

**Supplementary Appendix for  
“Driving Turnout:  
The Effect of Car Ownership on Electoral Participation”**

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## A Matching Process

Matching registrants to the drivers license file is relatively simple, as both files include names, addresses, and birth years. Overall, 96.7% of registered voters match to a drivers license. Most registrants (84.7%) match exactly on name, address, and birth year. The remainder match on variations of these variables or fuzzy matches that allow for small differences in full names or typos in birth years.

Matching registrants to the automobile registration data is somewhat more challenging, as this data includes only names and addresses. Our ultimate goal is to identify the people who have access to a car through someone in their household owning a car, rather than only those who personally own an automobile. Household ownership is a better measure of car access than personal ownership. For example, one person could own a car, but their spouse, family members, or others in the household may also have access to that vehicle. First, we matched 54.0% of registrants to at least one automobile using their exact name and address. An additional 24.1% of registrants live in the same household (based on the same full address) as a car owner. An additional 10.8% match on variations of name and address, and 0.90% matched on fuzzy matches or variations of name and address. Overall, we matched 89.7% of registrants to an automobile, and the average voter matched to 2.4 unique cars.

## B Effect of Car Access on 2016 Participation

In Table A1 we replicate the analyses presented in the main text of the paper but with 2016 general and primary election turnout as the dependent variable. These results largely corroborate the primary analyses in the paper, and show that across a variety of modeling strategies, access to a car has a substantively large effect on participation.

Table A1: Effect of Automobile Access on 2016 Voter Turnout

	<i>Dependent variable:</i>							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.255* (0.001)	0.248* (0.001)	0.215* (0.001)	0.119* (0.002)	0.107* (0.001)	0.106* (0.001)	0.101* (0.001)	0.049* (0.002)
Male	-0.042* (0.0004)	-0.042* (0.0004)	-0.041* (0.0003)	-0.071* (0.002)	-0.010* (0.0004)	-0.010* (0.0004)	-0.010* (0.0004)	-0.018* (0.002)
White	0.105* (0.0005)	0.106* (0.001)	0.034* (0.001)	0.028* (0.003)	0.060* (0.001)	0.049* (0.001)	0.048* (0.001)	0.022* (0.003)
Age	0.003* (0.00001)	0.003* (0.00001)	0.003* (0.00001)	0.001* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.004* (0.0001)
Constant	0.270* (0.001)				-0.327* (0.001)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	5,878,275	5,878,275	5,878,275	346,093	5,047,643	5,047,643	5,047,643	256,929
R <sup>2</sup>	0.062	0.070	0.099	0.243	0.104	0.111	0.133	0.310
Adjusted R <sup>2</sup>	0.062	0.070	0.099	0.147	0.104	0.111	0.132	0.194

*Note:*

\*p<0.01

## C Effect of Car Access on 2020 Participation

Following the 2018 election, the state of Michigan passed a law allowing no-excuse absentee voting. In line with the theory and results outlined in the main body of the paper, this expansion of absentee voting might lower inequalities in participation between those with and without access to a car given that people without access to a car could opt to instead vote absentee. On the other hand, allowing universal absentee voting might not mobilize this segment of the population given the need (despite eligibility) to fill out and mail in a request for an absentee ballot by each voter.

To examine this question, we assessed 2020 voter turnout among the sample of people for whom we had 2018 data. In Table A2 we replicate the analyses presented in the main text of the paper but with 2020 general election turnout as the dependent variable. These results largely corroborate the primary analyses in the paper, and show that – even after absentee voting was expanded in its eligibility – transportation still remained a powerful barrier to participation.

Table A2: Effect of Automobile Access on 2020 Voter Turnout

	<i>Dependent variable:</i>					
	2020 General Turnout					
	(1)	(2)	(3)	(4)	(5)	(6)
Auto in HH	0.300* (0.001)	0.292* (0.001)	0.251* (0.001)			
Drivers License				0.548* (0.001)	0.545* (0.001)	0.506* (0.001)
Male	-0.034* (0.0003)	-0.033* (0.0003)	-0.033* (0.0003)	-0.041* (0.0003)	-0.040* (0.0003)	-0.040* (0.0003)
White	0.107* (0.0005)	0.112* (0.0005)	0.041* (0.001)	0.137* (0.0004)	0.137* (0.0005)	0.046* (0.001)
Age	0.004* (0.00001)	0.004* (0.00001)	0.004* (0.00001)	0.004* (0.00001)	0.004* (0.00001)	0.004* (0.00001)
Constant	0.201* (0.001)			-0.075* (0.001)		
FE for County		✓			✓	
FE for Precinct			✓			✓
Observations	6,387,524	6,387,524	6,387,524	6,387,524	6,387,524	6,387,524
R <sup>2</sup>	0.085	0.096	0.132	0.093	0.104	0.144
Adjusted R <sup>2</sup>	0.085	0.096	0.131	0.093	0.104	0.143

*Note:*

\*p&lt;0.01

## D Effect of Drivers License on Turnout

Due to the logistical aid that having a drivers license as a form of identification might provide to potential voters, in this section we assess whether the effects of access to a car that we examine in the main body of the paper are confounded by access to a drivers license.

First, in Figure A1 we show that the rate of matching to the drivers' license database (i.e. the likelihood of having a drivers' license) varies across racial and age categories, though by less than the amount of variation in access to a car, as we show in Appendix I.

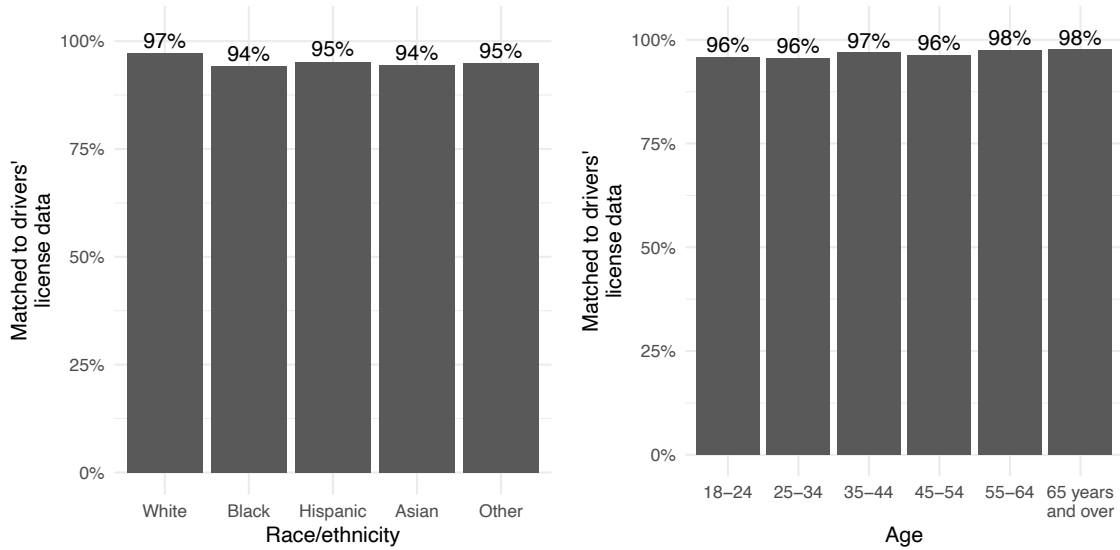


Figure A1: Differences in Drivers' License among Race and Age Subgroups

In Table A3 and Table A4, we demonstrate that access to a drivers license also has an effect on voter participation.

