

Building Equitable Student Transit (BEST)

Alex Karner, Georgia Institute of Technology & Nancy Erbstein, UC Davis

Neighborhood-level Analysis of Transit Needs

San Diego Unified School District Research Brief Series, Issue Two | May 2017

EXECUTIVE SUMMARY

Understanding where public transit service is needed most can help transit planners design and implement systems that function well to connect travelers to opportunities. In this research brief, we use a number of different data sources to identify locations in the San Diego Unified School District (SDUSD) that have a high need for transit service improvements, based on neighborhood demographics, school choices, and existing transit service. We highlight results for the City Heights neighborhood. The findings demonstrate an association between transportation conditions and some student performance outcomes, suggesting that long travel times may contribute to reduced academic performance.

INTRODUCTION

Affordable, convenient, and reliable transportation is fundamentally important for ensuring that students can attend school and perform at their best. If students are unable to get to school, they will be at a greater risk for a number of negative outcomes including chronic absence, dropout, and ill health. Historically, the link between students and schools was provided by the iconic yellow bus. But in an environment of school district budget cuts, school bus services across California are being scaled back or cut entirely. According to the 2010-2012 California Household Travel Survey, across the state, about 8% of students use public transit to get to school, roughly the same proportion who rely on the school bus. The proportion of students relying on public transit is likely to grow over time, as school bus service continues its decline.

In this research brief, we highlight the unique challenges faced by San Diego Unified School District (SDUSD) students and families that are likely to depend on public transit service. Substantial differences exist between those who rely on public

transit to meet daily needs and those who do not. According to the most recent ridership survey,¹ 72% of San Diego Metropolitan Transportation System (MTS) users have household incomes less than \$45,000/year. The equivalent figure for San Diego County is 36%. Additionally, 31% of MTS users did not have a vehicle available, compared to only 6% of households in San Diego County in the same situation.

Because average districtwide travel time analyses (such as those provided in Research Brief 1) can mask difficult transportation conditions faced by particular neighborhoods or schools, here we focus on City Heights, the San Diego Building Healthy Communities (BHC) site. City Heights is a neighborhood that has historically faced high levels of poverty, unemployment, and poor health outcomes, but which also possesses substantial community resources.² In addition to this neighborhood focus, we also present a method for identifying locations with particularly high demand for public transit and that face relatively long travel times to school.

¹ San Diego Association of Governments (2016). "2015 On-Board Transit Passenger Survey." ETC Institute. San Diego, CA.

² <http://www.calendow.org/places/city-heights/>

RESEARCH METHODS

Using student records from the 2014-2015 academic year, we calculated an expected travel time to school for each student.³ Times were calculated for both public transit and automobile. The transit travel time calculation relies on information on transit routes and schedules operated by MTS as of September 2, 2014. Travel times by public transit include walking to a transit stop, waiting for the vehicle, riding the vehicle, and walking to the destination. An average public transit travel time during the morning peak period (6:30am – 8:30am) was calculated for each census block in the district. In cases where walking to school would be faster than public transit, travel times reflect only walking speed. The automobile time was calculated using the Google Maps Distance Matrix Application Programming Interface (API).⁴

CITY HEIGHTS CONDITIONS

We identified 16 census tracts that correspond roughly to the location of the City Heights BHC site. These are shown in Figure 1, along with SDUSD's 16 neighborhood-serving high schools.

To assess the transportation conditions faced by students residing in City Heights compared to other SDUSD students, we identified those residing in the neighborhood during the 2014-2015 academic year. We then calculated census demographics, student demographics, and travel times (for individual students by walking or walking/public transit and automobile) for various comparison groups. Table 1 demonstrates that rates of both low vehicle ownership and poverty in City Heights are double and triple those in the rest of SDUSD, respectively. These demographics, combined with the proximity of City Heights to corridors where transit service is concentrated, mean that residents there will be much more likely to rely on public transit than the district as a whole.

