REACH National Center for Research on Education Access and Choice

The Role of School-Based Transportation in School Choice: Evidence from Detroit

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REACH in collaboration with the
Detroit Partnership for Education Equity & Research

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305C180025 to The Administrators of the Tulane Educational Fund, the Spencer Foundation through Grant 202000154, and the Skillman Foundation through Grant 21 07-2018003180 to Wayne State University. The opinions expressed are those of the authors and do not represent views of the foundations, Institute, or the U.S. Department of Education.

Motivation

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- Despite significant expansion of school choice options in many urban areas, school transit availability has not expanded at the same rate
  - Nationally, about the same percentage of students ride the school bus today (38%) as they did in the 1960s (Kontou et al., 2020)
- As students have enrolled in schools further from home, more have relied on their families to drive them rather than walk or bike
- School transportation availability can therefore create inequity in who has access to educational opportunity, creating mobility injustice (Bierbaum et al., 2021; Lenhoff et al., 2022; Speroni & Lenhoff, 2023)

Prior Literature

- In NYC, Trajkovski et al. (2021) found that proximity and school bus availability both mattered for kindergarten enrollment. Although distance to school mattered, school bus availability increased the likelihood of enrollment, even more than school quality did.

- In Detroit, Edwards (2021) found that students were more likely to enroll in their assigned school if they lived in areas with greater poverty and less car ownership. In addition, students were less likely to enroll in their assigned school if they lived further away from it and were therefore more likely to be eligible for the school bus.

- In New Orleans, Valant and Lincove (2023) found that car access is significantly associated with school choice preferences and enrollment.

Our Study

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- Prior research confounds school bus availability and eligibility or does not take into account the school transportation resources available in the full choice set.

- In this study, we measure both availability of the school bus at a given school and eligibility, or a student's reasonable likelihood of being able to use the school bus that is available. We then ask:

How is access to school-based transportation related to students' school choices in Detroit?

Study Context: Detroit

- Fragmented school choice landscape, with little transparency or regulation
- Detroit resident students can enroll in any DPSCD school, any charter school in the city or suburbs, and hundreds of suburban public schools through interdistrict choice
- Schools are not required to offer transportation to choice students
- DPSCD offers transportation only to students enrolled in their assigned school who live more than 0.75 miles away
- 50% of the schools Detroit students attend offer no transportation

Data

- We use student-level administrative records from Michigan's Center for Educational Performance and Information which include demographics, school enrolled, and census block of student's home for all students who live in Detroit and attend any public school in Michigan

- We conducted an audit of school transportation policies, calling each school enrolled by any Detroit student in 2021-22 to confirm the transportation offered and any rules for accessing it, including the bus stop locations

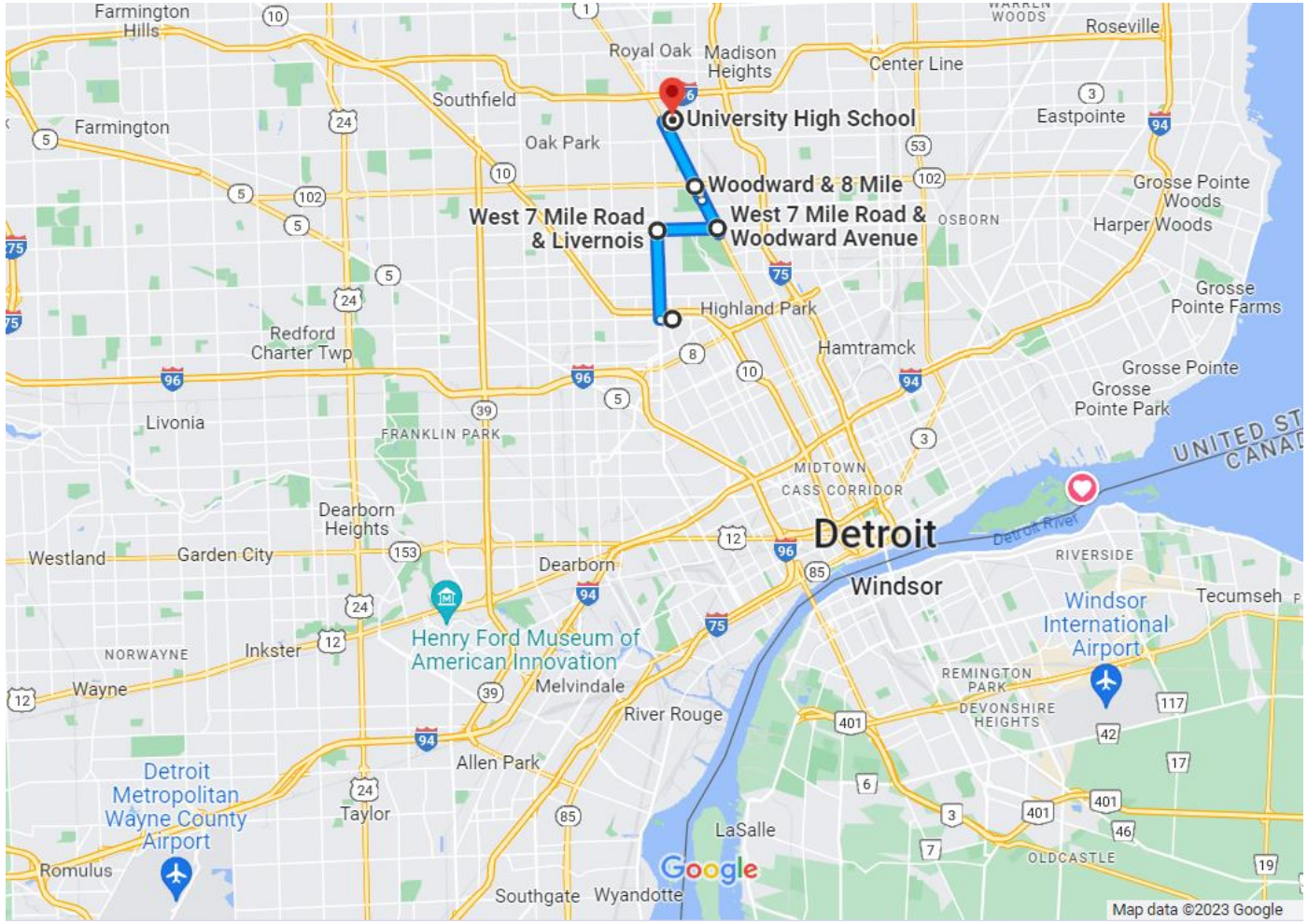
- We geo-coded the bus stop locations to determine each student's distance from each school's bus stops