Table A3: Effect of Drivers Licenses on 2018 Voter Turnout

	<i>Dependent variable:</i>							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Drivers License	0.457* (0.001)	0.456* (0.001)	0.433* (0.001)	0.293* (0.004)	0.255* (0.001)	0.256* (0.001)	0.245* (0.001)	0.150* (0.004)
Male	-0.027* (0.0004)	-0.026* (0.0004)	-0.026* (0.0004)	-0.047* (0.002)	-0.016* (0.0004)	-0.015* (0.0004)	-0.015* (0.0004)	-0.022* (0.001)
White	0.133* (0.0005)	0.133* (0.001)	0.049* (0.001)	0.033* (0.003)	0.074* (0.0005)	0.086* (0.001)	0.047* (0.001)	0.030* (0.002)
Age	0.005* (0.00001)	0.005* (0.00001)	0.005* (0.00001)	0.003* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.004* (0.00005)
Constant	-0.172* (0.001)				-0.362* (0.001)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	6,407,557	6,407,557	6,407,557	409,192	6,140,366	6,140,366	6,140,366	372,898
R <sup>2</sup>	0.082	0.093	0.123	0.220	0.100	0.108	0.128	0.247
Adjusted R <sup>2</sup>	0.082	0.093	0.123	0.137	0.100	0.108	0.127	0.159

Note:

\*p<0.01

Table A4: Effect of Drivers Licenses on 2016 Voter Turnout

	<i>Dependent variable:</i>							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Drivers License	0.530* (0.001)	0.527* (0.001)	0.504* (0.001)	0.358* (0.004)	0.179* (0.001)	0.179* (0.001)	0.173* (0.001)	0.115* (0.004)
Male	-0.049* (0.0004)	-0.048* (0.0003)	-0.047* (0.0003)	-0.075* (0.002)	-0.012* (0.0004)	-0.013* (0.0004)	-0.012* (0.0004)	-0.019* (0.002)
White	0.130* (0.0005)	0.126* (0.001)	0.036* (0.001)	0.026* (0.003)	0.072* (0.0005)	0.059* (0.001)	0.049* (0.001)	0.022* (0.003)
Age	0.003* (0.00001)	0.003* (0.00001)	0.003* (0.00001)	0.001* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.004* (0.0001)
Constant	-0.015* (0.001)				-0.404* (0.001)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	5,878,275	5,878,275	5,878,275	346,093	5,047,643	5,047,643	5,047,643	256,929
R <sup>2</sup>	0.080	0.089	0.120	0.250	0.105	0.112	0.134	0.310
Adjusted R <sup>2</sup>	0.080	0.089	0.119	0.156	0.105	0.112	0.133	0.194

Note:

\*p<0.01



## **E Effects of Automobile Access and Drivers Licenses with Additional Controls**

Here we supplement our previous analyses with additional data on registrants' household income, education, and homeowner status using commercial data provided on the voter file from L2. The use of these data comes with several tradeoffs. Income and homeownership status are estimated by L2 using proprietary data and models that have been validated by L2, but these data are not available for all registrants. Nevertheless, we include them here as an additional robustness check to ensure that car access is not simply a proxy for income or education levels. These models confirm our primary results presented in the main paper. However, the coefficients on income, education, and renting should be interpreted with caution, and missing data and modeled covariates may bias the results.

Tables A5 and A6 present models with the effect of automobile access with these control variables on turnout in the 2018 and 2016 elections, and Tables A7 and A7 present results for the effect of drivers licenses.

Table A5: Effect of Car Access on 2018 Election Turnout, with Additional Controls

	<i>Dependent variable:</i>							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.180* (0.001)	0.179* (0.001)	0.177* (0.001)	0.109* (0.003)	0.131* (0.001)	0.133* (0.001)	0.136* (0.001)	0.080* (0.003)
Male	-0.017* (0.0005)	-0.016* (0.0005)	-0.015* (0.0005)	-0.025* (0.003)	-0.017* (0.001)	-0.016* (0.001)	-0.015* (0.001)	-0.013* (0.003)
White	0.025* (0.001)	0.033* (0.001)	0.031* (0.001)	0.003 (0.005)	-0.001 (0.001)	0.020* (0.001)	0.041* (0.001)	0.021* (0.005)
Age	0.005* (0.00002)	0.005* (0.00002)	0.005* (0.00002)	0.003* (0.0001)	0.009* (0.00002)	0.009* (0.00002)	0.009* (0.00002)	0.005* (0.0001)
Est. HH Income	0.0005* (0.00000)	0.0004* (0.00000)	0.0002* (0.00001)	-0.0002* (0.00003)	0.0002* (0.00001)	0.0001* (0.00001)	0.00001 (0.00001)	-0.0001* (0.00003)
HS Diploma	0.022* (0.001)	0.020* (0.001)	0.014* (0.001)	0.016* (0.004)	0.005* (0.001)	0.004* (0.001)	0.002 (0.001)	0.017* (0.004)
Vocational Degree	0.061* (0.005)	0.062* (0.005)	0.056* (0.005)	0.083* (0.030)	0.040* (0.005)	0.040* (0.005)	0.038* (0.005)	0.080* (0.029)
Some College	0.055* (0.001)	0.050* (0.001)	0.037* (0.001)	0.030* (0.005)	0.045* (0.001)	0.040* (0.001)	0.031* (0.001)	0.023* (0.005)
College Degree	0.095* (0.001)	0.084* (0.001)	0.067* (0.001)	0.043* (0.005)	0.065* (0.001)	0.057* (0.001)	0.044* (0.001)	0.047* (0.005)
Grad Degree	0.129* (0.001)	0.112* (0.001)	0.088* (0.001)	0.059* (0.006)	0.111* (0.002)	0.095* (0.002)	0.072* (0.002)	0.066* (0.006)
Renter	-0.101* (0.001)	-0.105* (0.001)	-0.105* (0.001)	-0.035* (0.009)	-0.077* (0.001)	-0.081* (0.001)	-0.088* (0.001)	-0.064* (0.008)
Constant	0.168* (0.002)				-0.247* (0.002)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	3,434,399	3,434,399	3,434,399	173,024	3,363,529	3,363,529	3,363,529	161,238
R <sup>2</sup>	0.075	0.082	0.101	0.291	0.102	0.109	0.126	0.315
Adjusted R <sup>2</sup>	0.075	0.082	0.100	0.119	0.102	0.109	0.125	0.139

Note:

\*p<0.01

Table A6: Effect of Car Access on 2016 Election Turnout, with Additional Controls