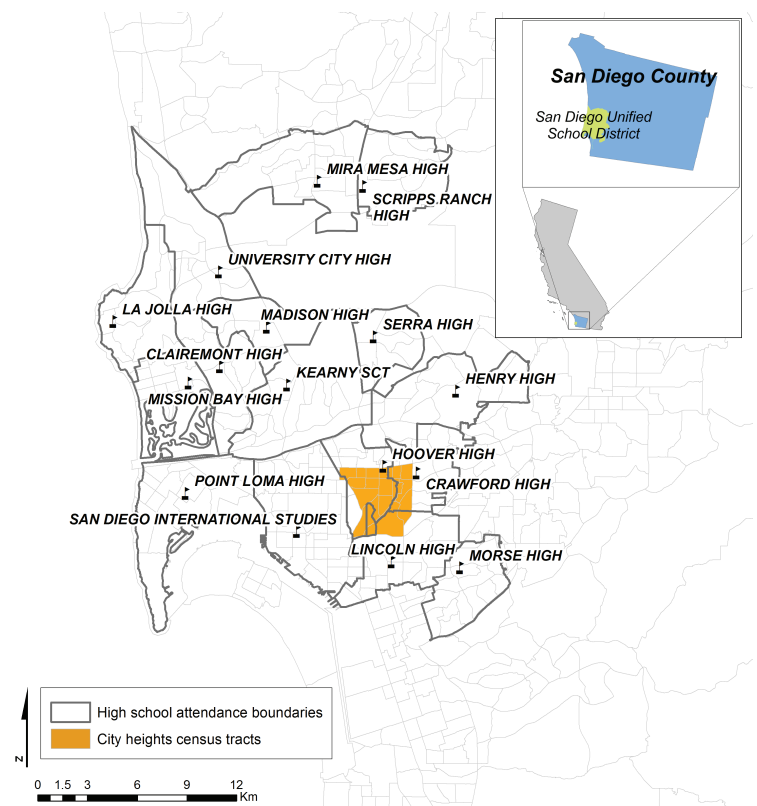


Figure 1. SDUSD neighborhood high school attendance boundaries (for reference) and City Heights census tracts.

Table 1. Census demographics (American Community Survey 2010-2014 five-year estimates) for City Heights and the rest of SDUSD.

	Total Families in Poverty	Proportion Families in Poverty	Total Zero-Vehicle Households	Proportion Zero-Vehicle Households
SDUSD	20,685	10%	27,564	7%
City Heights	5,048	29%	4,146	16%

³ Like Research Brief 1, the analysis presented here is limited by a lack of knowledge regarding which students actually take public transit. But it acknowledges that the propensity to use transit is dependent in part on demographic characteristics and so focuses on particular neighborhoods where transit use is likely to be high.

⁴ The API allows the user to generate many travel times and distances without having to type each into the Google Maps web interface.

Using individual student-level records, Table 2 summarizes the travel conditions faced by students across the SDUSD as they travel to school as well as key performance measures. Results are shown for each school level, and are shown separately for students residing in City Heights and those residing elsewhere in the district. On average, City Heights residents have lower GPAs than other SDUSD students. But they do not appear to be chronically absent⁵ at appreciably higher rates. In general, distances and travel times between home and school are shorter for students living in City Heights as compared to students residing elsewhere. But to the extent that these students rely on public transit as opposed to driving, their commute to school will be substantially more onerous than if they were to get a ride or drive themselves.

Table 2. Average travel distances, times by walking or walking/public transit and driving, and student-level attendance and performance information for students residing in City Heights (CH) and the rest of SDUSD (SD).

Grade Level	Number of Students	Distance (miles)	Walking or walking/transit time (minutes)	Driving time (minutes)	Average GPA	Average chronic absence rate
SD kindergarten	10,076	2.04	23.2	5.03	–	6.0%
CH kindergarten	1,536	1.29	14.1	3.72	–	6.3%
SD elementary	48,228	2.35	25.8	5.56	2.69	4.5%
CH elementary	7,564	1.66	16.9	4.39	2.31	4.3%
SD middle	13,077	3.60	37.0	7.83	2.89	4.4%
CH middle	2,129	3.31	30.1	7.10	2.63	4.5%
SD high	26,964	4.52	41.2	10.06	2.87	5.6%
CH high	4,352	4.32	35.8	10.29	2.61	4.2%

City Heights demographics suggest that more students there will rely on walking and public transit than in the district in general. The difference between travel times by driving and public transit are clear; students using public transit will travel approximately four times longer than those driving to traverse the same distance. Students taking transit will have to rise earlier and will have less time available for other activities. Participation in after-school activities might also be curtailed. Additionally, if a particular transit vehicle is late or if a student misses the bus, that student’s likelihood of being absent or tardy that day will also increase.

