

# Can Public Transportation Improve Students' Access to Denver's Best Schools of Choice?

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# Introduction

Transportation remains a vexing concern in cities that offer students school choice. Time and again, research has shown that families typically want high-performing schools or schools with unique academic programs.<sup>1</sup> But those schools tend to be concentrated in a city’s affluent neighborhoods, often long distances from low-income households and students of color.<sup>2</sup> Parents’ choices are constrained by how their children can get to school and how long it will take.<sup>3</sup> A choice system can’t truly be equitable if the best schools aren’t accessible to many students.

Transporting students to schools is expensive. In 2013, U.S. school districts spent \$23.4 billion on student transportation—almost 4 percent of total public school expenditures. As budgets have tightened, districts have reduced the number of students eligible for free bus transport.<sup>4</sup> Many cities that offer school choice don’t offer students transportation to schools outside of their neighborhood, and charter schools are rarely required to provide transportation.

When a school system doesn’t offer transportation, parents must take on the burden. In CRPE’s 2014 parent survey, about a quarter of parents in eight “high-choice” cities reported that getting their children to and from schools was a challenge. This was especially the case for low-income households and families of color.<sup>5</sup> In a recent survey by HopSkipDrive, a car shuttle service for children, 43 percent of parents said they spend more than five hours a week driving their children to and from school, and 40 percent reported that driving their child to school interferes with their work schedule at least weekly.<sup>6</sup>

Many cities—particularly larger ones—have public transportation systems that, in theory, could help connect students to their desired schools. Indeed, cities with robust public transportation networks, such as New York and Washington, D.C., already use their public transit systems to transport students. But in many cities, the transit systems are designed to transport workers to the city’s economic centers (usually downtown), while schools are located in residential neighborhoods. So transit networks designed for workers can’t always help students get to school. And they can’t always connect students from low-income households and students of color to the city’s highest-performing schools, which tend to be concentrated in affluent neighborhoods.

To better understand these challenges and how they might be surmounted, we analyzed how one city, Denver, approaches its transportation challenges. Specifically, we asked:

- 1. How well do Denver’s existing public transit routes connect students to the schools they currently attend?**
- 2. How well do Denver’s public transit routes connect students to the city’s highest-rated schools?**
- 3. Do differences in the viability of public transit options vary systematically by the race or ethnicity of students or the economic background of their families?**
- 4. If the public transit system isn’t a viable solution, what could be?**

We found that for all students to have reasonable access to a high-performing school, the city will have to look beyond the transit system for solutions. Because of difficult-to-reach neighborhoods, economically, racially, and ethnically segregated communities, and a supply of high-performing schools that remain concentrated in a few regions, many Denver students do not have reasonable access to the city's best schools, and wouldn't—even with free access to public transit. To provide all students with the best opportunities for learning, Denver, and other cities as well, must make strategic investments in improving the distribution of quality schools and will likely have to consider creative solutions like building enrollment partnerships with neighboring school districts, developing micro schools, or providing more students with virtual access to classrooms in the city's best schools.

# Denver's Approach to School Choice and Transportation

School choice is a central element of Denver's public school system. All students are guaranteed access to a single school or set of schools, but they can also apply to any other public school in the city that serves their grade level. Through a unified enrollment system, students can apply to a maximum of five schools (district and charter) in a single application. A centralized lottery matches students to schools based on student preferences, school availability, and lottery outcomes. More than 80 percent of Denver's students entering transition grades (kindergarten, 6th, and 9th) submit applications for schools through the unified enrollment system. The share of students applying for schools is relatively consistent across race and family income.<sup>7</sup>

Analyses of application data show that parents broadly prefer to send their child to a school that has a high performance rating, but their preference for high ratings is clearly considered alongside their preference for geographic proximity. That parents factor distance into their school choice decisions isn't surprising. Parents of young children don't want them traveling long distances on buses. And juggling school and work schedules is a challenge for parents of students of any age, especially if parents don't have access to vehicles.

Denver Public Schools (DPS) provides yellow bus transportation to elementary school students attending their assigned neighborhood school if they live more than 1 mile from school; middle school students attending their assigned school receive bus transportation if they live more than 2.5 miles from school. High school students who attend their assigned school and live more than 3.5 miles away are provided free public transit passes.