	<i>Dependent variable:</i>							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.141* (0.001)	0.140* (0.001)	0.136* (0.001)	0.085* (0.003)	0.074* (0.001)	0.073* (0.001)	0.079* (0.001)	0.044* (0.003)
Male	-0.036* (0.0004)	-0.035* (0.0004)	-0.035* (0.0004)	-0.050* (0.003)	-0.014* (0.0005)	-0.015* (0.0005)	-0.014* (0.0005)	-0.012* (0.003)
White	0.030* (0.001)	0.034* (0.001)	0.021* (0.001)	0.0004 (0.005)	0.029* (0.001)	0.020* (0.001)	0.052* (0.001)	0.019* (0.005)
Age	0.003* (0.00001)	0.003* (0.00001)	0.003* (0.00001)	0.001* (0.0001)	0.009* (0.00002)	0.009* (0.00002)	0.009* (0.00002)	0.005* (0.0001)
Est. HH Income	0.0004* (0.00000)	0.0003* (0.00000)	0.0002* (0.00000)	-0.0001 (0.00003)	-0.0001* (0.00000)	-0.0001* (0.00001)	-0.0001* (0.00001)	-0.0001* (0.00003)
HS Diploma	0.0002 (0.001)	-0.001 (0.001)	-0.005* (0.001)	-0.005 (0.004)	-0.013* (0.001)	-0.013* (0.001)	-0.015* (0.001)	0.023* (0.005)
Vocational Degree	0.023* (0.004)	0.024* (0.004)	0.020* (0.004)	0.034 (0.028)	0.009 (0.005)	0.010 (0.005)	0.008 (0.005)	0.057 (0.029)
Some College	0.037* (0.001)	0.035* (0.001)	0.024* (0.001)	0.020* (0.005)	0.021* (0.002)	0.022* (0.002)	0.014* (0.002)	0.023* (0.006)
College Degree	0.060* (0.001)	0.053* (0.001)	0.039* (0.001)	0.012* (0.005)	0.027* (0.001)	0.028* (0.001)	0.020* (0.001)	0.033* (0.005)
Grad Degree	0.086* (0.001)	0.075* (0.001)	0.055* (0.001)	0.027* (0.006)	0.052* (0.002)	0.053* (0.002)	0.039* (0.002)	0.056* (0.006)
Renter	-0.074* (0.001)	-0.076* (0.001)	-0.076* (0.001)	-0.018 (0.008)	-0.062* (0.001)	-0.061* (0.001)	-0.066* (0.001)	-0.042* (0.009)
Constant	0.416* (0.002)				-0.318* (0.002)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	3,307,509	3,307,509	3,307,509	155,254	3,025,023	3,025,023	3,025,023	121,289
R <sup>2</sup>	0.052	0.056	0.078	0.300	0.104	0.111	0.135	0.356
Adjusted R <sup>2</sup>	0.052	0.056	0.077	0.115	0.104	0.111	0.134	0.157

Note:

\*p<0.01

Table A7: Effect of Drivers License on 2018 Election Turnout, with Additional Controls

	<i>Dependent variable:</i>							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Drivers License	0.337* (0.002)	0.335* (0.002)	0.332* (0.002)	0.241* (0.011)	0.186* (0.002)	0.184* (0.002)	0.183* (0.002)	0.158* (0.011)
Male	-0.017* (0.0005)	-0.016* (0.0005)	-0.016* (0.0005)	-0.023* (0.003)	-0.016* (0.001)	-0.015* (0.001)	-0.014* (0.001)	-0.012* (0.003)
White	0.036* (0.001)	0.042* (0.001)	0.030* (0.001)	0.002 (0.005)	0.007* (0.001)	0.026* (0.001)	0.040* (0.001)	0.020* (0.005)
Age	0.005* (0.00002)	0.005* (0.00002)	0.005* (0.00002)	0.003* (0.0001)	0.009* (0.00002)	0.009* (0.00002)	0.009* (0.00002)	0.005* (0.0001)
Est. HH Income	0.001* (0.00000)	0.0004* (0.00000)	0.0003* (0.00001)	-0.0001* (0.00003)	0.0002* (0.00001)	0.0001* (0.00001)	0.00003* (0.00001)	-0.0001* (0.00003)
HS Diploma	0.030* (0.001)	0.028* (0.001)	0.021* (0.001)	0.017* (0.005)	0.010* (0.001)	0.010* (0.001)	0.007* (0.001)	0.017* (0.004)
Vocational Degree	0.071* (0.005)	0.072* (0.005)	0.066* (0.005)	0.088* (0.030)	0.047* (0.005)	0.048* (0.005)	0.045* (0.005)	0.084* (0.029)
Some College	0.061* (0.001)	0.056* (0.001)	0.042* (0.001)	0.030* (0.005)	0.049* (0.001)	0.045* (0.001)	0.035* (0.001)	0.023* (0.005)
College Degree	0.103* (0.001)	0.092* (0.001)	0.074* (0.001)	0.043* (0.005)	0.071* (0.001)	0.063* (0.001)	0.049* (0.001)	0.048* (0.005)
Grad Degree	0.138* (0.001)	0.121* (0.001)	0.095* (0.001)	0.061* (0.006)	0.118* (0.002)	0.102* (0.002)	0.078* (0.002)	0.068* (0.006)
Renter	-0.119* (0.001)	-0.123* (0.001)	-0.119* (0.001)	-0.036* (0.009)	-0.091* (0.001)	-0.095* (0.001)	-0.099* (0.001)	-0.065* (0.009)
Constant	-0.0001 (0.003)				-0.311* (0.003)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	3,434,399	3,434,399	3,434,399	173,024	3,363,529	3,363,529	3,363,529	161,238
R <sup>2</sup>	0.073	0.080	0.099	0.286	0.100	0.106	0.123	0.311
Adjusted R <sup>2</sup>	0.073	0.080	0.098	0.113	0.100	0.106	0.122	0.135

Note:

\*p<0.01

Table A8: Effect of Drivers License on 2016 Election Turnout, with Additional Controls

	<i>Dependent variable:</i>							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Drivers License	0.365* (0.002)	0.363* (0.002)	0.360* (0.002)	0.335* (0.011)	0.117* (0.002)	0.117* (0.002)	0.117* (0.002)	0.133* (0.012)
Male	-0.037* (0.0004)	-0.036* (0.0004)	-0.035* (0.0004)	-0.049* (0.003)	-0.014* (0.0005)	-0.014* (0.0005)	-0.014* (0.0005)	-0.011* (0.003)
White	0.038* (0.001)	0.040* (0.001)	0.020* (0.001)	-0.001 (0.005)	0.033* (0.001)	0.024* (0.001)	0.052* (0.001)	0.018* (0.005)
Age	0.003* (0.00001)	0.003* (0.00001)	0.003* (0.00001)	0.001* (0.0001)	0.009* (0.00002)	0.009* (0.00002)	0.009* (0.00002)	0.005* (0.0001)
Est. HH Income	0.0005* (0.00000)	0.0004* (0.00000)	0.0002* (0.00000)	-0.00005 (0.00003)	-0.0001* (0.00000)	-0.00003* (0.00001)	-0.0001* (0.00001)	-0.0001 (0.00003)
HS Diploma	0.006* (0.001)	0.005* (0.001)	0.0002 (0.001)	-0.005 (0.004)	-0.009* (0.001)	-0.009* (0.001)	-0.012* (0.001)	0.023* (0.005)
Vocational Degree	0.032* (0.004)	0.032* (0.004)	0.027* (0.004)	0.040 (0.028)	0.013 (0.005)	0.014* (0.005)	0.012 (0.005)	0.059 (0.029)
Some College	0.042* (0.001)	0.039* (0.001)	0.028* (0.001)	0.019* (0.005)	0.023* (0.002)	0.024* (0.002)	0.016* (0.002)	0.022* (0.006)
College Degree	0.066* (0.001)	0.059* (0.001)	0.045* (0.001)	0.013* (0.005)	0.030* (0.001)	0.031* (0.001)	0.023* (0.001)	0.033* (0.005)
Grad Degree	0.092* (0.001)	0.082* (0.001)	0.061* (0.001)	0.028* (0.006)	0.056* (0.002)	0.057* (0.002)	0.043* (0.002)	0.057* (0.006)
Renter	-0.087* (0.001)	-0.089* (0.001)	-0.085* (0.001)	-0.019 (0.008)	-0.070* (0.001)	-0.068* (0.001)	-0.072* (0.001)	-0.043* (0.009)
Constant	0.187* (0.002)				-0.365* (0.003)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	3,307,509	3,307,509	3,307,509	155,254	3,025,023	3,025,023	3,025,023	121,289
R <sup>2</sup>	0.055	0.059	0.081	0.300	0.103	0.111	0.134	0.355
Adjusted R <sup>2</sup>	0.055	0.059	0.080	0.116	0.103	0.111	0.133	0.156

