Driving Turnout:
The Effect of Car Ownership on Electoral Participation

Justin de Benedictis-Kessner* Maxwell Palmer†

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Abstract

Inequalities in voter participation between groups of the population pose a problem for democratic representation. We use administrative data on 6.7 million registered voters to show that a previously-ignored characteristic of voters—access to a personal automobile—creates large disparities in in-person voting rates. Lack of access to a car depresses election day voter turnout by substantively large amounts across a variety of fixed-effects models that account for other environmental and voter characteristics. Car access creates the largest hindrance to voting for those people who live farther from the polls. These effects do not appear for absentee voting, suggesting a simple policy solution to solve large disparities in political participation. This study contributes to the theoretic understanding of political participation as well as the impact of potential policy reforms to solve participatory gaps.

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*Assistant Professor, John F. Kennedy School of Government, Harvard University. jdbk@hks.harvard.edu.

†Associate Professor, Department of Political Science, Boston University. mbpalmer@bu.edu.

Regular electoral participation is a fundamental component of vibrant democracies. When citizens take part in elections, it suggests a democratic mandate for the government to enact policy. Yet low rates of voter turnout in settings like the United States create the potential for inequalities in representation. If the preferences of those who are vote are different from those who did not vote, then elected officials may not represent the full set of citizens (Bartels, 2008; Gilens, 2012). Participatory inequalities can thus be reflected in policies that are biased towards those who turn out to vote.

Assessing the quality of representation and examining the question of "who votes?" is, of course, not new (e.g. Merriam and Gosnell, 1924; Riker and Ordeshook, 1968). A large body of research has pointed to demographic and socio-economic differences in rates of voting participation, as well as the consequences of those participatory inequalities (Aldrich, 1993; Leighley and Nagler, 1992; Rosenstone and Hansen, 1993; Wolfinger and Rosenstone, 1980). One prominent explanation for differential rates of turnout has been that resources provided by socioeconomic status and education can be a primary driver of turnout (e.g. Verba, Schlozman and Brady, 1995). Subsequent research has suggested that the logistical cost of getting to the polls can result in differential turnout as well (Brady and McNulty, 2011; Dyck and Gimpel, 2005; Gimpel, Dyck and Shaw, 2006; Haspel and Knotts, 2005). Those reigstrants who live farther from their polling place have a harder time getting to the polls, thereby lowering their turnout rates.

Existing explanations of voter turnout, however, miss a critical feature of people's lives that structures their ability to vote and the ease with which they can do so: the mode of travel by which they get to the polls. Specifically, previous accounts of the barriers to voting posed by logistical costs largely ignore the fact that voters have a choice of how to get to the polls—on foot, by car, by public transportation, or any number of other ways. The degree to which these choices are available, however, differs across the population. Some people have access to a car, and some have access to reliable and fast public transportation. Other people lack both methods – and the people who lack reliable transportation are more often people of color and less affluent (Schmitt, 2020). Yet existing large-scale surveys of political behavior neglect to ask about car ownership or transportation access and thus ignore its potential impact as it intersects with race- and class-based barriers to participation. Examining the way that access to reliable and fast transportation can be an obstacle to voters participating on election day is critical for a theoretic understanding of

political participation. Yet it is also relevant to contemporary policy debates about polling place administration, transportation planning, and alternatives to in-person voting, such as voting by mail.

In this paper, we use administrative data on electoral participation and data on car ownership alongside modern causal inference analytic techniques to show that existing explanations of voter turnout miss a critical portion of the voting calculus. Specifically, these fine-grained individual-level data enable us to use powerful causal analytic strategies to compare nearly identical potential voters with access to a car and those without access to a car. We find that household access to a car has substantively large effects on voter turnout. This is true across a variety of fixed-effects regressions that leverage variation in car access within counties, within precincts, and even within the same buildings. The consistency of these results across a variety of identification strategies bolsters the causal interpretation of these effects, as do several theoretically-motivated moderating analyses. Using geographic data on registrants' home and polling place locations combined with travel time calculations from the Google Maps API, we show that the time it would take to travel to the polls moderates this relationship. Access to a car has an even larger effect on turnout among people for whom traveling to the polls would take a longer amount of time without a car. Furthermore, we find that car ownership has no effect on absentee voting – suggesting that mail voting has the power to reduce participatory inequalities that result from transportation access. Overall, these results highlight an oft-ignored factor that causes differential electoral participation rates.