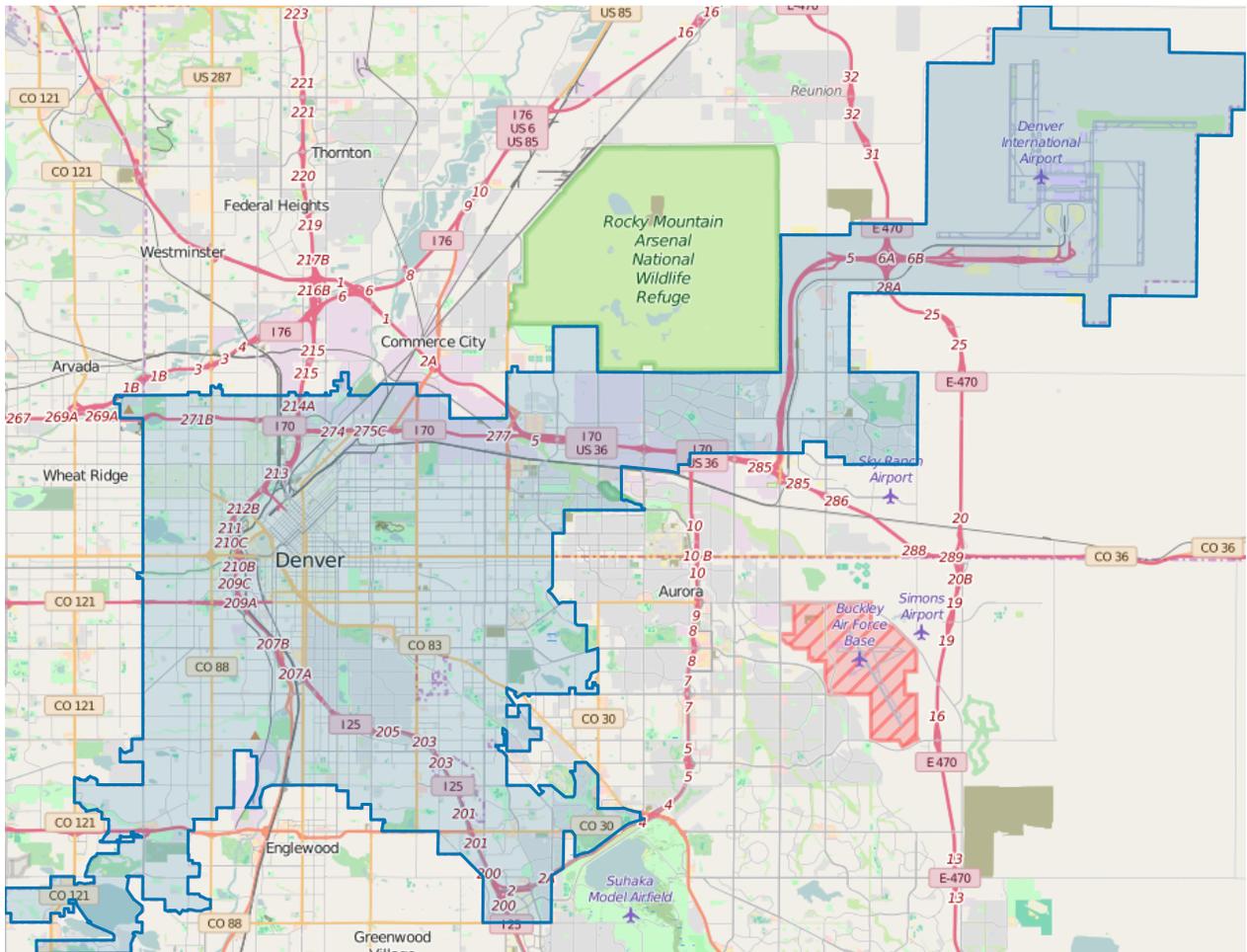
DPS also offers a circulator bus known as "Success Express" in two regions of the city that are predominantly home to low-income households, the Far Northeast and the Near Northeast. Students at both traditional and charter schools can hop on and off this bus at various stops, which are positioned to pick up students near home and drop them off at the region's schools.

Additionally, the district provides yellow bus transportation in other enrollment zones in select cases, including a small number of charter school students. For the most part, the district does not provide transportation for students who attend charter schools outside those zones.<sup>8</sup>

DPS offers several transit options and the district reports that nearly 40,000 students are eligible for free transportation. But DPS also reports that average ridership is only about 21,000 students.<sup>9</sup> Our 2014 survey shows that 64 percent of parents drive their children to school. With the burden of transportation falling heavily on parents, it is unsurprising that the same survey found that nearly a third of Denver's parents reported difficulty finding transportation to school for their children.

Figure 1 shows how the geography of Denver presents important challenges to providing affordable and reasonable transportation to students. First, the population is dispersed across a large area; about 650,000 residents live across 155 square miles. Second, rather than spanning a cohesive area, the city and school district stretch into distant corners, especially in the Southwest and Far Northeast. Finally, a highway (I-25) and river bisect the city, separating east and west, and another highway (I-70) cuts off the northern strip of the city, requiring east-west traffic to route through bridges.<sup>10</sup>

**FIGURE 1. Denver's Complex Geography**

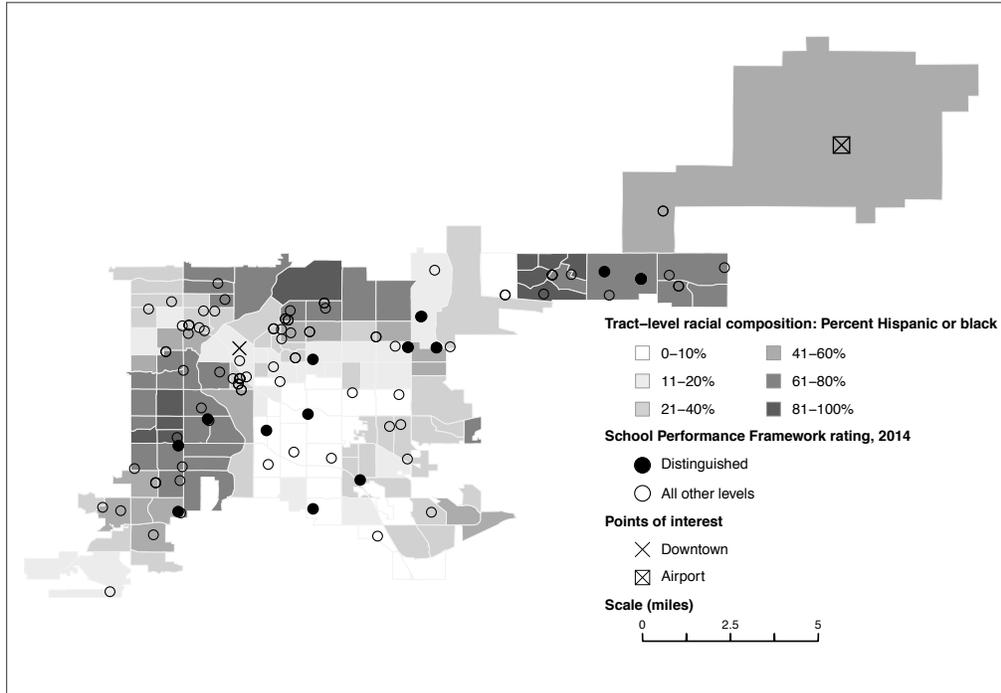


Note: The county, city, and school district of Denver are coterminous, and are outlined in blue in the map.