- We also interviewed families in Detroit about how and why they chose the schools they did. We coded excerpts in which families mentioned school transportation as being relevant to their choices, and we present findings from that analysis to supplement the quantitative analysis.

Transit Offered at Schools Enrolled by Detroit Students

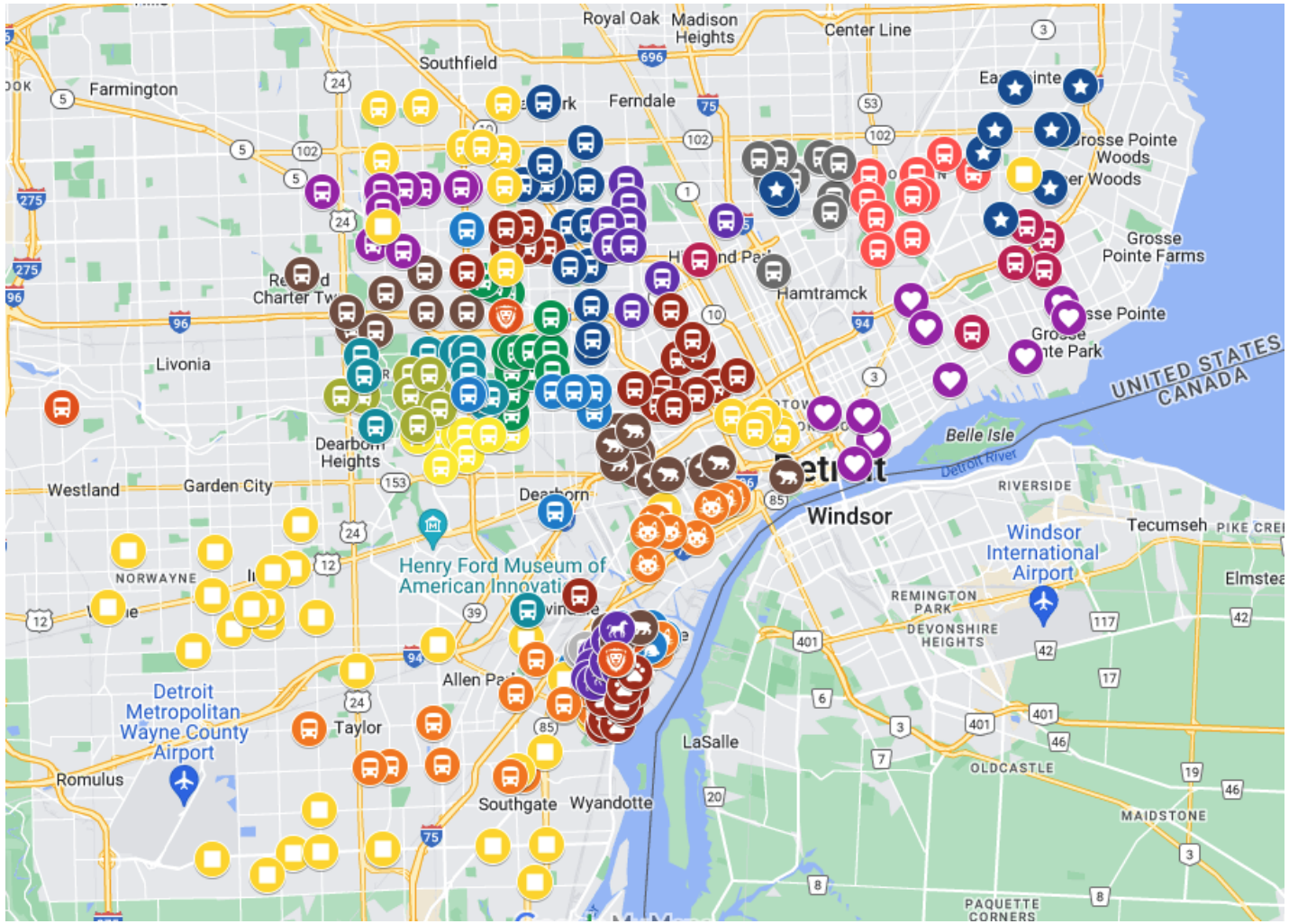
	All	DPSCD Neighborhood	DPSCD App/Exam	Detroit Charter	Suburban TPS	Suburban Charter
Traditional	75 (22%)	59 (100%)	3 (21%)	8 (16%)	3 (2%)	2 (3%)
Shuttle-Style	27 (8%)	-	-	11 (22%)	3 (2%)	13 (19%)
None	234 (70%)	-	11 (79%)	31 (62%)	139 (96%)	53 (78%)
Total	336 (100%)	59 (100%)	14 (100%)	50 (100%)	145 (100%)	68 (100%)