This paper contributes to the rich scholarly literature on political participation, and extends previous theories that focus on the role of material and temporal resources in driving voting. Our results provide new evidence that in-person voting rates depend partially on access to reliable transportation. Our results show that the sector of the population without access to cars or reliable alternative modes of transportation participates in politics at lower rates, which has the potential to erode democratic representation. This has important implications for policymakers instituting electoral reform: they can reduce these inequalities by either providing more reliable alternative transportation options or making alternative forms of voting, such as early or absentee voting, widely accessible to their citizens.

Data and Research Design

To examine the effect of automobile access on electoral turnout, we used administrative data on voter registration and automobile ownership from Michigan. Michigan is a representative location to assess these patterns: 8.7% of US residents have no access to a car, and while this rate varies across states from 3.8% in Wyoming to 29.1% in New York, Michigan is typical in that 7.8% of the state's residents have no access to a car (U.S. Census Bureau, 2018). We merged the Michigan voter file ($n = 6,716,936$ registrants), provided by the private data vendor L2, to the complete Michigan auto registration ($n = 15,983,061$ unique cars) and drivers license ($n = 6,496,514$ licensed individuals) databases, both provided by the state of Michigan, to identify which people registered to vote had a drivers license and personally owned automobiles or lived in the same household as a car owner.[1] These data give us a unique opportunity to learn about the effects of driving and car ownership on voter turnout.[2,3]

Results

In this section, we present the evidence showing inequalities in participation between registrants who do and do not have access to a car, both with descriptive models showing cross-sectional differences and with more methodologically sophisticated models allowing us to rule out the vast majority of alternative explanations for such differences.

As a first cut at the differences in participation between those with access to a car and those without, Figure 1 shows the turnout rates in the 2018 general (left panel) and primary (right panel) elections among those people with access to a car in the household and those without. While only 36% of those without a car voted in the 2018 general election, 66% with a car voted—a difference of 30 percentage points. A similar difference in turnout of 19 percentage points between those with and without access to a car occurred during the primary.

[1] We obtained the drivers license and auto registration databases as the result of a data production request for voting rights litigation. The voter file from the state of Michigan contained an implausibly large number of registrants (over 95% of the state's adult population), so we chose to use L2's voter file, which is cleaned and maintained such that "deadwood," or people who have moved and/or are no longer eligible to vote, have been removed. For a review of similar commercial data files, see the Pew Research Center's report: `https://www.pewresearch.org/methods/2018/02/15/commercial-voter-files-and-the-study-of-u-s-politics/`

[2] While commercial data on car ownership are available from a variety of firms, and can be included on commercial voter file purchases, these data are generally limited to automobiles purchased from car dealerships, and exclude person-to-person sales, transfers between individuals, and other transactions. The state automobile registration database, however, includes every currently registered car, along with the names and address of the car owners.

[3] We rely on the L2 voter file for data on voters' addresses, voting precincts, age, and sex. We estimate voters' race using the Bayesian Improved Surname Geocoding method from Imai and Khanna (2016).

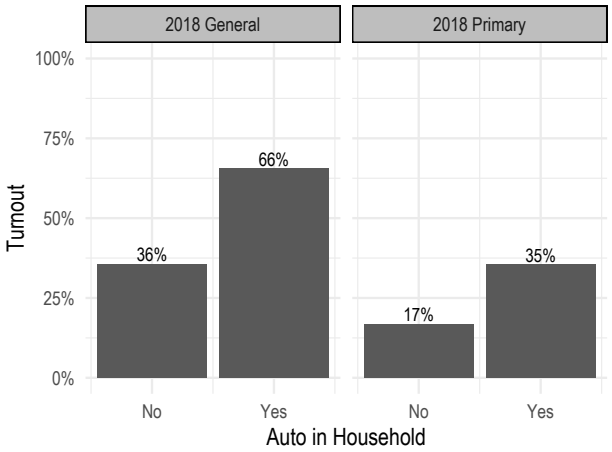

Figure 1: Participation rates by car ownership.