Denver's demographic patterns present additional challenges to providing equal access to schools throughout the city. Its families of color and white families tend to live in different regions of the city, as shown in Figure 2. Hispanic and black families are concentrated in some of the more difficult-to-access regions of the city—in the far Northeast appendage, as well as west of I-25 and the river. Meanwhile, most of the city's higher-ranking schools (represented in Figure 2 by the solid circles) are located in central, majority-white neighborhoods. This geographic pattern holds when looking at not just race but also family income.

**FIGURE 2.**

**The City of Denver: Where White, Hispanic, and Black Families Are Concentrated, and How Schools Perform There**



**DENVER PUBLIC SCHOOLS SCHOOL PERFORMANCE FRAMEWORK**

Denver Public Schools uses several indicators to categorize each school into one of five ratings according to its **School Performance Framework**:

- Distinguished
- Meets Expectations
- Accredited on Watch
- Accredited on Priority Watch
- Accredited on Probation

Source: Authors' compilation of publicly available data. Tract-level racial/ethnic data come from the five-year 2010–2014 American Community Survey; school location and performance data come from the Denver Public Schools website.

Note: The sample of schools depicted in this figure includes schools whose grade spans include 6th and 9th grades.

It is in this context that community leaders have raised the possibility that providing all students with a free transit pass for the city's Regional Transit District service—no matter where they live or what schools they choose—could lessen the role of proximity in families' school choices and increase the opportunity for the city's less affluent students and students of color to seek and gain entry into the city's highest-ranking schools.

## **CALCULATING DENVER SCHOOL ACCESS VIA PUBLIC TRANSIT**

### **Data & Methodology**

To examine how public transit could extend students' access to schools, we linked administrative data from DPS with information about the region's public transit system. The data from DPS included a record for every student whose parent submitted a school choice application in the spring of 2014 for entrance into the 6th or 9th grade, and whose application contains a valid (non-missing) home address. We focused on students entering middle and high school for two reasons. First, these grade levels have high rates of participation in DPS's unified enrollment system: about 70 percent, with students from low-income households, English language learners, and students of color somewhat less likely to participate than affluent, white, and native-English-speaking students.<sup>11</sup> Students' home addresses come from the enrollment applications; using the high-participation grades ensures our analysis covered a sufficient share of the city's student population. Second, although students entering preschool and kindergarten also have high rates of school choice participation, students in middle and high school are much more likely to use public transit to get to school than very young students.

In total, our data consisted of residential and demographic information for roughly 8,000 students. We matched these students to every public school in the district that was open in the 2014–2015 school year, contained the student's next grade level, and made no obvious restrictions to their student body (for example, boys were not matched to an all-girls school). Our final dataset thus contained about 550,000 student-school records.

For each of these records, we used the Google Maps Directions Application Program Interface (API) to calculate transit and driving directions between each student's home address and the schools to which they could have applied. In calculating these directions, we stipulated several conditions to approximate the context under which students are most likely to get to school. First, we set the arrival time for which the API calculates the trip directions at 8:00 a.m.—the average starting time for DPS's middle and high schools—on what is likely to be a standard Wednesday that school is in session: May 11, 2016. Second, we biased the directions toward fewer transfers, assuming students (and their parents) would prefer the most direct route. The API generated our key measures of transit accessibility: the distance in miles and the duration in minutes between where students live and the schools from which they can choose. Importantly, the distance and duration measures encompassed the entire journey door to door, including walking to a transit stop, boarding a bus or train, any walking and waiting necessitated by transfers, and walking to school.<sup>12</sup>

# Analyzing the Role of Public Transit for Denver's Students

## Public Transit Is Unlikely to Improve Equal Access to Highly Rated Schools

Our analysis shows that most of the city's students can reasonably use public transit to get to their current school, but public transit won't necessarily help them access the city's highest-performing schools.

The average child, we found, could reach their current school in 22.3 minutes: half of the students in the sample could reach their school within 17.2 minutes and, as shown in Table 1, roughly three-quarters could get to school within 30 minutes.

**TABLE 1. Travel Times to Current School Via Public Transit**

PERCENT OF STUDENTS WHO COULD REACH THEIR CURRENT SCHOOL WITHIN 15, 30, 45, AND 60 MINUTES VIA PUBLIC TRANSIT					
		15 minutes	30 minutes	45 minutes	60 minutes
Overall		43	74	89	96
By race	Hispanic	48	77	92	97
	White	35	73	90	97
	Black	38	65	81	91
By free/reduced-price lunch	Eligible	46	75	90	96
	Non-eligible	35	71	88	96
By region	Far NE	50	75	86	92
	Near NE	44	76	91	98
	NW	49	75	91	98
	SE	28	70	92	98
	SW	49	81	94	98

It would take far longer, however, for students to get to one of the 7 percent of Denver schools earning the top rating on the city’s School Performance Framework (SPF). We found that only 58 percent of students could get to a top-rated school in 30 minutes or less by public transit (see Table 2). The burden is especially great for students of color: While 69 percent of white students live within 30 minutes of a top-rated school, only 53 percent of Hispanic students and 63 percent of black students do; there is a similar transit-time gap when considering family income. Public transit also seems limited in its ability to move students from the city’s lowest-performing schools—probation and watch schools—to its highest-performing schools. Forty-seven percent of students currently attending probation and watch schools could not get to a highly rated school within 30 minutes on public transit.