Note:

\*p<0.01

## F Interaction Between Automobile Access and Drivers Licenses

In Table A9 and Table A10 we present the regression results for election turnout where we include indicators for automobile access, drivers licenses, and the interaction of both variables. These results show that the effect of access to a car on participation remains large for individuals both with and without a drivers license, but is even larger for those with a license.

Table A9: Effects of Car Ownership and Drivers Licenses on 2018 Election Turnout

	<i>Dependent variable:</i>							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.055* (0.002)	0.060* (0.002)	0.047* (0.002)	0.020* (0.008)	0.028* (0.002)	0.033* (0.002)	0.028* (0.002)	0.006 (0.007)
Drivers License	0.203* (0.002)	0.193* (0.002)	0.179* (0.002)	0.104* (0.008)	0.140* (0.002)	0.132* (0.002)	0.125* (0.002)	0.072* (0.007)
Auto in HH x Drivers License	0.264* (0.002)	0.273* (0.002)	0.273* (0.002)	0.231* (0.005)	0.124* (0.002)	0.132* (0.002)	0.133* (0.002)	0.108* (0.004)
Male	-0.028* (0.0004)	-0.028* (0.0004)	-0.027* (0.0004)	-0.049* (0.002)	-0.017* (0.0004)	-0.016* (0.0004)	-0.016* (0.0004)	-0.023* (0.001)
White	0.099* (0.0005)	0.104* (0.001)	0.046* (0.001)	0.032* (0.003)	0.051* (0.0005)	0.066* (0.001)	0.044* (0.001)	0.029* (0.002)
Age	0.005* (0.00001)	0.005* (0.00001)	0.005* (0.00001)	0.003* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.004* (0.00005)
Constant	-0.189* (0.002)				-0.368* (0.002)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	6,407,557	6,407,557	6,407,557	409,192	6,140,366	6,140,366	6,140,366	372,898
R <sup>2</sup>	0.104	0.115	0.140	0.231	0.109	0.117	0.135	0.252
Adjusted R <sup>2</sup>	0.104	0.115	0.139	0.149	0.109	0.117	0.135	0.165

Note:

\*p<0.01

Table A10: Effects of Car Ownership and Drivers Licenses on 2016 Election Turnout

	<i>Dependent variable:</i>							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.061* (0.002)	0.060* (0.002)	0.045* (0.002)	-0.020 (0.008)	0.015* (0.002)	0.018* (0.002)	0.021* (0.002)	0.010 (0.008)
Drivers License	0.170* (0.002)	0.165* (0.002)	0.154* (0.002)	0.132* (0.008)	0.088* (0.002)	0.084* (0.002)	0.076* (0.002)	0.037* (0.008)
Auto in HH x Drivers License	0.365* (0.002)	0.368* (0.002)	0.365* (0.002)	0.285* (0.005)	0.097* (0.002)	0.101* (0.002)	0.104* (0.002)	0.092* (0.005)
Male	-0.050* (0.0003)	-0.050* (0.0003)	-0.049* (0.0003)	-0.076* (0.002)	-0.013* (0.0004)	-0.013* (0.0004)	-0.013* (0.0004)	-0.020* (0.002)
White	0.098* (0.0005)	0.099* (0.001)	0.033* (0.001)	0.025* (0.003)	0.057* (0.001)	0.046* (0.001)	0.047* (0.001)	0.022* (0.003)
Age	0.003* (0.00001)	0.003* (0.00001)	0.003* (0.00001)	0.001* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.004* (0.0001)
Constant	-0.039* (0.002)				-0.407* (0.002)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	5,878,275	5,878,275	5,878,275	346,093	5,047,643	5,047,643	5,047,643	256,929
R <sup>2</sup>	0.100	0.108	0.135	0.259	0.109	0.116	0.137	0.312
Adjusted R <sup>2</sup>	0.100	0.108	0.134	0.166	0.109	0.116	0.136	0.197

Note:

\*p<0.01

## **G Effect of Car Access Among Sample of Voters Matched to Drivers' Licenses**

Voter registration databases are notorious for having large numbers of “deadwood” registrants – people who are no longer alive, have moved, or are no longer eligible to vote in the state for a variety of other reasons. Deadwood in our voter registration database is generally less of a danger than in state-maintained registration lists given that the data vendor (L2) engages in a thorough cleaning and matching process to other data sources that can help eliminate deadwood, such as the National Change of Address database maintained by USPS and death records. However, there is still the danger that some deadwood registrants in our data might match to the auto ownership database at a rate that correlates with their voter turnout. For example, dead registrants are less likely to have a record of turning out to vote in recent elections and also less likely to match to an administrative dataset of car owners given that car registrations are updated regularly. This would potentially artificially depress the turnout rates of people without access to a car.

Though we believe this is unlikely due to the effort that L2 puts into removing deadwood from registrant lists, we engaged in an empirical exercise that helps to account for this potential differential matching. Since registrants matched between two administrative datasets are less likely to be deadwood, we use the subset of our registrant data that matched to the drivers' license dataset. Registrants matched to this dataset are unlikely to have this differential deadwood matching problem, given that all of these registrants have already matched to one administrative dataset (licenses). We then examined the effect of car access on these licensed registrants.

In Table A11 and Table A12, we demonstrate that access to a car has an effect on voter participation among the subsample of registrants whom we matched to the drivers' license database.