Example of Limited Shuttle Bus Stops: University High School



- 4 bus stops in Detroit

Example of Expansive Shuttle Bus Stops: River Rouge



- Nearly 300 bus stops in Detroit and other nearby suburbs

Transportation Availability and Eligibility Definitions

- **Available = Any type of school bus offered to DETROIT students**

- **Eligible**
  - DPSCD: District rules = Enrolled in assigned school and live 0.75 miles away
  - Charter/suburban shuttle: lives 1mi or less from shuttle stop
  - Charter/suburban traditional: based on specific rules (e.g., within 3mi of school; some cases no restrictions)

- **Eligibility by type: traditional, shuttle, none**

Methods

- We employed a discrete choice model (McFadden, 1974) to predict the odds a student would enroll in a school with their choice set given the school's transportation resources.

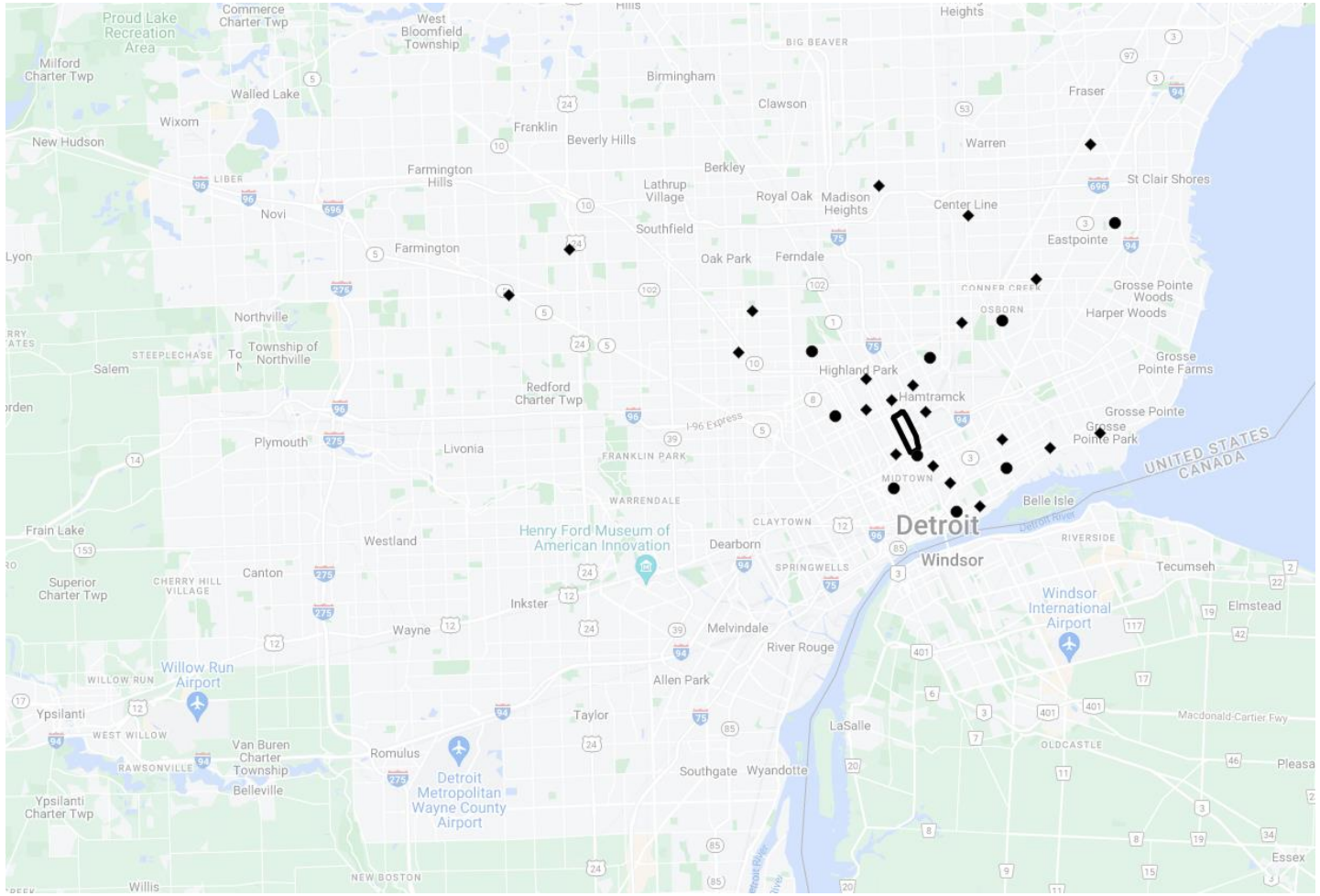
- We focus on three transportation variables:
  1. Transportation available
  2. Transportation eligible
  3. Transportation type (none, traditional school bus, shuttle bus)