**TABLE 2. Travel Time to Top-Rated Schools Via Public Transit**

PERCENT OF STUDENTS WITH AT LEAST ONE TOP-RATED SCHOOL VIA PUBLIC TRANSIT WITHIN 15, 30, 45, AND 60 MINUTES					
		15 minutes	30 minutes	45 minutes	60 minutes
<b>Overall</b>		20	58	82	94
<b>By race</b>	<b>Hispanic</b>	18	53	76	91
	<b>White</b>	26	69	90	97
	<b>Black</b>	20	63	92	99
<b>By free/reduced-price lunch</b>	<b>Eligible</b>	19	55	79	93
	<b>Non-eligible</b>	24	66	89	98
<b>By region</b>	<b>Far NE</b>	20	62	95	100
	<b>Near NE</b>	32	85	97	100
	<b>NW</b>	0	22	67	97
	<b>SE</b>	17	56	94	100
	<b>SW</b>	25	56	59	83

What’s more, white students don’t have just one top-rated school within relatively easy reach; they are also likelier to have robust choice among multiple top schools by virtue of geography. Fifty-one percent of white students entering 6th and 9th grades have two or more top-rated schools within 30 minutes via public transit, while only 32 percent of Hispanic students and 37 percent of black students do.

## Public Transit Is Unlikely to Reduce Neighborhood Isolation

Denver’s relatively large size, unconventional borders, and bisecting highways and river isolate neighborhoods in ways that the public transit system can’t resolve. Figure 3 shows the regions of the city where public transit is a reasonable option for students to reach a top-rated school, most of which are located east of I-25. Students east of the highway—where less than half of the student population is Hispanic or black—can get to top-rated schools in about 30 minutes or less; students west of the highway cannot.

**FIGURE 3.**

**Travel Time Via Public Transit to a Top-Rated School for 6th and 9th Graders**

6th Grade

9th Grade

*Note: Maps show the average time in minutes via public transit for rising 6th and 9th grade students to get to a top-rated ("distinguished") school.*

Given Denver’s segregation of communities and uneven distribution of high-quality schools, it is unsurprising that the students least able to take advantage of public transit to attend high-performing schools are those living in areas where there are high rates of low-income households and people of color. In particular, students entering middle and high school who live in areas with high rates of people of color (especially the Southwest and the Northern strip) might have to travel on public transit for 90 minutes to reach a top-rated school. As Table 2 shows, only 22 percent of rising 6th and 9th graders in the Northwest region live within 30 minutes of a top-rated school. The problem is especially acute for rising 9th graders: While 78 percent of 6th graders live within 30 minutes of a top-rated school, just 29 percent of 9th graders do.

It is important to note that our analysis is in many ways a best-case scenario. Our analyses only consider whether students can reach a high-quality school within 30 minutes on public transit. But there is a big difference between reaching a school and being able to gain entry. Many schools in Denver are sought by far more students than they can serve, and students living far away may have little chance of enrolling in them when the enrollment system prioritizes a student’s proximity.

## The Transportation Burden Falls to Parents

For many students, driving is a more reasonable option than public transit—a fact that effectively shifts the transportation burden to parents. If students or their parents have access to a car and the ability to drive, 98 percent of Denver’s students could reach a top-rated school in 30 minutes or less. The relative difference in drive times and transit times (illustrated in Figure 4) raises the question of how many families would make use of a free public transit pass for the middle or high schooler even if it became available.

**FIGURE 4.**

**Driving Times Versus Public Transit Times to School for 6th and 9th Graders**

**6th Grade**

**9th Grade**

*Note: Maps show the difference in minutes between the average time it takes via public transit and the average time it takes via driving for rising 6th and 9th grade students to get to a top-rated ("distinguished") school.*

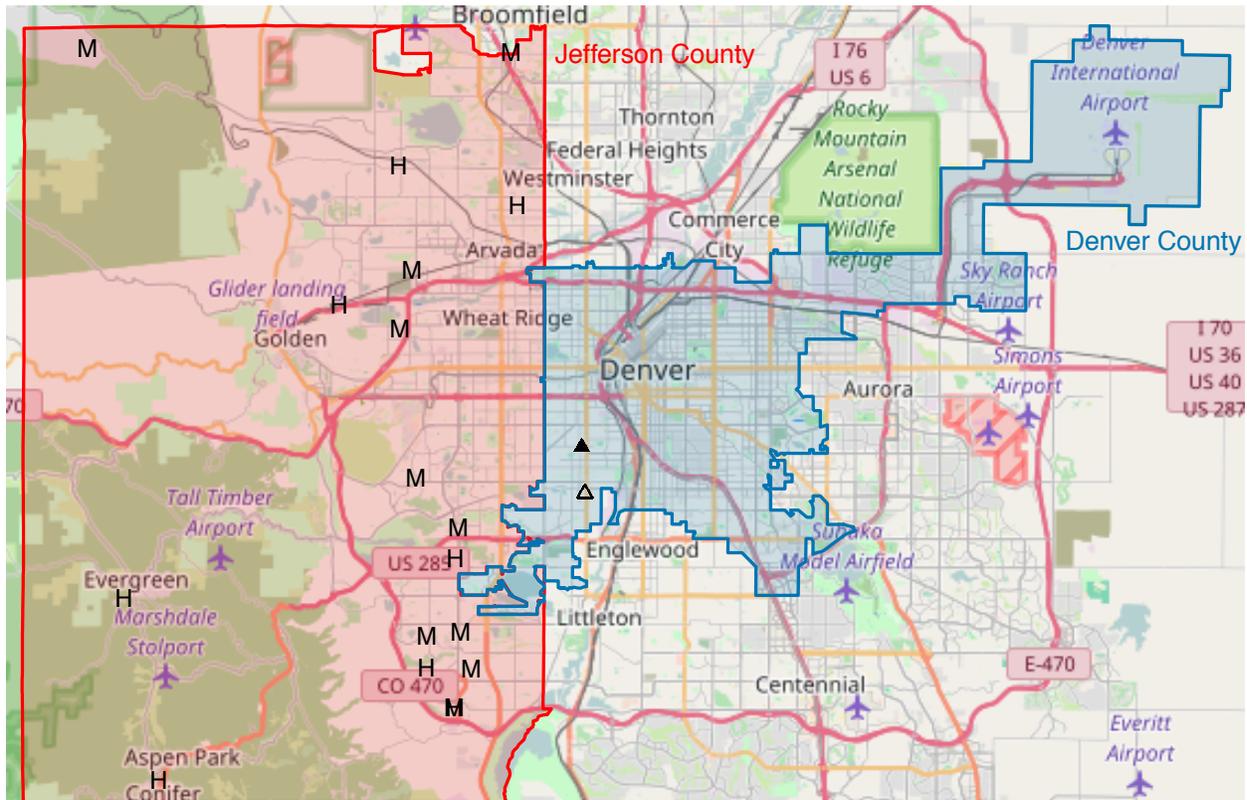
## Alternative Solutions Could Improve Access to Quality Schools