Table A11: Effect of Car Ownership on 2018 Turnout — Voters with Drivers Licenses

	<i>Dependent variable:</i>							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.258* (0.001)	0.252* (0.001)	0.225* (0.001)	0.123* (0.002)	0.168* (0.001)	0.165* (0.001)	0.152* (0.001)	0.078* (0.002)
Male	-0.028* (0.0004)	-0.027* (0.0004)	-0.027* (0.0004)	-0.048* (0.002)	-0.017* (0.0004)	-0.016* (0.0004)	-0.016* (0.0004)	-0.022* (0.001)
White	0.100* (0.001)	0.106* (0.001)	0.048* (0.001)	0.032* (0.003)	0.052* (0.001)	0.068* (0.001)	0.047* (0.001)	0.031* (0.002)
Age	0.005* (0.00001)	0.005* (0.00001)	0.005* (0.00001)	0.003* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.005* (0.00005)
Constant	0.060* (0.001)				-0.258* (0.001)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	6,201,533	6,201,533	6,201,533	388,235	5,944,756	5,944,756	5,944,756	354,565
R <sup>2</sup>	0.078	0.089	0.115	0.221	0.102	0.111	0.129	0.250
Adjusted R <sup>2</sup>	0.078	0.089	0.115	0.134	0.102	0.111	0.128	0.157

Note:

\*p<0.01

Table A12: Effect of Car Ownership on 2016 Turnout — Voters with Drivers Licenses

	<i>Dependent variable:</i>							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.231* (0.001)	0.225* (0.001)	0.196* (0.001)	0.110* (0.002)	0.102* (0.001)	0.101* (0.001)	0.096* (0.001)	0.047* (0.002)
Male	-0.050* (0.0004)	-0.050* (0.0004)	-0.049* (0.0003)	-0.076* (0.002)	-0.013* (0.0004)	-0.013* (0.0004)	-0.013* (0.0004)	-0.020* (0.002)
White	0.099* (0.0005)	0.100* (0.001)	0.035* (0.001)	0.027* (0.003)	0.059* (0.001)	0.048* (0.001)	0.050* (0.001)	0.024* (0.003)
Age	0.003* (0.00001)	0.003* (0.00001)	0.003* (0.00001)	0.001* (0.0001)	0.008* (0.00001)	0.008* (0.00001)	0.008* (0.00001)	0.004* (0.0001)
Constant	0.312* (0.001)				-0.326* (0.001)			
FE for County		✓				✓		
FE for Precinct			✓				✓	
FE for Address				✓				✓
Observations	5,687,215	5,687,215	5,687,215	328,630	4,877,742	4,877,742	4,877,742	243,853
R <sup>2</sup>	0.057	0.065	0.093	0.241	0.105	0.112	0.134	0.311
Adjusted R <sup>2</sup>	0.057	0.065	0.092	0.140	0.105	0.112	0.133	0.190

Note:

\*p<0.01

## H Descriptive Information on Travel Time to Polls and the Effect of Travel Time on Participation

In Figure A2 below we present the density of travel time to get to the polls both with and without access to a car for all registered voter in the 1% random sample of the voter file.

In Figure A3 we present the density of the difference between these two quantities for each potential voter in the 1% sample (i.e. the travel time with car access subtracted from the travel time without access to a car). As described in the main text of the paper, this additional time burden on voters without access to a car ranges from a median of approximately 18.5 minutes to time burdens of over an hour.

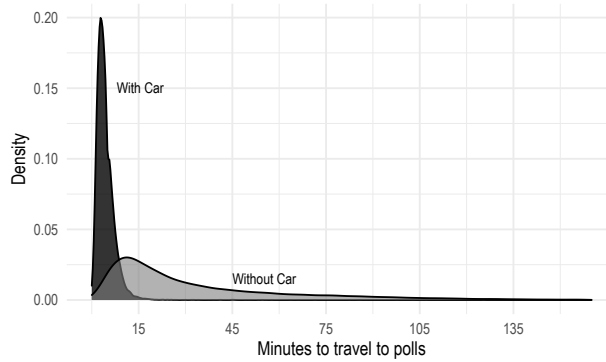


Figure A2: Minutes to travel to polls.

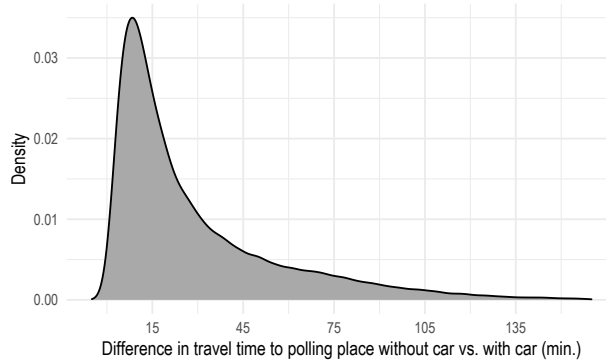


Figure A3: Differences in minutes to travel to polls with and without a car.

In Table A13 we show the results from the models presented in the main text of the paper in Figure 2, showing moderation of the effect of car access by travel time burden. In addition, we replicate this examination of the moderating effect of travel time using our within-address

comparison (i.e. columns 4 and 8 of Table 1 in the main text) in Figure A4 and Table A14.

Table A13: Within-Precinct Effect of Car Access on Turnout, by Quartile of Travel Time Burden

	<i>Dependent variable:</i>			
	2018 Turnout			
	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
	(1)	(2)	(3)	(4)
Auto in HH	0.216* (0.012)	0.225* (0.014)	0.222* (0.015)	0.268* (0.017)
Male	-0.036* (0.008)	-0.043* (0.008)	-0.017 (0.008)	0.002 (0.008)
White	0.030 (0.015)	0.033 (0.015)	0.038 (0.016)	0.038 (0.023)
Age	0.004* (0.0002)	0.005* (0.0002)	0.005* (0.0002)	0.006* (0.0002)
FE for Precinct	✓	✓	✓	✓
Observations	15,975	15,996	15,999	16,084
R <sup>2</sup>	0.289	0.301	0.282	0.219
Adjusted R <sup>2</sup>	0.128	0.123	0.115	0.098
<i>Note:</i>				*p<0.01

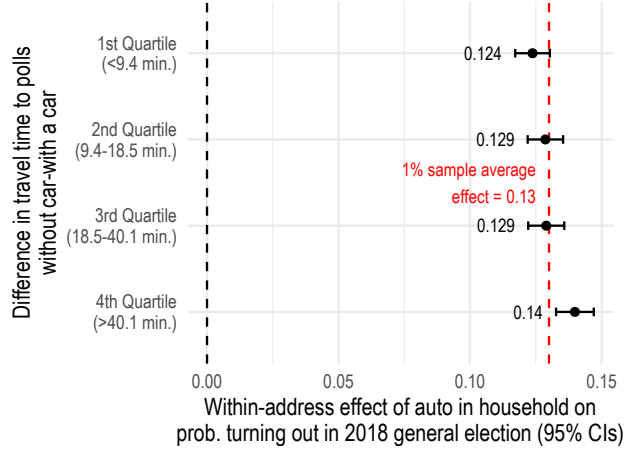


Figure A4: Within-address differences in participation rates, by travel time to polls.

Table A14: Within-Address Effect of Car Access on Turnout, by Quartile of Travel Time Burden

<i>Dependent variable:</i>				
2018 Turnout				
	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
	(1)	(2)	(3)	(4)
Auto in HH	0.124*	0.129*	0.129*	0.140*
	(0.003)	(0.003)	(0.003)	(0.004)
Male	-0.048*	-0.042*	-0.053*	-0.035*
	(0.003)	(0.003)	(0.003)	(0.003)
White	0.046*	0.044*	0.021*	0.023*
	(0.005)	(0.005)	(0.005)	(0.005)
Age	0.002*	0.003*	0.003*	0.003*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
FE for Address	✓	✓	✓	✓
Observations	104,029	102,436	102,105	100,504
R <sup>2</sup>	0.220	0.226	0.220	0.215
Adjusted R <sup>2</sup>	0.142	0.136	0.136	0.136

Note:

\*p<0.01

## I Disparate Effects of Car Access

On whom do the effects of car access have the greatest impact on political participation? Underlying patterns of car ownership are not equal across certain demographic characteristics. While 92% of white registrants in our voter file have access to cars, only 74% of Black registrants and 86% of Hispanic registrants do. Similar (though smaller) differences occur across age categories, as we show in Figure A5. We might therefore expect car access to have differential effects on turnout.

