC elementary, middle, and high school students travel to school. Assuming students walk or take public transportation, the average trip in the data was 10.3 minutes in kindergarten, 17.4 minutes in sixth grade, and 31.3 minutes in ninth grade. A look at all trips in the data finds a meaningful number of students making longer commutes: 30 or more minutes (each way) in middle school and 50 or more minutes in high school.

Some subgroups have systematically longer commutes than others. At all grade levels, black students travel farther to school than students from other racial or ethnic backgrounds. Girls travel farther than boys in middle and high school, and higher-achieving students travel farther than lower-achieving students. Charter students travel farther to school than students attending traditional public schools in kindergarten and sixth grade, but in ninth grade, charter school students attend schools closer to home.

There are several likely explanations for these patterns. First, students are unevenly distributed around the city, and some neighborhoods are more dense, walkable, or better served by public transit than others. Although this is only part of the story, comparisons that control for residential location continue to find meaningful differences between groups. Second, some students are less likely to attend their closest school or their neighborhood zoned school, if they have one. Black students are least likely to attend their closest school and are more likely to attend a charter school or other public option. Higher-achieving students in middle and high school attend academically screened schools that draw students borough- and citywide. Third, families vary in their willingness and ability to send their child on longer trips. Differences in the willingness to travel longer distances are observed in school applications.

Families make numerous trade-offs when choosing where to send their child to school, and some may be willing to endure a long commute if it is to a school that helps their child succeed. Groups making longer average trips to school in NYC are often the ones with fewer proximate high-quality options. That said, long commutes may take time away from schoolwork or decrease student engagement with school. The availability of many school options—and the means to get there—also reduces the likelihood that children attend school with others from their neighborhood or previous school. My initial look at student “diffusion” across schools finds a high level of isolation from these peers.

I do not address whether longer commutes or diffusion are good or bad. Rather, my aim is to provide an initial evidence base on how far NYC students travel (and are willing to travel) to school and how the commuting burden varies by subgroup.

## **Limitations**

This study has several limitations. First, I assume that students walk or commute to school by bus, subway, or ferry following the fastest route available. I believe this assumption holds for most NYC students.<sup>22</sup> To the extent some students have access to a faster mode of transportation, I will overestimate their actual commuting time. Additionally, NYC provides school bus transportation for some students in K–6, and this mode may be faster or slower than my estimated commuting time by public transit. Second, my analysis used data from the 2013–14 and 2014–15 academic years, the most recent geocoded data available. I also focused on three grade levels (kindergarten, sixth grade, and ninth grade). Results may differ for other grades and school years, but I see little reason to expect significant differences from those reported here. Third, my analysis of the availability of proximate school options did not consider differences in school quality or variation in admissions rules (e.g., academic screening)

that shape families' "effective" supply of school choices. As such, I likely overstate the accessibility of high-quality school options for some families.

## **Lessons for Policy and Practice**

This report offers a stark example of how school choice, urban density, and subsidized public transportation can facilitate access to dozens of school options. The number of high schools accessible within 45 minutes of the average NYC ninth grader's home, for example, is staggering. This is good news for families looking to find the right school to help their child succeed. The downside is that students may spend a great deal of time in transit. The burden can be especially heavy on students living in neighborhoods with fewer high-quality schools or fewer public transit stops.

School districts can do more to monitor and minimize commuting time. In addition to tracking enrollment and student performance, districts should track their students' commuting times to school and identify populations making particularly long trips. These data could be used to provide supports or guide decisions about future school locations. Students and families also need useful information about schools available to them and the commutes they would entail (Corcoran et al. 2018). The complexity and sheer number of options in NYC may lead some families to apply to more distant schools they know over similar-quality schools nearby that they are less familiar with. Finally, more rigorous evidence is needed on the costs and benefits of longer commutes to school and the consequences of student diffusion resulting from school choice.