The above analyses suggest that free public transit passes under the current conditions may not dramatically improve the ability for most students—particularly students of color and less affluent students—to access top-rated schools. The distribution of top-rated schools is clearly an important part of the problem; the most enduring way for the district to improve access would be to have more quality schools, perhaps by investing in the improvement of existing schools, replicating higher-performing schools, or launching new, promising ones in select neighborhoods. In outlying regions like the Southwest, Northwest, and Southeast, the district might partner with regional suburban districts to receive students from Denver.

To test the impact of new supply, we simulated how students' access to top-rated schools might change by improving a school in Denver's western regions or by encouraging cross-district enrollment in the relatively high-performing schools of a suburb to the west of the city's boundary (see Figure 5). We chose these regions because currently fewer than a quarter of students in the Northwest and only about 56 percent of students in the Southwest can reach a top-rated school within 30 minutes on public transit. Further, while the average minimum time to get to a top-rated school is 30 minutes for the district overall, it takes students living in the Northwest and Southwest regions a minimum of 39 and 35 minutes, respectively.

**FIGURE 5.**

**How New Schools or Cross-District Enrollment Could Improve Access**

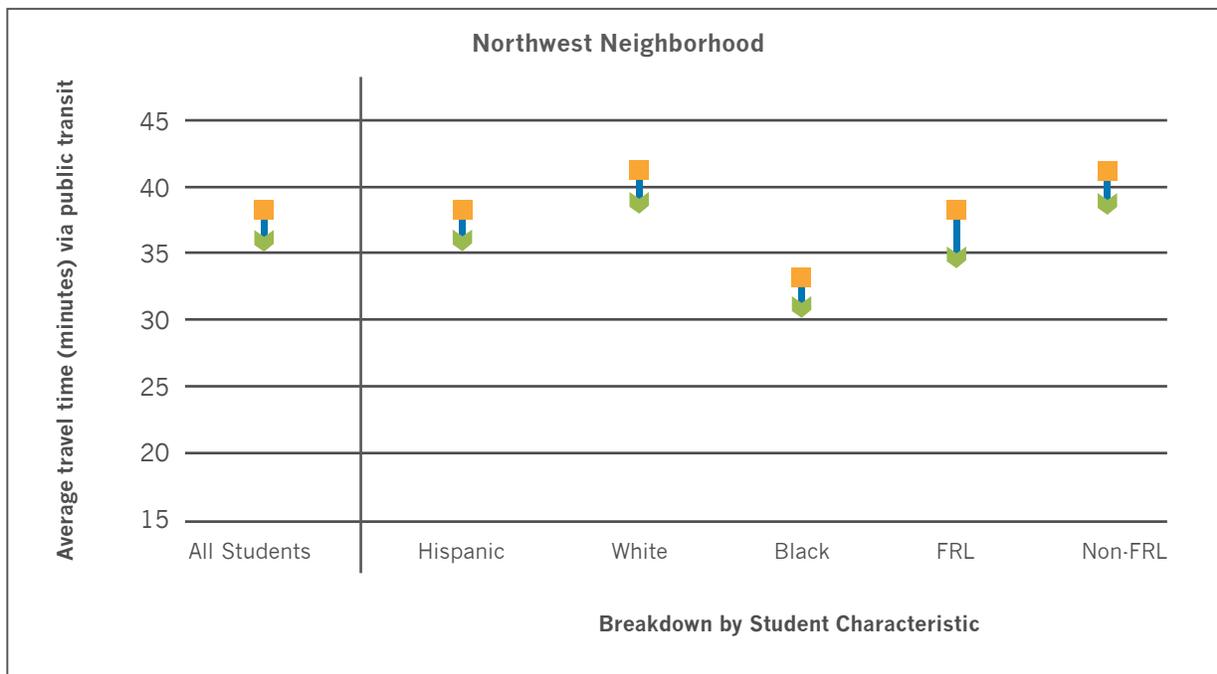
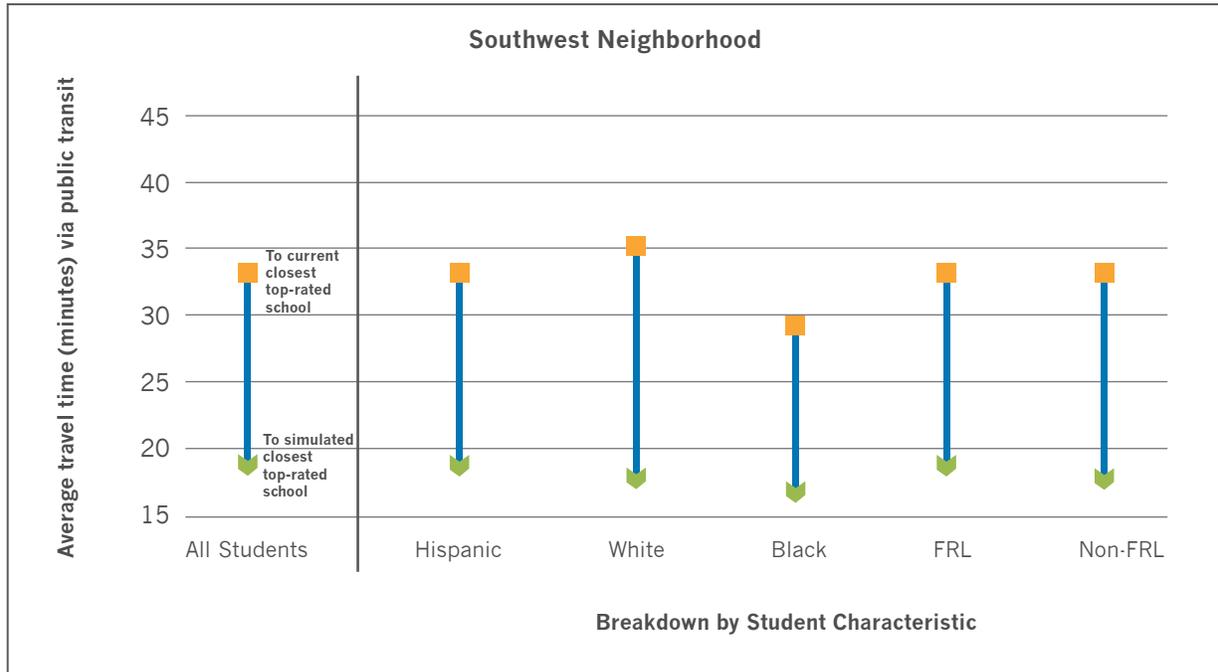