To examine who bears the largest burden from a lack of access to a car (and whose participation is most boosted by car access) we next examine differences in turnout between those with a car and without a car by age and race. Figure A6 compares turnout rates in the 2018 general election by age and race. Across all subgroups, turnout is significantly higher among car owners compared to non-owners. The largest effects of car access on turnout are among white registrants and older registrants.<sup>10</sup> White registrants without access to a car turn out at an average rate of 39.3%, while Black registrants without a car turn out at a rate of 29.2% and Hispanic registrants at a rate of 24.6%. Meanwhile, among those with access to a car, 67.5% of white registrants turn out, while only 53.4% of Black registrants and 49.7% of Hispanic registrants turn out. The difference in turnout rates between White and Black registrants without car access is 10.1 percentage points, while this gap in turnout widens to 14.1 percentage points for those with access to a car. Similarly, the difference in turnout between White and Hispanic registrants is 14.7 percentage points among those without car access, but an even larger 17.8 percentage points for those with access to a car. In other words, disparate access to cars widens existing participatory gaps.

In Figure A7 we present the coefficients for the effect of car access within age and race/ethnicity subgroups, which represent the differences between the subgroup mean turnout rates presented in Figure A6. In Table A15 and Table A16 we present the tabular results for these models in each subgroup as well.

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<sup>10</sup>Figure A7 and Tables A15 and A16 present regression results for each subgroup, using the full voter file and precinct fixed effects. The differences in turnout due to car ownership appear across all groups.

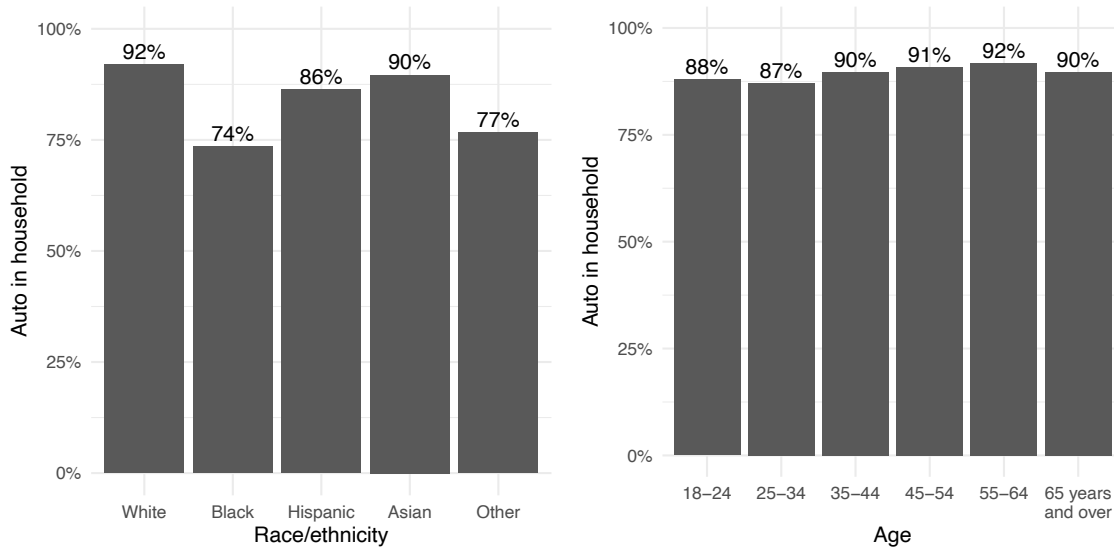


Figure A5: Differences in Car Access among Race and Age Subgroups

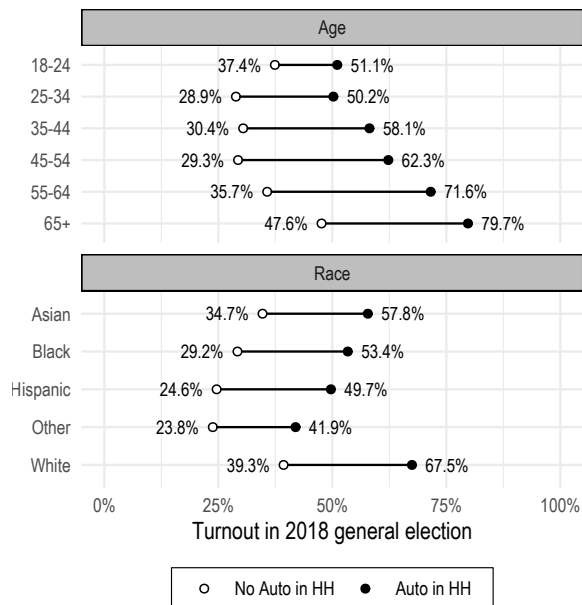


Figure A6: Differences in Turnout by Car Ownership among Age and Race Subgroups

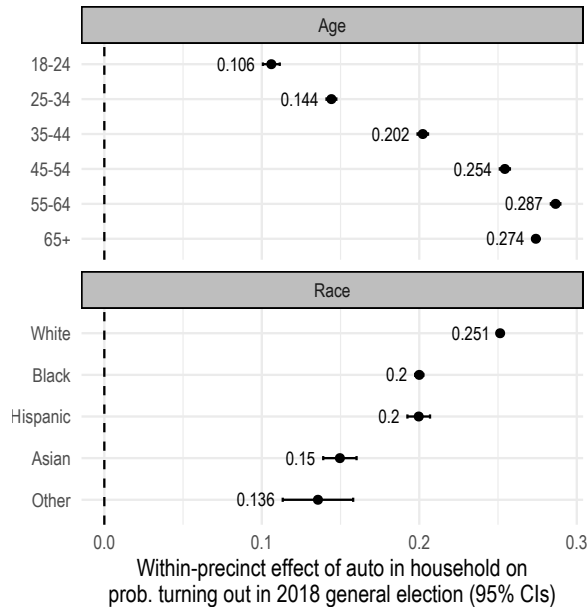


Figure A7: Differential effects of car access by race and age

Table A15: Effect of Car Ownership on 2018 General Election Turnout by Age

	<i>Dependent variable:</i>					
	2018 General Turnout					
	18-24	25-34	35-44	45-54	55-64	65+
	(1)	(2)	(3)	(4)	(5)	(6)
Auto in HH	0.106* (0.003)	0.144* (0.002)	0.202* (0.002)	0.254* (0.002)	0.287* (0.002)	0.274* (0.001)
Male	-0.045* (0.002)	-0.055* (0.001)	-0.045* (0.001)	-0.018* (0.001)	-0.014* (0.001)	0.012* (0.001)
White	0.042* (0.003)	0.060* (0.002)	0.051* (0.002)	0.039* (0.002)	0.050* (0.002)	0.057* (0.002)
FE for Precinct	✓	✓	✓	✓	✓	✓
Observations	397,722	958,711	988,012	1,137,469	1,275,008	1,650,635
R <sup>2</sup>	0.063	0.081	0.088	0.095	0.097	0.101
Adjusted R <sup>2</sup>	0.052	0.077	0.083	0.091	0.094	0.099