- We constructed choice sets for students by census tract, to include all schools offering K and attended by at least one student in the tract, plus their assigned school and chosen school. (We excluded alternative and virtual schools.)

Kindergarten Student Characteristics, 2021-22

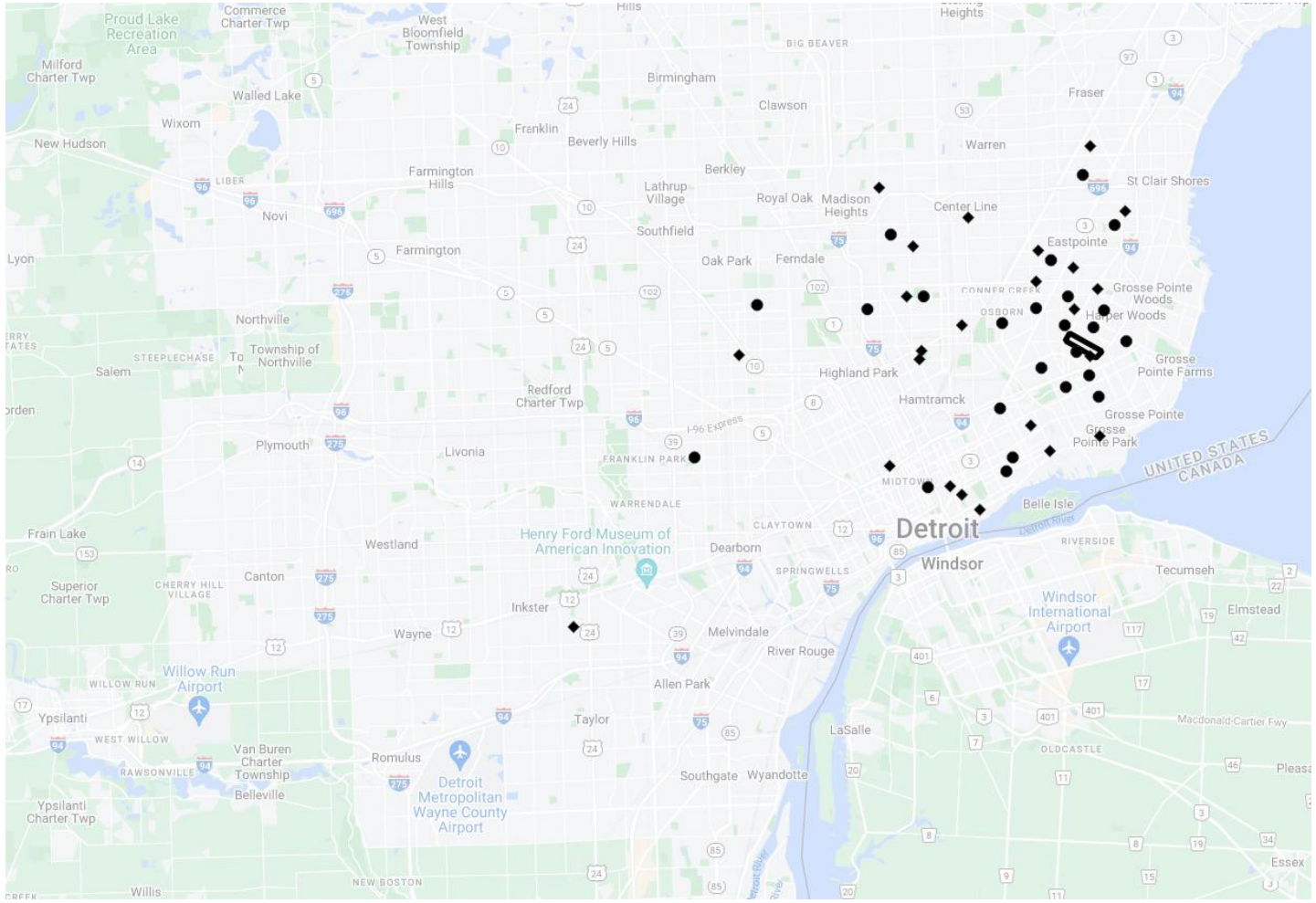
Variable	N	Mean	Std. dev.	Min	Max
Economically Disadvantaged	6,538	0.92	-	0	1
Special Education Recipient	6,538	0.07	-	0	1
English Learner	6,538	0.09	-	0	1
Female	6,538	0.49	-	0	1
Black	6,538	0.83	-	0	1
Hispanic	6,538	0.09	-	0	1
White or Middle Eastern	6,538	0.04	-	0	1
Other Race/Ethnicity	6,538	0.03	-	0	1
Distance to School (mi)	6,538	4.14	4.47	0.07	43.18
DPSCD Neighborhood School	6,538	0.40	-	0	1
Suburban TPS	6,538	0.06	-	0	1
DPSCD App/Exam School	6,538	0.05	-	0	1
Detroit Charter	6,538	0.34	-	0	1
Suburban Charter	6,538	0.15	-	0	1
Number of Schools in Choice Set	6,538	49.37	18.19	4.00	93.00