Note: The figure shows the schools used in our simulations. The “H” and “M” markers refer to relatively high-performing high and middle schools, respectively, in the Jefferson County school district to the west of DPS. To be included in our simulation sample, schools had to have a median growth percentile of at least 60; this is consistent with schools in DPS rated as either “meets expectations” or “distinguished” (data are available from the Colorado Department of Education). Basing the definition of “relatively high-performing” in our simulation on the top two categories of the DPS School Performance Framework (SPF)—rather than just the top “distinguished” category, as in our other analyses—provides a “better case” scenario by ensuring a sufficient number of schools in Jefferson County to carry out the simulation. Further, while we could have defined “relatively high-performing” using Colorado’s SPF levels, we chose to match DPS’s SPF levels to the continuous measure of median growth percentile. The triangle markers show schools whose ratings we adjusted upward from “on probation” or “on priority watch” to “distinguished”: the closed triangle indicates a middle school, and the open triangle indicates a high school.

As figures 6 and 7 show, improving schools located near the city’s Northwest and Southwest regions would reduce the average minimum time it would take students living in those regions to travel to a top-rated school via public transit. Among students in these western neighborhoods, this “improvement” strategy lowers the minimum time it would take students to travel via public transit to a high-rated school for three-quarters of white students and students not eligible for free and reduced-price lunch (FRL), and two-thirds of Hispanic and black students and students eligible for FRL. This is especially true for students in the Southwest region, whose travel time was cut in half, given that the simulated schools were located closer to this region. Because the Northwest and Southwest regions are home to large populations of Hispanic and lower-income families, this focused attention on improving a particular school (or set of schools) could lead to a dramatic increase in access for some of the city’s most underserved populations.<sup>13</sup>