Note:

\*p<0.01



Table A16: Effect of Car Ownership on 2018 General Election Turnout by Race

	<i>Dependent variable:</i>				
	2018 General Turnout				
	White	Black	Hispanic	Asian	Other
	(1)	(2)	(3)	(4)	(5)
Auto in HH	0.251* (0.001)	0.200* (0.001)	0.200* (0.004)	0.150* (0.005)	0.136* (0.011)
Male	-0.007* (0.0004)	-0.114* (0.001)	-0.051* (0.002)	-0.005 (0.003)	-0.064* (0.009)
Age	0.005* (0.00001)	0.005* (0.00003)	0.003* (0.0001)	0.003* (0.0001)	0.003* (0.0003)
FE for Precinct	✓	✓	✓	✓	✓
Observations	5,403,840	719,191	160,820	112,350	11,356
R <sup>2</sup>	0.103	0.136	0.130	0.106	0.242
Adjusted R <sup>2</sup>	0.102	0.132	0.105	0.080	0.106

*Note:*

\*p<0.01

## J Effect on Vote Mode: Tabular Results

In Table A17 we present the tabular results that correspond to the average turnout rates presented in Figure 3 of the main paper. Moreover, in Table A18 we present the predicted probabilities of each choice options from multinomial logit analyses to examine the full choice set allowing of voting absentee, voting in person, and not voting. The coefficients from this multinomial logit are also presented in Table A19. These results confirm the OLS models and demonstrate that car access slightly increases the likelihood of absentee voting, but has a substantively much larger effect on in-person voting.

Table A17: Effect of Car Ownership on 2018 General Election Voting Method

	<i>Dependent variable:</i>			
	2018 General Absentee (1)	2018 General In-Person (2)	2018 Primary Absentee (3)	2018 Primary In-Person (4)
Auto in HH	0.014* (0.001)	0.117* (0.002)	0.011* (0.001)	0.069* (0.001)
Male	-0.029* (0.001)	-0.015* (0.001)	-0.020* (0.001)	-0.0003 (0.001)
White	0.010* (0.002)	0.025* (0.002)	0.010* (0.002)	0.020* (0.002)
Age	0.006* (0.00003)	-0.003* (0.0001)	0.004* (0.00003)	0.0004* (0.00004)
FE for Address	✓	✓	✓	✓
Observations	408,839	408,839	372,684	372,684
R <sup>2</sup>	0.334	0.212	0.284	0.186
Adjusted R <sup>2</sup>	0.264	0.128	0.200	0.091

Note:

\*p<0.01

Table A18: Predicted Probabilities of Full Choice Set from Multinomial Logit Regression

Variable	Did not vote	Absentee	In-person
Auto in HH	44.74	15.27	39.99
No Auto in HH	61.52	13.87	24.61
Male	53.61	12.42	33.97
Female	49.03	16.08	34.89
White	50.08	14.88	35.04
Non-white	52.94	14.14	32.92
Age: 18-24	52.41	1.83	45.76
Age: 25-34	57.69	2.12	40.20
Age: 35-44	59.52	2.33	38.15
Age: 45-54	58.12	3.81	38.07
Age: 55-64	50.37	11.60	38.04
Age: 65+	38.64	40.53	20.83

Table A19: Effect of Car Ownership on 2018 General Election Voting Method, Multinomial Logit

	<i>Dependent variable:</i>	
	Choose absentee over not voting	Choose in-person over not voting
	(1)	(2)
Auto in HH	0.429*** (0.011)	0.807*** (0.008)
Male	-0.428*** (0.011)	-0.115*** (0.007)
White	0.122*** (0.013)	0.121*** (0.008)
Age: 18-24	-1.374*** (0.034)	0.113*** (0.010)
Age: 25-34	-1.327*** (0.022)	-0.121*** (0.007)
Age: 35-44	-1.266*** (0.026)	-0.207*** (0.008)
Age: 45-54	-0.748*** (0.021)	-0.184*** (0.008)
Age: 55-64	0.515*** (0.014)	-0.034*** (0.008)
Age: 65+	2.042*** (0.011)	-0.370*** (0.008)
Constant	-2.158*** (0.013)	-0.803*** (0.007)
Akaike Inf. Crit.	707,899.600	707,899.600

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## K Subgroup Effects within Individual Counties

In Figure A8 and Figure A9 we replicate the same models presented in the main text of the paper, but within county subgroups of registered voters for both 2018 general and primary election participation. In Figures A10 and A11 we do the same but for the 2016 general and primary elections.