Example Choice Sets



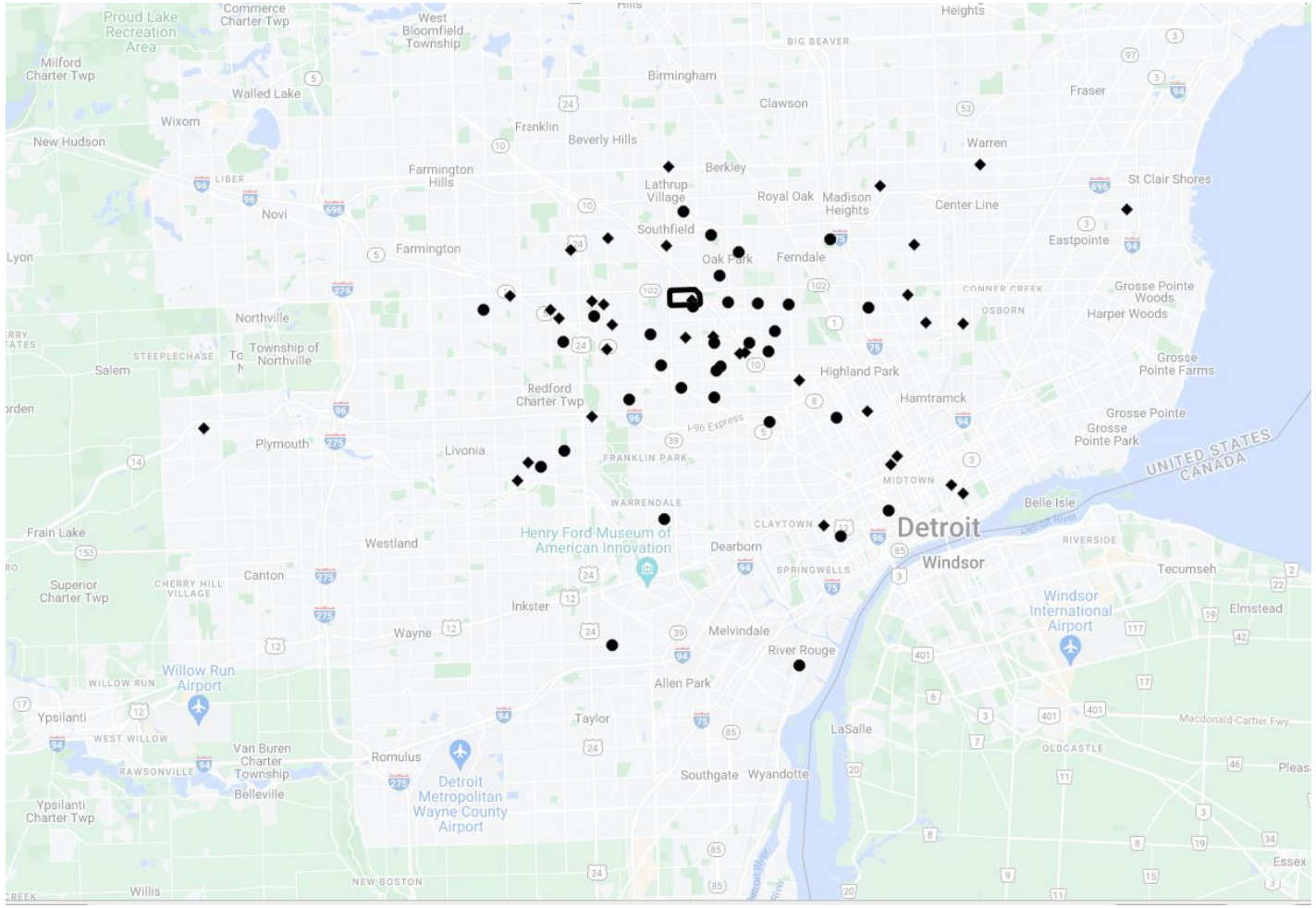
Smaller choice set: 30 schools (~1SD below mean)