Of course, those individuals with and without access to cars are likely to differ in a variety of other ways that might also affect their participation rates. Gender, race, and age all may lead to differences in car access and in voting.[4] To account for these individual characteristics, we next analyze turnout in both general and primary elections while controlling for these demographic characteristics using OLS regression. These results are shown in Models 1 and 5 of Table 1, and suggest that these demographic characteristics are not what account for the broad differences in turnout between people with and without access to a car. Car access has a substantively large impact on voter turnout.

These models may still miss other potential confounding factors. While controlling for demographic characteristics of individuals allows us to rule out any variation in turnout induced by these *observable* characteristics, there are a host of *unobservable* characteristics that might lead some people to participate more than others. To better interrogate the the true effect of having access to a car on political participation, we next include geographic area fixed-effects. The models using county and precinct fixed effects allow us to account for geographical variation in turnout that comes from, say, neighborhood-level income or different offices on the ballot in different counties. Such variation, if it were correlated with car ownership patterns, might confound estimates of car access on participation. These fixed-effects also help to rule out alternative explanations that are not observable or measurable and which might explain the differences in participation between

[4]For instance, as we show in Appendix I, rates of car access are substantially higher among white registrants relative to non-white registrants.

Table 1: Effect of Automobile Access on 2018 Voter Turnout

	Dependent variable:							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.272*	0.267*	0.236*	0.130*	0.173*	0.171*	0.156*	0.080*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Male	−0.021*	−0.021*	−0.020*	−0.045*	−0.013*	−0.012*	−0.012*	−0.020*
	(0.0004)	(0.0004)	(0.0004)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.001)
White	0.105*	0.109*	0.046*	0.034*	0.054*	0.069*	0.045*	0.030*
	(0.001)	(0.001)	(0.001)	(0.003)	(0.0005)	(0.001)	(0.001)	(0.002)
Age	0.005*	0.005*	0.005*	0.003*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.00005)
Constant	0.035*				−0.264*			
	(0.001)				(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^2	0.081	0.092	0.119	0.220	0.102	0.110	0.128	0.249
Adjusted R^2	0.081	0.092	0.118	0.137	0.102	0.110	0.128	0.161
Note:								*p<0.01

those with and without access to a car.

The results from these fixed effects analyses, shown in Table 1, indicate that access to a car has a consistently positive effect on participation. In both the general and primary elections in 2018, people with access to a car voted at higher rates than those without access to a car. This effect holds true when using both county-level (columns 2 and 6) and precinct-level (columns 3 and 7) fixed effects — in essence, when comparing individuals within the same county or precinct to other potential voters in the same location. The size of this effect is between 23–27 percentage points in the general election and 16–17 percentage points in the primary. Given the baseline average turnout levels in the general and primary elections (63% and 34%, respectively), these effects are substantively enormous. They suggest that gaining access to a car can effectively increase the probability of a voter participating by at least a third.

Our models using county and precinct fixed effects enable us to account for confounding that could occur within these geographic areas. However, there are any number of potential confounders

that could still occur within precincts. To avoid this possible confounding, we next move to comparing participation among a subgroup of comparable respondents who live at addresses with both car owners and non-car owners (i.e. multiple apartments or units).

In Models 4 and 8 of Table 1, we use fixed effects at the address level, which enables us to compare turnout within individual addresses. These models account for any observable or unobservable confounding that could occur at the address level. The effects identified by these models thus represent our most conservative estimates of car access on turnout, as they only compare turnout within the subset of addresses where both car owners and non-car owners live. The effect of car access could, of course, be much larger when comparing participation rates among people who live in incomparable locations, but we would not be able to rule out other observable or unobservable characteristics of those individuals that could result in participatory differences. Even with such a conservative estimand, the results from these within-address comparisons corroborate the earlier analyses. Namely, access to a car still has a substantively large effect on turnout: 13 percentage points in the general election and eight in the primary.

Additionally, in Tables A5-A8 we replicate our analyses with additional covariates for household income, education, and homeownership, using commercial data available for a subset of registrants. The inclusion of these variables does not alter the magnitude of our results; even controlling for household income and background characteristics, automobile access remains a substantial driver of turnout.[5]

The Moderating Role of Travel Time

One natural implication of the substantively large effects we observe across a variety of modeling choices—and a logical corollary of their causal interpretation—is that car access should have a larger effect for registrants who live farther from the polls and who therefore would have a more difficult time voting without access to a car. To examine this, we bring in auxiliary data on travel times to the polls calculated using the Google Maps API.[6] As we show in Appendix Figure A3, the

[5] We also replicate the above models in Table A1 for the 2016 elections and in Tables A3 and A4 using drivers licenses, rather than automobile access, as our primary independent variable. Having a drivers license also has a large and positive effect on electoral turnout. Having a drivers license alone does not explain the the effect of automobile access on turnout that we observe. Interacting automobile access and drivers licenses, shown in Tables A9 and A10, indicate that having access to a car has a large effect on participation whether or not a person has a license.