LOCATIONS MOST IN NEED OF PUBLIC TRANSIT TO INCREASE SCHOOL ACCESS

In addition to focusing on a specific neighborhood known to have a high need for reliable and affordable public transportation, travel time results developed for this work can be employed to identify other district locations experiencing high need for public transit service and facing relatively long travel times to school.

⁵ Here, students were identified as chronically absent if they missed 10% or more of enrolled days.

This analysis again uses the individual student-level records to determine travel times between student home and school locations for high school students only.⁶ To focus on places where students are likely to face burdensome travel times, we identify census tracts where there are high proportions of zero-vehicle households and families in poverty,⁷ and the average travel time by walking or walking/public transit exceeds 45 minutes. Applying these conditions to the SDUSD tracts results in the identification of 31 census tracts containing 4,784 students. The 31 tracts are shown in Figure 2 and illustrate some overlap with City Heights but tend to extend more deeply into southeast San Diego, specifically the Lincoln Heights and Encanto neighborhoods contained within the Lincoln High attendance boundary. The locations highlighted in Figure 2 are likely to be good candidate sites for transit service improvements.

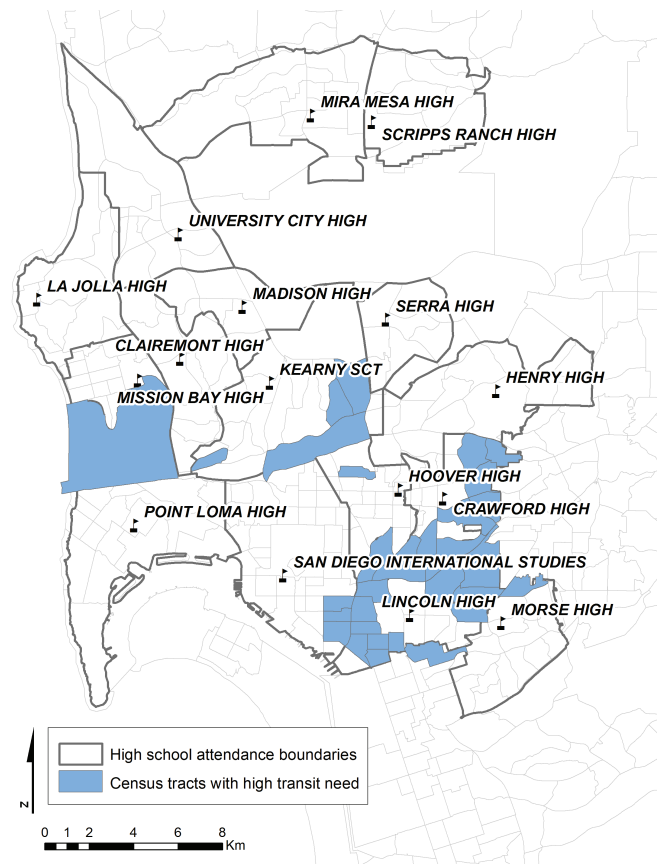
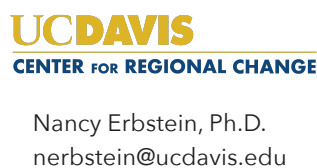


Figure 2. Identification of census tracts with a high need for public transit and relatively poor public transit service between students' home and school locations.

CONCLUSION

This research brief highlighted transportation conditions faced by SDUSD students who likely depend on public transit and demonstrated several ways that individual student record data can enrich the type of analyses conducted using only publicly available data (such as those presented in Research Brief 1).

These results can be used to inform and advocate for improved transportation conditions among SDUSD's neighborhoods with high need. They are also some of the first to identify potential associations between transportation and student performance outcomes, including GPA and chronic absence rates. The City Heights findings in particular suggest that in the SDUSD, transportation-related challenges might be associated with certain outcomes (e.g. reduced GPA) but not others (e.g. chronic absence rates).



⁶ High school students are much more likely than students in other grade levels to use public transportation. According to the 2010-2012 California Household Travel Survey, approximately 8% of high school students use public transit to get to school. The same figure for K-8 students is 2.4%.

⁷ We identified tracts that had proportions of zero-vehicle households and families in poverty that exceeded the median proportions in tracts where students resided. These were 4.9% for zero-vehicle households and 7.7% for families in poverty.