# Appendix

This report draws on several administrative data sources from the New York City Department of Education (NYCDOE): (1) deidentified residential census block, demographic, achievement, and programmatic information for all students enrolled in public schools and (2) addresses, descriptive characteristics, and performance measures for all NYC schools. I focus on students enrolled in kindergarten, sixth grade, and ninth grade—and the schools that offered these grade levels—in 2013–14.<sup>23</sup>

## Forming Block Combinations with Student and School Location Data

My first aim was to calculate distance and travel time between students' residential census block and the census block of *their* school and *all other schools* offering their grade level. Residential addresses were geocoded using Geosupport software from the NYC Department of City Planning.<sup>24</sup> School addresses were obtained from the NYCDOE Location Code Generation Management System for March 2014. I obtained spatial coordinates (latitude and longitude) for school addresses using a free online geocoding tool. I used ArcGIS and 2010 census block boundary files to assign students and schools to census blocks.<sup>25</sup> All travel time calculations were based on the centroids of the residential and school census blocks. Figure A.1 illustrates a sample student-school pair in Brooklyn, along with their census blocks and tracts.

FIGURE A.1

Sample Student-School Pair in Brooklyn, with Census Block and Tract Boundaries



**Source:** Produced by the author using 2010 Census boundary files for census blocks and tracts and geocoded school location data from the New York City Department of Education.

**Notes:** Thick borders are 2010 census tract boundaries, and thin borders are census block boundaries. School is identified with a flag symbol, and student residence is identified with a triangle.

Students across all three grade levels lived in 26,119 census blocks. Schools serving these grades were located in 1,161 census blocks. The student data include charter school students but exclude students enrolled in alternative schools (District 79) or schools that exclusively serve students with disabilities (District 75).

Calculating travel time between *all* unique residential and school block combinations would be computationally intensive and expensive. (There are roughly 24.2 million block pairs between the three grades.) To reduce the scope of the analysis, I first eliminated kindergarten block pairs in different boroughs. This decision was justified given that most kindergarten students attend a school in the same borough.<sup>26</sup> Eliminating kindergarten pairs in different boroughs significantly reduced the number of block pairs from 24.2 million to 17.0 million. I did not make this restriction for sixth or ninth graders because many do attend a school outside their residential borough.

To further reduce the number of calculations, I calculated the straight-line distance between the centroids of each remaining student and school block pair. If the straight-line distance was more than 5 miles (for kindergarten pairs) or more than 10 miles (for sixth- or ninth-grade pairs), the block pair was

eliminated, assuming that few students in these grades would travel that far to school.<sup>27</sup> This further reduced the number of block pairs from 17.0 million to 9.6 million.

For the block pairs that remained, I calculated travel time between student and school *block centroids* when the straight-line distance was less than one mile. When the straight-line distance was one mile or more, I calculated travel time between student and school blocks using *tract centroids*. Because tracts encompass a larger land area than blocks, this further (and substantially) reduced the number of required travel-time calculations.<sup>28</sup>

After applying these rules, my final travel-time dataset included the 17.0 million block pairs noted above. 9.4 million of these had nonmissing public transit travel time: 7.4 million were missing travel-time data because their straight-line distance exceeded the 5- or 10-mile threshold, and 146,493 were missing data for other reasons (e.g., errors returned during the travel-time query). Note that 98.1 percent of the block pairs missing transit-time data were missing because they exceeded the distance threshold.

Of the 9.4 million block pairs with nonmissing travel-time data, 314,706 (or 3.3 percent) had transit time based on block-to-block calculations (less than one mile). The remainder were based on tract-to-tract calculations (one mile or more). For block combinations in which tract centroids were used, there were 794,572 tract combinations. Taken together, my dataset includes 1.1 million travel-time calculations (314,706 + 794,572).

## Travel-Time Calculations

I used the Google Distance Matrix API (application programming interface) to calculate travel time and distance between blocks (for block centroids less than one mile apart) or tracts (for block centroids one mile or more apart). I ran these separately by mode of travel: public transit, driving, and walking. “Public transit” refers to transportation by the shortest combination of bus, subway, ferry, or walking. Drive times were returned under typical conditions and in traffic. (Unless otherwise specified, I report driving time under typical conditions.) I obtained walk time only for block centroids less than 0.5 miles apart. For uniformity, I fixed the date and time for each query to Wednesday, September 13, 2017, at 7:30 a.m. (for kindergarten and ninth grade) and Friday, April 30, 2018, at 7:30 a.m. (for sixth grade, which was executed later). The Google API does not allow for travel-time calculations in the past, so traffic and transit times may differ from what these estimates would have been in 2013.