[6] Specifically, we take a 1% random sample of 67,168 registrants in our data and calculate the time it would take to travel to their polling place by car, by car in traffic, by public transportation, and by walking. Then, we identify the fastest travel time among the non-driving modes (i.e. public transportation and walking) and including the driving modes (i.e. all four potential travel times). See Figure A2.

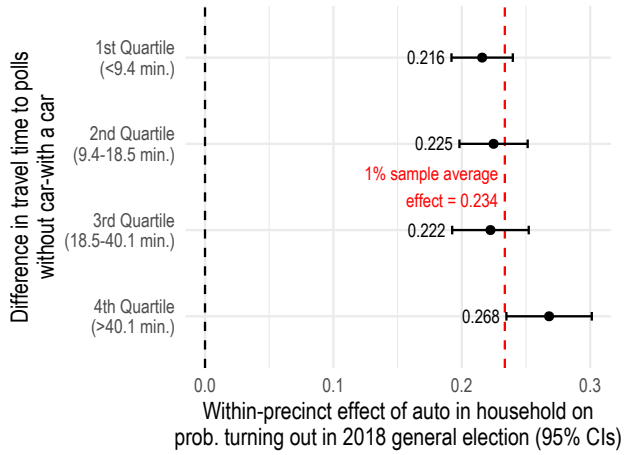

Figure 2: Within-precinct effects of car access on participation rates, by travel time to polls.

time it takes to get to the polls with access to a car is far shorter on average than the time it takes to get to the polls via public transit or on foot. However, the difference between these times—the time burden of not having access to a car—varies across our sample of registrants. To examine the moderating role of the travel time burden imposed on voters without access to a car, we break our sample into quartiles of the difference in the time it would take them to travel to the polls with versus without a car, and separately examine the effect of car access among these groups.

These results are displayed in Figure 2, which shows that the effect of access to a car on voting is moderated by the burden of travel time. For those people in the lowest quartile of travel time burden to the polls (for whom the difference between traveling to the polls with a car and without a car is less than 9.4 minutes), people with access to a car are 21.6 percentage points more likely to vote than those people without access to a car. Meanwhile, among those people who live farther from the polls (for whom access to a car would reduce their travel time by more than 40 minutes), car access has an even larger effect on turnout of 26.8 percentage points. Not only does car access hinder some people from participating, but it has its largest effect on those people who live farther from the polls or do not have access to fast and reliable public transportation.[7]

Vote Method

Up to this point, we have analyzed the impact of car access on voting by any mode. However, if we expect that car access has an important mobilizing effect apart from the effect of other

[7]Table A13 presents the full regression results. Table A14 and Figure A4 replicate these results using our within-address sample and address fixed effects, which similarly shows a strong moderating effect of travel time burden.

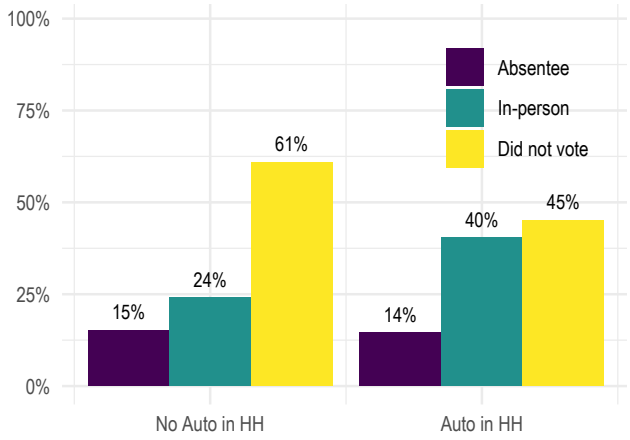

Figure 3: Within-address differences in participation rates by voting method, 2018 General Election.

characteristics—observable or unobservable—that are potentially correlated with car access, then it should have its largest effect on voting *in person*, and much smaller or no effect on absentee voting (vote-by-mail).