Example Choice Sets



Average choice set: 49 schools (at mean)

Example Choice Sets



Larger choice set: 67 schools (~1SD above mean)

Kindergarten Choice Set Characteristics, 2021-22

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Variable	N	Mean	Std. dev.	Min	Max
Distance to Choice (mi)	287	7.26	1.46	2.98	10.64
Pct. of Neighbors Attending Choice	287	0.03	0.02	0.01	0.25
DPSCD Neighborhood School	287	0.30	0.09	0.07	0.60
Suburban TPS	287	0.09	0.06	0.00	0.37
DPSCD App/Exam School	287	0.10	0.06	0.00	0.38
Detroit Charter	287	0.34	0.09	0.15	0.75
Suburban Charter	287	0.17	0.08	0.00	0.33
Transportation Offered	287	0.49	0.09	0.18	0.80
Transportation Eligible	287	0.10	0.05	0.00	0.50

Model (part 1)

$$\Pr(Y_{ik} = k) = \frac{e^{Z_{ik}\beta}}{\sum_k e^{Z_{ik}\beta}}$$

The probability that for a given student (*i*), their chosen school (*Y*) will be choice *k*, as a function of choice characteristics (*Z*), expressed as an odds ratio.

Model (part 2)

$$Z_{ik}\beta = \beta_1(\text{School Type}_k) + \beta_2(\text{Distance to Choice}_{ik}) + \beta_3(\text{School Demographics}_k) + \beta_3(\text{School Transportation}_k) + \beta_4(\text{School Quality}_k)\,\mu_i + \varepsilon_{ik}$$

- *School type* = DPSCD neighborhood, DPSCD app/exam, Detroit charter, suburban charter, suburban TPS
- *Distance to choice* = as-crow-flies, in miles
- *School demographics* = racial and socioeconomic composition
- *School transportation* = offered, eligible , or eligible by type
- *School quality* = MI School Index Score (2019)
- μ = student fixed effects (allowing for within-choice-set analysis)

Methods

We complement our discrete choice model findings with qualitative data from parent interviews:

- 54 interviews, February-April 2022
- Interviews focused on parents' school-choosing, asking about the full history of their school choices for all children
- Interviews are not exclusively focused on Kindergarten choice, but offer some insight into why we find positive associations between school-based transportation and school choices

Findings

	(1) Transportation Offered	(2) Transportation Eligible	(3) Transportation Eligible by Type
Choice Type (ref=DPSCD neighborhood)			
DPSCD app/exam	0.81**	0.75***	0.75***
Detroit charter	1.07	0.96	0.96
Suburban charter	1.23***	1.12*	1.12*
Suburban TPS	0.86*	0.74***	0.74***
Choice Demographics			
Pct. Economically Disadvantaged+	1.11***	1.12***	1.12***
Pct. Black+	1.04	1.04	1.04
Pct. Hispanic+	1.01	1.01	1.01
Pct. of Neighbors Attending Choice+	1.39***	1.38***	1.38***
Distance to Choice (mi)	0.85***	0.86***	0.86***
MI School Index Score (2019)	1.01***	1.01***	1.01***
Transp. Offered	1.15***	-	-
Transp. Eligible	-	1.35***	-
Transp. Eligibility Type (ref=none)			
Traditional school bus	-	-	1.33***
Shuttle-style bus	-	-	1.45***
N students	6,538	6,538	6,538
N student-observations	300,487	300,487	300,487

*p<0.05, **p<0.01, ***p<0.001

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Discrete Choice Model Predicting Enrollment