## Student Demographic and Other Data

I obtained demographic and other student information from NYCDOE administrative data for 2013–14. These include traditional demographic variables (e.g., gender, race or ethnicity, and country of birth), other program classifications (e.g., eligibility for free or reduced-price meals, students with disabilities, and English language learner status), and annual attendance rates. Contemporaneous math and English language arts test scores were available for sixth grade but not for students in kindergarten and ninth grade, as these students do not take the annual third-to-eighth-grade tests. I have lagged (2012–13) test scores for most sixth- and ninth-grade students.<sup>29</sup>

Table A.1 summarizes the match between the administrative data and travel-time dataset. In total, 75,745 kindergarten students, 66,285 sixth-grade students, and 79,401 ninth-grade students were in the administrative data and had nonmissing residential and school block information (roughly 91.8 percent of all grade-level observations in the administrative data; the remainder were missing geocoded location data). Of these, 97.5 percent were matched to transportation time to their school by public transit. The 2.5 percent that did not match were, in most cases, making trips that exceeded my threshold for running travel-time calculations (e.g., more than five miles for kindergarten).<sup>30</sup>

TABLE A.1

## Match between Administrative Data and Travel-Time Calculations

	KG	Sixth grade	Ninth grade	Total
(1) Total in 2013–14 administrative data	83,998	70,911	86,241	241,150
(2) With nonmissing student and school block	75,745	66,285	79,401	221,431
(2) as % of (1)	90.2%	93.5%	92.1%	91.8%
(3) Nonmissing public transit time data	74,617	65,717	75,481	215,815
(3) as % of (1)	88.8%	92.7%	87.5%	89.5%
(3) as % of (2)	98.5%	99.1%	95.1%	97.5%
<b>Straight-line distance: Counts (of 3)</b>				
Total	74,617	65,717	75,481	215,815
<1 mile	64,745	42,725	18,032	125,502
≥1 mi. but <5 (KG) or <10 mi. (sixth and ninth grades)	9,458	22,976	57,374	89,808
≥5 mi. (KG) or ≥10 mi. (sixth and ninth grades)	414	16	75	505
(4) Missing public transit-time data	1,128	568	3,920	5,616
(5) Of (4), beyond mileage threshold	704	292	2,685	3,681
(5) as % of (4)	62.4%	51.4%	68.5%	65.5%

**Source:** Author's calculations using 2013–14 data from the New York City Department of Education.

**Note:** KG = kindergarten.

Table A.2 provides student-level descriptive statistics by grade level. As the crow flies, the average kindergartener lived 0.64 miles from school, compared with 1.2 miles for sixth graders and 3.1 miles for ninth graders. Close to 87 percent of kindergarten students lived within a mile of school, while 64 percent of sixth graders and 23 percent of ninth graders did so.<sup>31</sup> Virtually all kindergarteners (97.8 percent) lived in the same borough as their school, while 95.9 percent of sixth graders and 83.3 percent of ninth graders attended school in the same borough. The average trip to school by public transit was 10.3 minutes for kindergarten students, 17.4 minutes for sixth graders, and 31.3 minutes for ninth graders. Note that 72.8 percent of kindergarten students lived within walking distance from school (less than 0.5 miles straight-line distance; this share falls when looking at walking and driving distance, which takes into account the street grid).