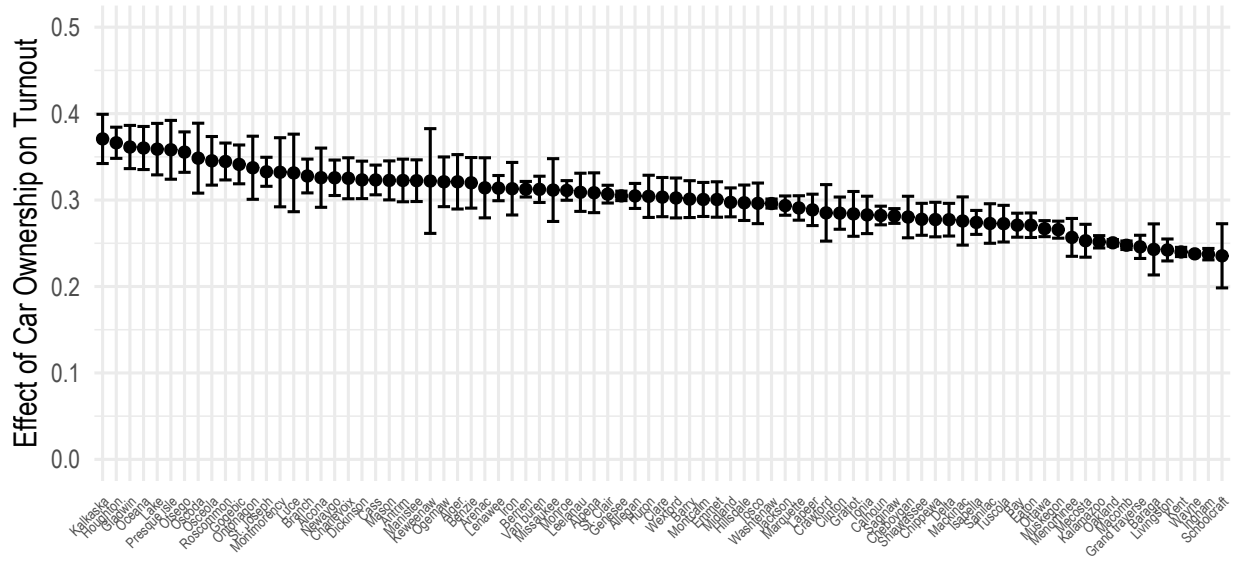


Figure A8: Effect of Car Ownership by County, 2018 General Election

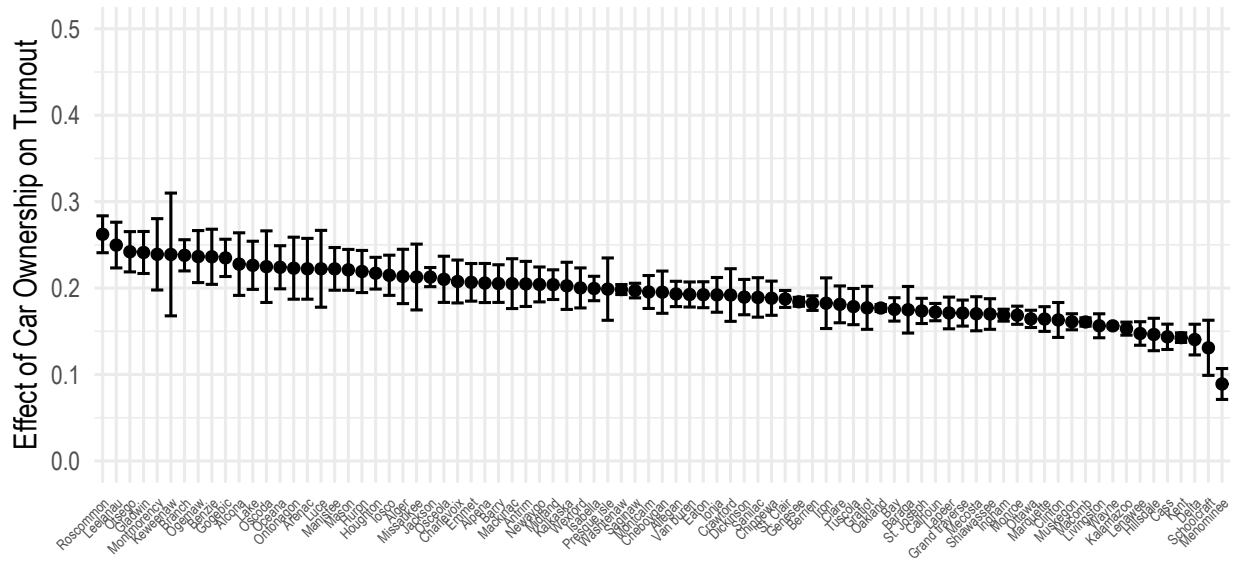


Figure A9: Effect of Car Ownership by County, 2018 Primary Election

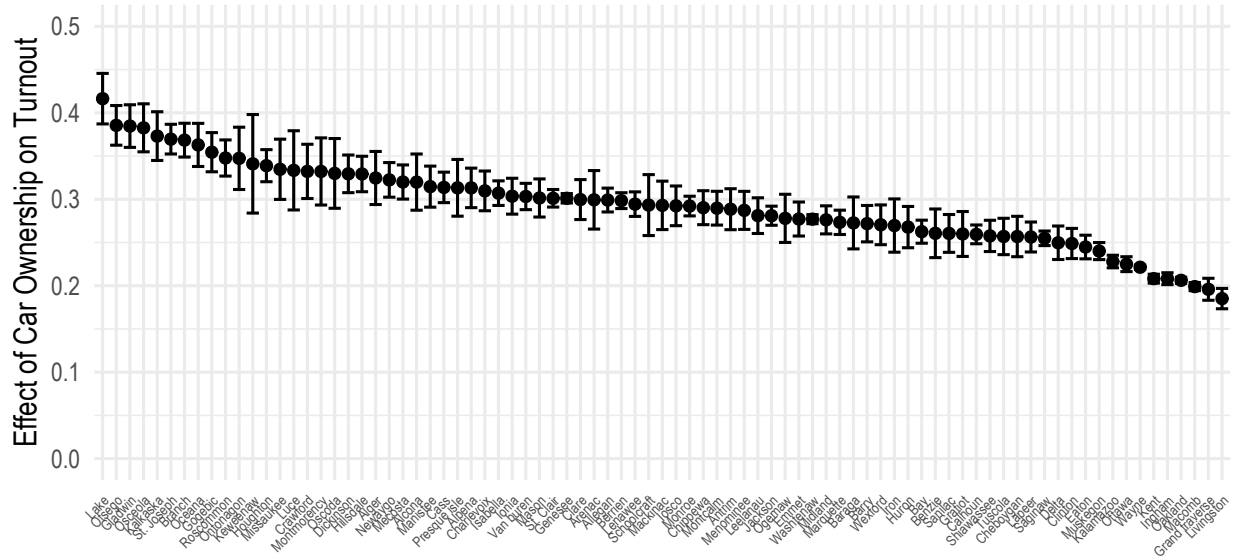


Figure A10: Effect of Car Ownership by County, 2016 General Election



## L Effect in Survey Data

Few large-scale surveys that ask questions about political behavior also ask about access to transportation. The American National Election Studies, Cooperative Congressional Election Surveys, and National Annenberg Election Surveys all neglect to ask about transportation access or mode of transportation as it relates to voting. However, the American Panel Survey (TAPS), run by the Weidenbaum Center at Washington University in St. Louis, does ask questions about political participation and did briefly ask about frequency of driving in surveys run in 2014 and 2015. These surveys are publicly available online,<sup>11</sup> and so we used these data to assess whether the effects of car access that we observe in our administrative data might be confounded by other demographic characteristics of potential voters. In Table A20 we present the results of analyses comparing reported turnout rates in the 2014 midterm election among people who did and did not frequently drive. We find that access to a car still has a large positive effect on reported turnout even controlling for race, gender, education, and age – all of which are established as demographics that can influence turnout rates.

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<sup>11</sup><https://wc.wustl.edu/american-panel-survey>

Table A20: Effect of Driving Frequency on 2014 General Election Turnout

	<i>Dependent variable:</i>	
	Reported Voting in Nov. 2014	
	Nov. 2014 Survey	Oct. 2015 Survey
	(1)	(2)
Reported driving a car regularly, Dec. 2014	0.189*** (0.041)	
Reported driving a car regularly, May 2015		0.098** (0.043)
Race/Eth.: Black, non-Hispanic	0.052 (0.040)	0.136*** (0.042)
Race/Eth.: Other, non-Hispanic	-0.163*** (0.048)	-0.054 (0.052)
Race/Eth.: Hispanic	-0.145*** (0.035)	-0.019 (0.039)
Race/Eth.: 2+ Races, non-Hispanic	-0.067 (0.071)	-0.033 (0.075)
Female	-0.041** (0.021)	-0.022 (0.021)
Education: High school degree	0.164** (0.070)	-0.027 (0.079)
Education: Some college	0.250*** (0.067)	0.076 (0.075)
Education: Bachelor's degree or higher	0.317*** (0.066)	0.151** (0.074)
Age: 30-44	0.100** (0.044)	0.076 (0.050)
Age: 45-59	0.277*** (0.042)	0.217*** (0.047)
Age: 60+	0.364*** (0.041)	0.342*** (0.046)
Constant	0.123 (0.081)	0.405*** (0.091)
Observations	1,378	1,167
R <sup>2</sup>	0.177	0.130
F Statistic	24.385*** (df = 12; 1365)	14.433*** (df = 12; 1154)

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Omitted category for race is White, non-Hispanic  
Omitted category for education is Less than high school  
Omitted category for age is 18-29