To test this assertion and further support the causal interpretation of our results, we next move to separately examining the impact of car access on voting in person and absentee. Again, we use the subset of potential voters who lived in buildings that had car owning households and non-car owning households to identify the most conservative estimate of car access on voting. Figure 3 shows the percent of such individuals voting absentee (purple bar), voting in-person (turquoise bar), or not voting (yellow bar), broken down by car access along the horizontal axis, for the 2018 general election.

The effect of car access on absentee voting is quite small. Meanwhile, the substantial difference in rates of voting in-person between those with and without car access remains. In the 2018 general election, 40% of people with access to a car voted in-person, while only 24% of those without access to a car voted in-person. This difference of 16 percentage points represents a 68% increase over the baseline of in-person turnout among those without car access. This effect is comparatively even larger in the primary, and accounts for an in-person turnout rate among people with access to a car that is effectively double that of those without car access.

Though our use of the same-address sample helps alleviate concerns that these differences might be due to other confounding variables, we further verify that car access is driving these differences by again using address-level fixed effects to compare turnout among individuals with and without

car access within the same residential building. These results, shown in Table A17, reiterate the basic differences shown visually in Figure 3.[8] In both the 2018 general and primary elections, car access had a large effect on in-person turnout, while its effect on absentee voting is much smaller.

Discussion and Conclusion

Investigating inequalities in political participation is a crucial task for assessing the health of democracy. The legitimacy provided to a democratic government by broad voter turnout is a normatively attractive outcome. Differential voter turnout rates signal potential flaws in this mechanism of democratic representation. Examining such worrisome inequalities has been a central question in political science, leading to the development of a host of theories about what drives people to participate in democracy (e.g. Verba, Schlozman and Brady, 1995; Rosenstone and Hansen, 1993).

Building from previous research on political participation, we show that a frequently-ignored feature of citizens' environment—transportation to the polls—can lead to large inequalities in voter turnout. We use administrative data on 6.7 million registered voters and a research design with a strong causal inference strategy to address a topic where scholars must often utilize correlational research designs or survey measures instead. Our findings indicate that car access has a large causal effect on voting on election day. This effect goes beyond the effects of other demographic features and holds true using a variety of modeling strategies, including those that compare potential voters residing in the same building.[9] The size of the barrier to participation that results from a lack of car access is larger than many other hindrances to turnout, such as registration deadlines (Burden and Neiheisel, 2013) or voter identification laws (Highton, 2017). The effects of car access are also exacerbated by the burden of longer travel time between potential voters' homes and polling locations. Importantly, these participatory differences only exist for in-person election day voting, and not for absentee voting. Together, the variety of identification strategies and moderating analyses strongly support a causal interpretation of the effect of access to a car.

Our findings suggest that previous theories on the motivations and correlates of political participation ignore the critical role of transportation in voters' lives. Any explanation of voter participation that does not incorporate the political geography of citizens' transportation options between

[8] We also present analyses of the full choice set using multinomial logit regression in Table A18.

[9] We also verify that these differences are not confounded by other demographics using one of the only public survey datasets that tracks car access in Appendix I.

their home and polling locations provides an incomplete picture. We highlight how access to cars creates inequalities in access to voting. Disparate access to cars across race and age groups can explain a large portion of race- and age-based disparities in participation. This paper therefore builds a more comprehensive theory of voter participation. Future work could extend our analyses by examining the over-time effects of car access or its interaction with institutional changes. Such work will help in developing a more holistic picture of the causal effects of car access in participation more broadly.

These results have nuanced implications for policymakers. Lack of access to a car is a substantial obstacle to voting. A naive interpretation of our results would suggest that, due to their mobilizing effects, cars should be made more widely available. However, we caution against such a conclusion. More tractable instead is to broaden access to reliable and fast public transportation that closes the travel time burden imposed on those people without access to cars. Though infeasible in all locations, policymakers might also locate polling places in walkable locations that eliminate the need for car access to reach them quickly. A simple alternative to these potentially expensive policy reforms could involve broadening access to early or absentee voting, which we find exhibits no differences stemming from citizens' access to cars. Policymakers seeking to reduce voting inequalities and broaden the electoral franchise should pursue these reforms to electoral institutions. Doing so has the power to decouple democratic participation from access to a personal automobile and improve representation.