TABLE A.2

## Descriptive Statistics: Kindergarten, Sixth-Grade, and Ninth-Grade Students, 2013–14

	Kindergarten	Sixth grade	Ninth grade
N of students	75,745	66,285	79,401
Percent with driving time info.	98.5%	99.1%	94.1%
Percent with public transit info.	98.5%	99.1%	95.1%
<b>Current school</b>			
Straight-line distance to school (miles)	0.640	1.158	3.087
Lives <0.5 miles from school	0.728	0.384	0.093
Lives ≥0.5 and <1.0 mile from school	0.128	0.261	0.134
Lives ≥1 mile from school	0.144	0.355	0.773
Lives same borough as school	0.978	0.959	0.833
Driving distance (miles)	0.872	1.605	3.897
Driving time (minutes)	4.582	7.861	15.045
Public transit distance (miles)	0.821	1.617	3.923
Public transit time (minutes)	10.274	17.415	31.277
Walking distance (miles)	0.317	0.361	0.426
Walking time (minutes)	6.099	7.098	8.515
Female	0.493	0.504	0.478
<b>Home borough</b>			
Brooklyn	0.315	0.312	0.312
Manhattan	0.127	0.113	0.106
Queens	0.281	0.287	0.283
Staten Island	0.056	0.062	0.065
Bronx	0.221	0.226	0.235
<b>Race or ethnicity</b>			
Black	0.247	0.280	0.303
Hispanic	0.409	0.400	0.416
White	0.163	0.150	0.121
Asian	0.157	0.160	0.151
Other	0.023	0.010	0.009
Free and reduced-price lunch	0.729	0.688	0.761
English language learner	0.202	0.124	0.138
Students with disabilities	0.113	0.148	0.157
Native born	0.941	0.861	0.780
Limited English proficient	0.202	0.125	0.138
Attendance rate	91.915	94.300	86.588
English language arts z-score: lagged	-	0.100	0.083
Math z-score: lagged	-	0.089	0.088

**Source:** Author's calculations using 2013–14 student and school data from the New York City Department of Education.

**Notes:** Baseline number of students represents the number of students with nonmissing demographic data and residential and school block identifiers. Sample sizes with nonmissing data vary. Walking time and distance is conditional on students living less than 0.5 miles (straight-line distance) from school.

Other student characteristics of note are the following: roughly 65 percent of kindergarteners, 68 percent of sixth graders, and 72 percent of ninth graders were black or Hispanic. More than 68 percent were eligible for free and reduced-price meals. 20.2 percent of kindergarteners, 12.4 percent of sixth graders, and 13.8 percent of ninth graders were English language learners. 94.1 percent of kindergarteners, 86.1 percent of sixth graders, and 78 percent of ninth graders were born in the United

States. The largest share of students in both grades lived in the Brooklyn (31 percent), and the smallest share lived on Staten Island (5 to 6 percent).

## School Quality Measures

In section 3, I calculated the minutes of travel time to the nearest high-quality school, or a school in the top quartile of performance citywide. For kindergarten and sixth grade, I identified all schools that offered the same grade level *and* had two available measures of academic performance: the share of students who scored at the “proficient” level or higher in mathematics and English language arts and the school’s median adjusted growth percentile in math and ELA. Both measures were drawn from the NYCDOE School Quality Review for 2013–14. Because state tests begin in third grade, these scores pertain to students in grades three through eight (for proficiency) and grades four through eight (for growth percentiles). The proficiency and growth measures include all grade levels served by the school. Schools that do not serve any of these grades are not eligible for “high-quality” designation in this analysis. (Consequently, kindergarten students may be more proximate to a school that offers K–2, but I lack an academic performance measure for comparison with other schools.)

To identify top-quartile schools, I first standardized the proficiency and growth measures separately to have a mean of 0 and standard deviation 1. I then averaged these two standardized measures and divided the resulting measure into four quartiles.

For ninth grade, I identified all schools that offered ninth grade *and* had a reported four-year graduation rate. These included any charter high schools with nonmissing graduation rates. All data were drawn from the NYCDOE’s official data archive.<sup>32</sup> I divided schools with nonmissing graduation data into four quartiles for the resulting measure.

TABLE A.3

Regression-Adjusted Differences in Travel Time  
to School, without and with Geographic School District Controls