**FIGURE 6.**

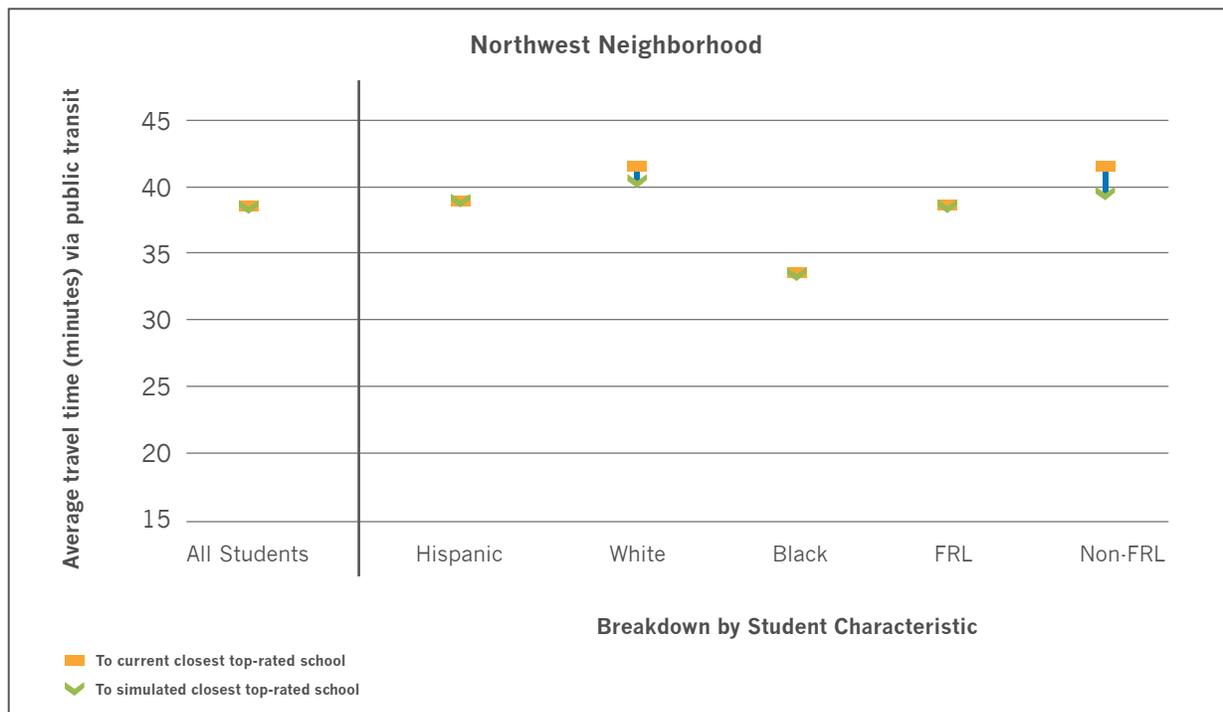
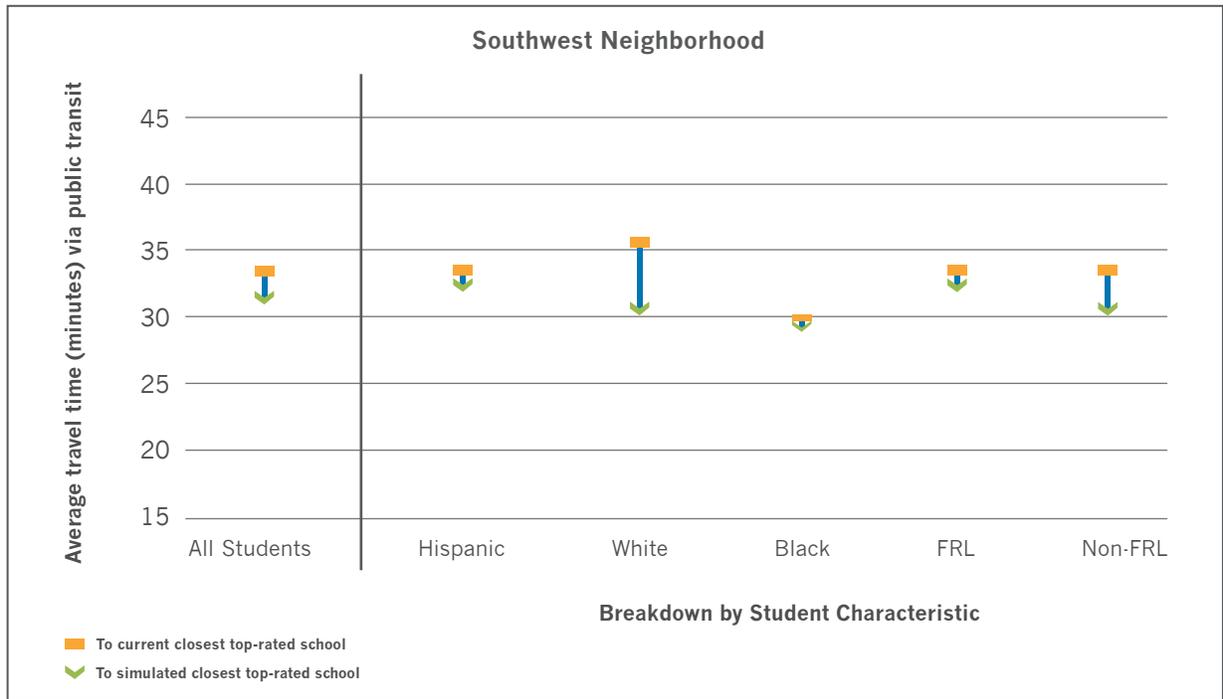
**Investing in the Strategic Improvement of Schools in the Southwest and Northwest Neighborhoods Improves Access**



Note: The figures show (1) the shortest average time via public transit to a current “distinguished” school per DPS’ School Performance Framework rating system, (2) the shortest average time via public transit to a simulated “distinguished” school (DPS improves two schools, one middle school and one high school, in the neighborhoods).

**FIGURE 7.**

**Encouraging Partnerships with Jefferson County Schools Offers Modest Improvements in Access to Quality Schools in the Southwest and Northwest Neighborhoods**



Note: The figures show, (1) the shortest average time via public transit to reach the closest current top-rated school, (2) the shortest average time via public transit to reach the closest top-rated school if the choices included schools both inside and outside of DPS.

Of course, it is unlikely that a district can quickly convert a struggling school into a relatively high-performing one. Opening a new school or starting new programs can be costly, time-intensive, and risky. A more efficient and likely more effective approach would be for schools outside the district boundaries to provide students with more immediate access to high-performing schools.

Cross-boundary solutions, however, carry some risks. First, families whose children are being asked to leave the district may feel that the district would rather outsource their children than serve them. Second, DPS would lose the state allocation of resources for any students heading outside the district for school. Third, surrounding districts might not want or have enough seats to accommodate DPS students in their best schools. Still, there is a precedent for cross-boundary enrollment among Colorado districts. State law permits students to enroll across district lines where there is space; each year, hundreds of students within Denver's boundaries seek to enroll in outlying districts, and students from outlying districts seek to enroll in DPS.

Our simulation suggests that there could be some benefit to regionalizing enrollment by providing Denver students in the Northwest and Southwest neighborhoods with guaranteed enrollment to a neighboring district's school. Adding this option impacts fewer students than improving the performance of a school in the city, and it seems to be of greatest benefit to white and affluent students, who, as is shown in Figure 2, concentrate along the border between Denver and outlying regions. Specifically, among students residing in these western neighborhoods, regionalizing enrollment strategy lowered the minimum time it would take for students to get to a high-rated school for over a quarter (26 percent) of white students but 16 percent of Hispanic students and just 7 percent of black students; this strategy also lowers the transit time for 26 percent of students not eligible for FRL, but for only 16 percent of students eligible for FRL.