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Supplementary Appendix for "Driving Turnout: The Effect of Car Ownership on Electoral Participation"

Justin de Benedictis-Kessner and Maxwell Palmer

Political Science Research and Methods

Contents

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 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

	Dependent variable:							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.255*	0.248*	0.215*	0.119*	0.107*	0.106*	0.101*	0.049*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Male	−0.042*	−0.042*	−0.041*	−0.071*	−0.010*	−0.010*	−0.010*	−0.018*
	(0.0004)	(0.0004)	(0.0003)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.002)
White	0.105*	0.106*	0.034*	0.028*	0.060*	0.049*	0.048*	0.022*
	(0.0005)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)
Age	0.003*	0.003*	0.003*	0.001*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.0001)
Constant	0.270*				−0.327*			
	(0.001)				(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^2	0.062	0.070	0.099	0.243	0.104	0.111	0.133	0.310
Adjusted R^2	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

	Dependent variable:					
	2020 General Turnout					
	(1)	(2)	(3)	(4)	(5)	(6)
Auto in HH	0.300*	0.292*	0.251*			
	(0.001)	(0.001)	(0.001)			
Drivers License				0.548*	0.545*	0.506*
				(0.001)	(0.001)	(0.001)
Male	−0.034*	−0.033*	−0.033*	−0.041*	−0.040*	−0.040*
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
White	0.107*	0.112*	0.041*	0.137*	0.137*	0.046*
	(0.0005)	(0.0005)	(0.001)	(0.0004)	(0.0005)	(0.001)
Age	0.004*	0.004*	0.004*	0.004*	0.004*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Constant	0.201*			−0.075*		
	(0.001)			(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^2	0.085	0.096	0.132	0.093	0.104	0.144
Adjusted R^2	0.085	0.096	0.131	0.093	0.104	0.143
Note:						*p<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.

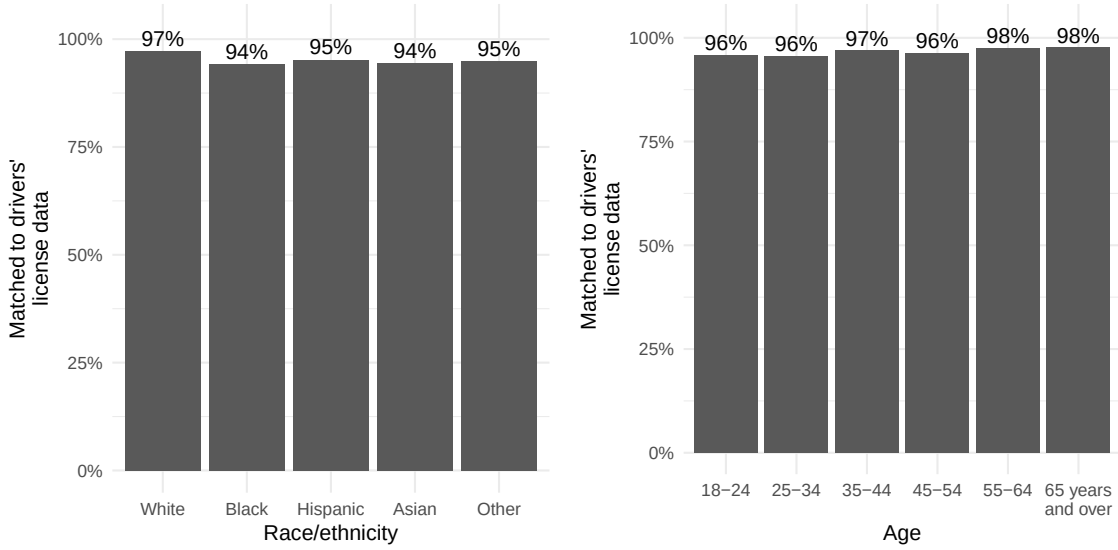

Figure A1: Differences in Drivers' License among Race and Age Subgroups

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

	Dependent variable:							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Drivers License	0.457*	0.456*	0.433*	0.293*	0.255*	0.256*	0.245*	0.150*
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.001)	(0.004)
Male	−0.027*	−0.026*	−0.026*	−0.047*	−0.016*	−0.015*	−0.015*	−0.022*
	(0.0004)	(0.0004)	(0.0004)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.001)
White	0.133*	0.133*	0.049*	0.033*	0.074*	0.086*	0.047*	0.030*
	(0.0005)	(0.001)	(0.001)	(0.003)	(0.0005)	(0.001)	(0.001)	(0.002)
Age	0.005*	0.005*	0.005*	0.003*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.00005)
Constant	−0.172*				−0.362*			
	(0.001)				(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^2	0.082	0.093	0.123	0.220	0.100	0.108	0.128	0.247
Adjusted R^2	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