	Kindergarten	Kindergarten	Sixth grade	Sixth grade	Ninth grade	Ninth grade
Residential district controls	No	Yes	No	Yes	No	Yes
Black	0.288*	0.116	1.765***	2.701***	5.404***	2.308***
	-0.116	-0.126	-0.165	-0.185	-0.216	-0.237
Hispanic	-1.205***	-0.698***	-1.725***	0.253	1.469***	0.181
	-0.106	-0.111	-0.158	-0.169	-0.21	-0.221
Asian	-0.188	-0.399**	0.575**	1.224***	3.596***	2.872***
	-0.122	-0.124	-0.183	-0.186	-0.245	-0.248
Female	-0.0163	-0.0068	0.390***	0.375***	1.062***	1.081***
	-0.067	-0.0657	-0.0995	-0.0975	-0.124	-0.121
FRPL	-1.488***	-1.526***	-2.094***	-1.638***	-1.634***	-1.838***
	-0.0828	-0.0834	-0.113	-0.113	-0.151	-0.149
ELL	-1.123***	-1.053***	-2.070***	-1.763***	-3.674***	-3.222***
	-0.0909	-0.0908	-0.169	-0.166	-0.208	-0.204
SWD	0.200	0.316**	0.306*	0.322*	-1.800***	-1.440***
	-0.106	-0.105	-0.142	-0.14	-0.172	-0.169
Foreign born	-1.029***	-0.859***	-1.469***	-1.489***	-1.938***	-2.566***
	-0.133	-0.131	-0.154	-0.152	-0.174	-0.171
Attends charter	9.528***	10.43***	4.882***	6.023***	-3.768***	-2.890***
	-0.11	-0.112	-0.175	-0.176	-0.275	-0.273
Constant	11.02***	10.77***	18.73***	17.11***	30.66***	32.38***
	-0.0948	-0.101	-0.146	-0.156	-0.202	-0.213
Observations	74,478	74,477	65,579	65,575	74,949	74,948

Source: Author's calculations using 2013–14 student and school data from the New York City Department of Education.

Notes: ELL = English language learner; FRPL = free and reduced-price lunch; SWD = students with disabilities. "Residential district controls" are separate indicator variables for geographic district of residence (1–32). The regression coefficient for "other race or ethnicity" is not shown.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

# Notes

- <sup>1</sup> For more detail, see Corcoran and Levin (2011); Mader, Hemphill, and Abbas (2018); and Schneider, Teske, and Marschall (2000).
- <sup>2</sup> “Kindergarten,” New York City Department of Education, accessed October 2, 2018, <https://www.schools.nyc.gov/enrollment/enroll-grade-by-grade/kindergarten>.
- <sup>3</sup> “Gifted and Talented,” New York City Department of Education, accessed October 2, 2018, <https://www.schools.nyc.gov/enrollment/enroll-grade-by-grade/gifted-and-talented>. For an analysis of differential participation in the G&T test, see Lu and Weinberg (2016).
- <sup>4</sup> “Middle School,” New York City Department of Education, accessed October 2, 2018, <https://www.schools.nyc.gov/enrollment/enroll-grade-by-grade/middle-school>.
- <sup>5</sup> Most students receive a match, but those who do not will be assigned to a school with available seats. There is an additional “new schools” round in February, in which families can apply to newly opened middle schools that were not available in the fall.
- <sup>6</sup> “High School,” New York City Department of Education, accessed October 2, 2018, <https://www.schools.nyc.gov/enrollment/enroll-grade-by-grade/high-school>.
- <sup>7</sup> Hunter College High School is another well-known, highly-selective public school that admits students in seventh grade. This school is operated by the City University of New York, however, and has its own admissions process.
- <sup>8</sup> “NYC Common Online Charter School Application,” New York City Charter School Center, accessed October 2, 2018, <http://www.nyccharterschools.org/resources/nyc-common-online-charter-school-application>.
- <sup>9</sup> Details on my analytic dataset are provided in section 3 and in the appendix.
- <sup>10</sup> The counts of students I used to produce these statistics are large, so most group differences are statistically significant.
- <sup>11</sup> Each shaded area is a census tract as those boundaries were defined in 2010.
- <sup>12</sup> Appendix table A.3 shows regression-adjusted differences in travel time with and without controls for students’ residential community school district.
- <sup>13</sup> All these differences are statistically significant except for FPRL-eligible kindergarteners.
- <sup>14</sup> These results are consistent with those Mader, Hemphill, and Abbas (2018) found when they examined attendance and segregation patterns among kindergarten students in NYC from 2008 to 2017. In 2016–17, they found that 40 percent of kindergarteners attended a school other than a neighborhood zoned elementary school.
- <sup>15</sup> Details are provided in the appendix. For schools serving kindergarten or sixth grade, I used the average of two z-scores, the first based on math and ELA proficiency in tested grades and the second based on the New York City Department of Education’s median adjusted growth percentile measure. Schools in the top quartile had an average proficiency + growth index in the top 25 percent.
- <sup>16</sup> Not addressed here are other enrollment restrictions that limit students’ effective choices, including academic screens and geographic priorities.
- <sup>17</sup> This average of 36.4 minutes differs from the mean of 39.4 minutes in figure 11 because it represents the average *student’s* application. Figure 11 treats each choice as an observation, and not all students apply to 12