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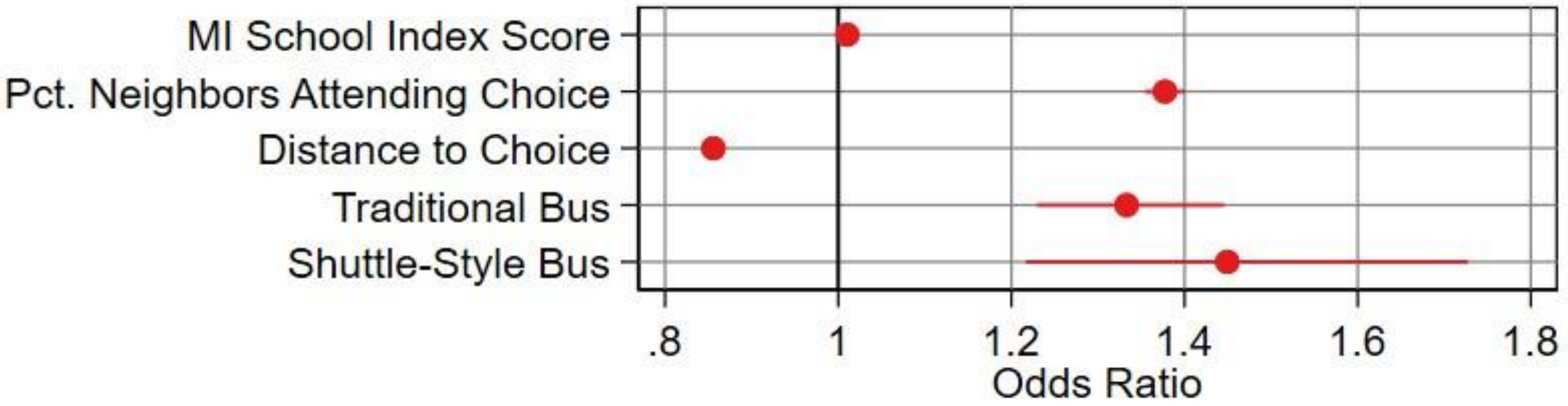


Discrete Choice Model Predicting Enrollment by Block Group Pct. Car Ownership

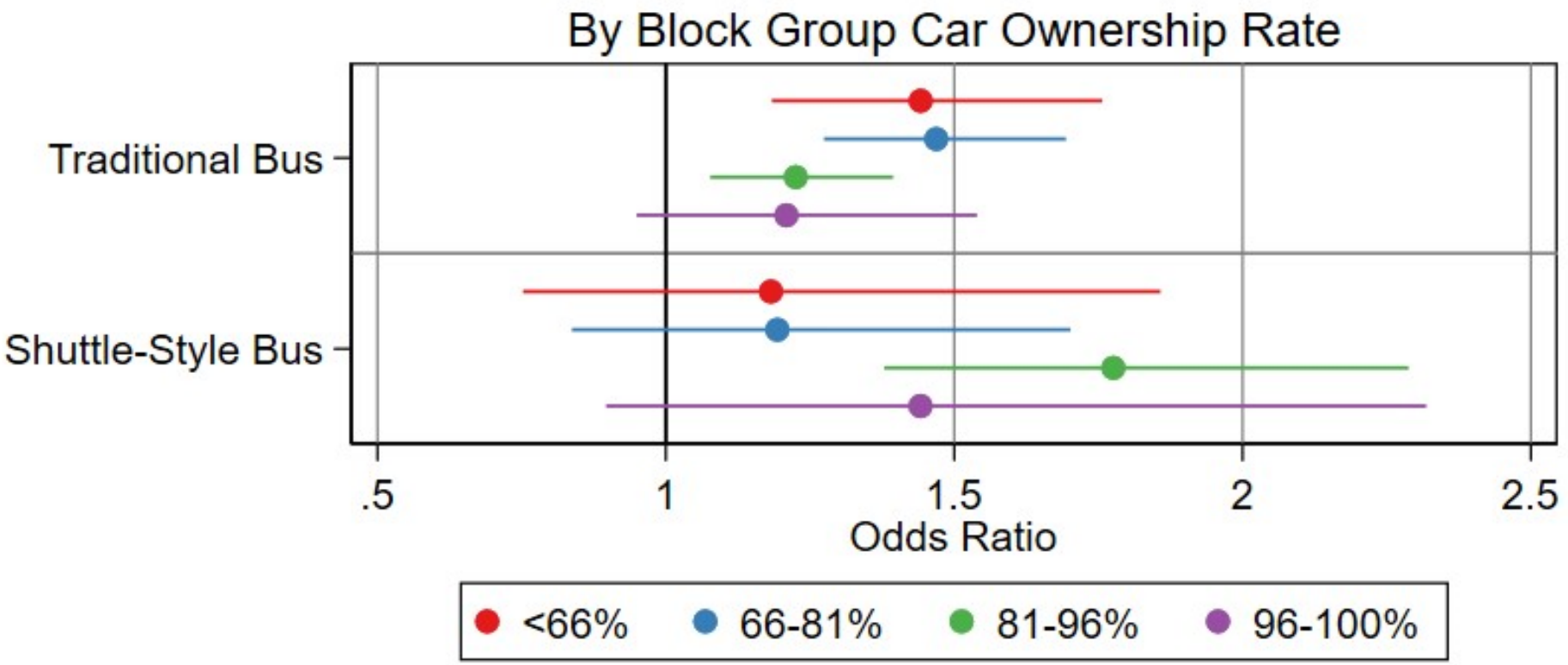
	(1) <66% Cars (<-1 S.D.)	(2) 66-81% Cars (-1 to 0 S.D.)	(3) 81-96% Cars (0 to 1 S.D.)	(4) 96-100% Cars (>1 S.D.)
Choice Type (ref=DPSCD neighborhood)				
DPSCD app/exam	0.74	0.71**	0.79*	0.77
Detroit charter	0.90	0.89	0.96	1.32*
Suburban charter	0.91	1.12	1.12	1.42**
Suburban TPS	0.59*	0.73**	0.75**	0.93
Choice Demographics				
Pct. economically disadvantaged+	1.23***	1.16***	1.10**	1.01
Pct. Black+	1.12	1.01	1.06	0.95
Pct. Hispanic+	1.11	0.96	1.04	0.95
Pct. of neighbors attending choice+	1.31***	1.37***	1.41***	1.41***
Distance to choice (mi)	0.86***	0.86***	0.85***	0.87***
Michigan School Index score (2019)	1.01***	1.01***	1.01***	1.01***
Transp. Eligibility Type (ref=none)				
Traditional school bus	1.44***	1.47***	1.23**	1.21
Shuttle-style bus	1.18	1.19	1.78***	1.44
N students	896	2,108	2,800	734
N student-observations	33,546	97,726	135,612	33,603