	Dependent variable:							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Drivers License	0.530*	0.527*	0.504*	0.358*	0.179*	0.179*	0.173*	0.115*
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.001)	(0.004)
Male	−0.049*	−0.048*	−0.047*	−0.075*	−0.012*	−0.013*	−0.012*	−0.019*
	(0.0004)	(0.0003)	(0.0003)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.002)
White	0.130*	0.126*	0.036*	0.026*	0.072*	0.059*	0.049*	0.022*
	(0.0005)	(0.001)	(0.001)	(0.003)	(0.0005)	(0.001)	(0.001)	(0.003)
Age	0.003*	0.003*	0.003*	0.001*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.0001)
Constant	−0.015*				−0.404*			
	(0.001)				(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^2	0.080	0.089	0.120	0.250	0.105	0.112	0.134	0.310
Adjusted R^2	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

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

	Dependent variable:							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.141*	0.140*	0.136*	0.085*	0.074*	0.073*	0.079*	0.044*
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)
Male	−0.036*	−0.035*	−0.035*	−0.050*	−0.014*	−0.015*	−0.014*	−0.012*
	(0.0004)	(0.0004)	(0.0004)	(0.003)	(0.0005)	(0.0005)	(0.0005)	(0.003)
White	0.030*	0.034*	0.021*	0.0004	0.029*	0.020*	0.052*	0.019*
	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.001)	(0.001)	(0.005)
Age	0.003*	0.003*	0.003*	0.001*	0.009*	0.009*	0.009*	0.005*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00002)	(0.00002)	(0.00002)	(0.0001)
Est. HH Income	0.0004*	0.0003*	0.0002*	−0.0001	−0.0001*	−0.0001*	−0.0001*	−0.0001*
	(0.00000)	(0.00000)	(0.00000)	(0.00003)	(0.00000)	(0.00001)	(0.00001)	(0.00003)
HS Diploma	0.0002	−0.001	−0.005*	−0.005	−0.013*	−0.013*	−0.015*	0.023*
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.001)	(0.005)
Vocational Degree	0.023*	0.024*	0.020*	0.034	0.009	0.010	0.008	0.057
	(0.004)	(0.004)	(0.004)	(0.028)	(0.005)	(0.005)	(0.005)	(0.029)
Some College	0.037*	0.035*	0.024*	0.020*	0.021*	0.022*	0.014*	0.023*
	(0.001)	(0.001)	(0.001)	(0.005)	(0.002)	(0.002)	(0.002)	(0.006)
College Degree	0.060*	0.053*	0.039*	0.012*	0.027*	0.028*	0.020*	0.033*
	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.001)	(0.001)	(0.005)
Grad Degree	0.086*	0.075*	0.055*	0.027*	0.052*	0.053*	0.039*	0.056*
	(0.001)	(0.001)	(0.001)	(0.006)	(0.002)	(0.002)	(0.002)	(0.006)
Renter	−0.074*	−0.076*	−0.076*	−0.018	−0.062*	−0.061*	−0.066*	−0.042*
	(0.001)	(0.001)	(0.001)	(0.008)	(0.001)	(0.001)	(0.001)	(0.009)
Constant	0.416*				−0.318*			
	(0.002)				(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^2	0.052	0.056	0.078	0.300	0.104	0.111	0.135	0.356
Adjusted R^2	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