schools. This difference suggests students who list more schools on their application include schools farther from home.

- <sup>18</sup> The average commute of 33.9 minutes to students' matched schools (table 7) differs somewhat from the average ninth-grade commute of 31.3 minutes reported in section 2. This is likely because of several factors. First, this analysis includes only students who applied and matched to high schools in the traditional school choice process. Students who enrolled in charter schools or who arrived in NYC after the application deadline are not included. Section 2 found that charter students have shorter commutes than traditional high school students, which will bring the average down. Students who arrive after the deadline typically have fewer options and may be assigned to a school closer to home. Second, some students change residences or later transfer, which may result in shorter commutes than their match would indicate. Students can appeal a match when the commuting time would be unreasonable. Finally, this analysis used a different cohort of students (2014–15) than section 2 (2013–14).
- <sup>19</sup> This takes the supply of schools as given. All else equal, all families might prefer more high-quality options close to home.
- <sup>20</sup> I consider the specific grade and school combination in these calculations. The more inclusive calculation that includes *all* students in the school yields 5 percent of kindergarten students as the only student at their school from their home census tract, 8 percent of sixth graders, and 20 percent of ninth graders.
- <sup>21</sup> Descriptively, these results are consistent with those of Burdick-Will (2017), who found similar patterns in Chicago high schools. She found that students living in low-income and disadvantaged neighborhoods “scatter geographically” to schools across the city, while students from more affluent areas attended fewer schools closer to home with their neighborhood peers.
- <sup>22</sup> According to 2011–15 American Community Survey five-year estimates, 69 percent of New York City adults commute to work on foot or by public transportation. Seventy-six percent of adults below the federal poverty level commute by foot or public transportation.
- <sup>23</sup> 2013–14 was the most recent year of geocoded student location data available at the time I assembled this dataset.
- <sup>24</sup> This software is the official geocoder of the city government and is generally better at parsing nonstandard NYC addresses than other available packages.
- <sup>25</sup> Census blocks are the smallest geographic unit used by the US Census Bureau and are identified by a 15-digit ID: 2-digit state + 3-digit county + 6-digit tract + 4-digit block (e.g., 360610002011001). There are 30,131 populated census blocks in NYC. The average 2010 population for NYC census blocks was 271.
- <sup>26</sup> In 2013–14, only 2.2 percent of kindergarten students attended school outside their borough.
- <sup>27</sup> The 95th percentile of straight-line distance between home and current school for ninth grade was 9 miles. For kindergarten, it was 2.2 miles. Trips this far are rare in the data.
- <sup>28</sup> For a random sample of 500 block pairs, I compared the travel time calculated using block and tract centroids. For driving time, the correlation was 0.987. For public transit time, the correlation was 0.981.
- <sup>29</sup> I initially constructed my travel-time dataset using a separate student location file, which included more observations than the final student file. This is presumably because the address data represent all students who attended NYC public schools at any point during the year. The administrative data represent a snapshot at a single point in time. My travel-time dataset has more observations than would be expected based on the census blocks of students and schools represented in the administrative file.

<sup>30</sup> For a few cases, I have transit time even when the trip exceeds the mileage threshold. For example, I have transit time for 414 kindergarten students who traveled more than five miles to school. This arises anytime the block combination appears in the travel-time data for a different grade.

<sup>31</sup> These percentages are larger than those in table 2 because they depend on straight-line distance rather than driving distance.

<sup>32</sup> “Graduation Results,” New York City Department of Education, accessed October 2, 2018, <https://infohub.nyced.org/reports-and-policies/citywide-information-and-data/graduation-results>.

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