*p<0.05, **p<0.01, ***p<0.001

Note: Coefficients are presented as odds ratios.

+Variables are standardized, and coefficients represent the odds associated with a standard-deviation change.

Discrete Choice Model by Block Group Pct. Car Ownership



How School Transportation Shapes Families' Choices

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Families factor school buses into their choice set, especially if they lack transportation resources or have schedule constraints.

I knew we only had the one car [which my husband uses for work], and that I would need them to get on the bus. And then the other school, I can't think of the name it... they wouldn't pick up here. We were off by like two blocks. So the only option I did have was [our neighborhood school].

I always put them in school, whatever school is in the area where we live...I did it that way because it would be easier for them to get to school, like, to be put on the [school bus] transportation route and, um, to get there, if we had to walk or whatever.

How School Transportation Shapes Families' Choices

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School-based transportation increases access for families who face geographic and transportation-related constraints.

In the mornings they tend to get up at 5:30 in the morning because their bus comes to the stop...I have a newborn, so I'm not always able to take them to the bus stop. So [if I can't bring them to the stop] my mom would have to take them...Because my husband goes to work at three or four o'clock in the morning, he's not able to take them.

How School Transportation Shapes Families' Choices

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Now we had moved...and [the principal] put a bus stop right by my house for my kids to go back to [the school], and they end up going back to [that school]...Every time I moved, [the principal] made a bus stop by my house.

Summary of Findings

- School transit availability was associated with 15% greater odds of enrollment.
- School transit eligibility was significantly associated with enrollment. Students had 35% greater odds of enrolling in a school where they were eligible for school-based transportation.
  - Overall, estimates for shuttle-style transportation were larger but much less precise than for traditional school bus transportation.
  - Estimates differed notably based on block group-level car ownership rates.
- Even controlling for transit eligibility, distance to school is associated with a decreased likelihood of enrollment.

Discussion

- Difficulty of measuring transportation eligibility in a fragmented choice landscape

- Persistent effect of distance

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Let us know what you think!

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Student Characteristics by Sample Inclusion, 2021-22

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Variable	Included (N=6,538)	Excluded (N=1,239)
Economically Disadvantaged	0.92	0.90*
Special Education Recipient	0.07	0.05*
English Learner	0.09	0.14***
Female	0.49	0.50
Black	0.83	0.80**
Hispanic	0.09	0.12**
White or Middle Eastern	0.04	0.06*
Other Race/Ethnicity	0.03	0.02
Distance to School (mi)	4.13	4.04
DPSCD Neighborhood School	0.39	0.21***
Suburban TPS	0.06	0.05
DPSCD App/Exam School	0.05	0.12***
Detroit Charter	0.34	0.40***
Suburban Charter	0.15	0.21***

**p<0.05, **p<0.01, ***p<0.001*