Still, for some students living in these regions, encouraging regional choice could lower the travel time to get to a high-performing school.

## Beyond This Analysis: Next Steps

For a choice system to provide genuine opportunity, cities must do more than simply allow families to choose schools. They must also make sure that students can get to—and into—those schools. Because of an enrollment system that prioritizes proximity, and because top schools are in high demand, many Denver students would be shut out of those schools even if transportation options improved. In addition, even where there is an efficient route to school, it may not be a safe one. Safety is a constant worry that should be incorporated into any school planning. Our future work will analyze access along several dimensions, including time to reach the school, likelihood of entry, and safety of the passage to school.

In the meantime, these analyses offer some useful insights for Denver, as well as other choice cities wrestling with the challenge of transportation:

- 1. Public transit will not be an adequate substitute for a well-distributed supply of quality schools.** This analysis shows that, at least in Denver, the public transportation system does not reduce the isolation of regions with a limited supply of quality schools.
- 2. Individual schools will always be unreachable to some students, which matters for the allocation of specialized schools.** The geography and transportation corridors of Denver make it unreasonable to think that all students will be able to get to any school within 30 minutes. Cities will likely not succeed at making every school accessible to every student. As such, cities must think hard about the availability and placement of specialized schools like select arts academies, STEM-focused schools, and International Baccalaureate programs. If only one arts academy exists in a city, the school likely will not be a viable choice for some students. If ensuring equitable access to specialized schools is a priority, districts must carefully consider location and transportation.
- 3. Regionalizing choice could be a quick, though limited, remedy.** Our simulations show that access to quality in isolated regions can improve by considering options outside the district boundaries. Though this strategy may be difficult to message, has financial implications for both the sending and receiving districts, and benefits some families more than others, it could benefit some students immediately.
- 4. Strategic supply investments will be crucial to improving access.** Investing in new schools and turnaround efforts can be difficult, costly, and time-consuming, but our simulations show how dramatically such improvements could change the access equation for students in isolated neighborhoods.

In the short run, cities may have no choice but to spend extra resources to provide students with transportation to the school of their choice. Yellow buses or added public transit routes to connect schools and students, or more flexible rideshare strategies may be the only way for some students

living in more isolated neighborhoods to reach a highly rated school. Even these strategies may still fall short for students if the distance between them and the city's best schools is too far. We plan future analyses to explore the potential impact of these solutions. To make choice work in the long run, however, cities must explore a broader set of solutions. Creative solutions like micro schools or providing more students with virtual access to classrooms in the city's best schools could be among the options. However, the most impactful option is likely to be the most important and enduring one: evening out the distribution of quality schools.

# Endnotes

- 1 Douglas N. Harris and Matthew F. Larsen, *What Schools Do Families Want (and Why)?* (New Orleans, LA: Education Research Alliance for New Orleans, 2015).
- 2 See, for example, Patrick Denice and Betheny Gross, “Choice, Preferences, and Constraints: Evidence from Public School Applications in Denver,” *Sociology of Education* 89, no. 4 (2016); Paul Jargowsky, “Segregation, Neighborhoods, and Schools” in *Choosing Homes, Choosing Schools*, ed. Annette Lareau and Kimberly Goyette (New York, NY: Russell Sage Foundation, 2014), 97-136; Annette Lareau and Kimberly A. Goyette, *Choosing Homes, Choosing Schools* (New York, NY: Russell Sage Foundation, 2014); Douglas Lee Lauen, “Contextual Explanations of School Choice,” *Sociology of Education* 80, no. 3 (2007) 179-209.
- 3 Paul Teske, Jody Fitzpatrick, and Tracey O’Brien, *Drivers of Choice: Parents, Transportation, and School Choice* (Seattle, WA: Center on Reinventing Public Education, 2009).
- 4 Urban Institute Student Transportation Working Group, *Student Transportation and Educational Access* (Washington, DC: Urban Institute, 2017).
- 5 Ashley Jochim, et al., *How Parents Experience Public School Choice* (Seattle, WA: Center on Reinventing Public Education, 2014).
- 6 “HopSkipDrive Releases Inaugural Survey on State of Back to School Transportation in America,” PRWeb, August 16, 2016.
- 7 Denice and Gross, “Choice, Preferences, and Constraints” 300-320.
- 8 There are a handful of schools that serve specific attendance zones, as well as isolated cases in which transportation is offered to charter schools or the school offers to pay for a public transportation pass.
- 9 Denver Public Schools Transportation Services, “Transportation Facts & Figures,” Denver Public Schools, accessed May 10, 2017.
- 10 Maps for figures 1, 3, 4, and 5 generated using: David Kahle and Hadley Wickham, “ggmap: Spatial Visualization with ggplot2,” *The R Journal* 5, no. 1 (June 2013) 144-161.
- 11 Denice and Gross, “Choice, Preferences, and Constraints.”
- 12 All program code used for transit time and distance calculations will be released to allow other cities to replicate this analysis in their own locales.
- 13 Importantly, the overall finding—that focused attention on improving the performance of a school near the Northwest and Southwest regions of Denver leads to more accessibility via public transit to top-rated schools—is not sensitive to the particular choice of school. We considered a variety of lower-performing schools (those rated “on probation” or “on priority watch”), and the general result was substantively similar; however, the share of Northwest and Southwest residents who experience an increase in accessibility does shift with the particular location of the selected schools.

# About This Report

## Acknowledgments

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