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

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

	Dependent variable:							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.055*	0.060*	0.047*	0.020*	0.028*	0.033*	0.028*	0.006
	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)	(0.002)	(0.007)
Drivers License	0.203*	0.193*	0.179*	0.104*	0.140*	0.132*	0.125*	0.072*
	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)	(0.002)	(0.007)
Auto in HH x Drivers License	0.264*	0.273*	0.273*	0.231*	0.124*	0.132*	0.133*	0.108*
	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.002)	(0.004)
Male	−0.028*	−0.028*	−0.027*	−0.049*	−0.017*	−0.016*	−0.016*	−0.023*
	(0.0004)	(0.0004)	(0.0004)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.001)
White	0.099*	0.104*	0.046*	0.032*	0.051*	0.066*	0.044*	0.029*
	(0.0005)	(0.001)	(0.001)	(0.003)	(0.0005)	(0.001)	(0.001)	(0.002)
Age	0.005*	0.005*	0.005*	0.003*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.00005)
Constant	−0.189*				−0.368*			
	(0.002)				(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^2	0.104	0.115	0.140	0.231	0.109	0.117	0.135	0.252
Adjusted R^2	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

	Dependent variable:							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.061*	0.060*	0.045*	−0.020	0.015*	0.018*	0.021*	0.010
	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)	(0.002)	(0.008)
Drivers License	0.170*	0.165*	0.154*	0.132*	0.088*	0.084*	0.076*	0.037*
	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)	(0.002)	(0.008)
Auto in HH x Drivers License	0.365*	0.368*	0.365*	0.285*	0.097*	0.101*	0.104*	0.092*
	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.002)	(0.005)
Male	−0.050*	−0.050*	−0.049*	−0.076*	−0.013*	−0.013*	−0.013*	−0.020*
	(0.0003)	(0.0003)	(0.0003)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.002)
White	0.098*	0.099*	0.033*	0.025*	0.057*	0.046*	0.047*	0.022*
	(0.0005)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)
Age	0.003*	0.003*	0.003*	0.001*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.0001)
Constant	−0.039*				−0.407*			
	(0.002)				(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^2	0.100	0.108	0.135	0.259	0.109	0.116	0.137	0.312
Adjusted R^2	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

	Dependent variable:							
	2018 General Turnout				2018 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.258*	0.252*	0.225*	0.123*	0.168*	0.165*	0.152*	0.078*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Male	−0.028*	−0.027*	−0.027*	−0.048*	−0.017*	−0.016*	−0.016*	−0.022*
	(0.0004)	(0.0004)	(0.0004)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.001)
White	0.100*	0.106*	0.048*	0.032*	0.052*	0.068*	0.047*	0.031*
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)
Age	0.005*	0.005*	0.005*	0.003*	0.008*	0.008*	0.008*	0.005*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.00005)
Constant	0.060*				−0.258*			
	(0.001)				(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^2	0.078	0.089	0.115	0.221	0.102	0.111	0.129	0.250
Adjusted R^2	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

	Dependent variable:							
	2016 General Turnout				2016 Primary Turnout			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auto in HH	0.231*	0.225*	0.196*	0.110*	0.102*	0.101*	0.096*	0.047*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Male	−0.050*	−0.050*	−0.049*	−0.076*	−0.013*	−0.013*	−0.013*	−0.020*
	(0.0004)	(0.0004)	(0.0003)	(0.002)	(0.0004)	(0.0004)	(0.0004)	(0.002)
White	0.099*	0.100*	0.035*	0.027*	0.059*	0.048*	0.050*	0.024*
	(0.0005)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)
Age	0.003*	0.003*	0.003*	0.001*	0.008*	0.008*	0.008*	0.004*
	(0.00001)	(0.00001)	(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.0001)
Constant	0.312*				−0.326*			
	(0.001)				(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^2	0.057	0.065	0.093	0.241	0.105	0.112	0.134	0.311
Adjusted R^2	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.

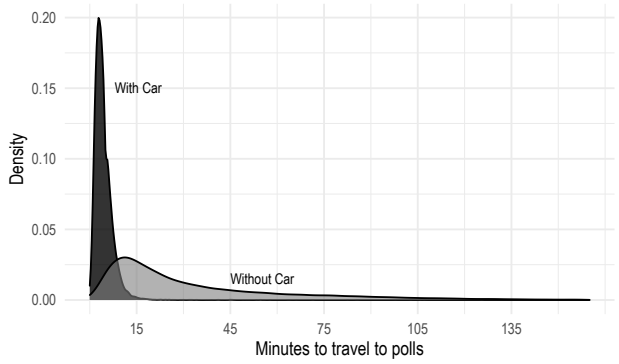

Figure A2: Minutes to travel to polls.

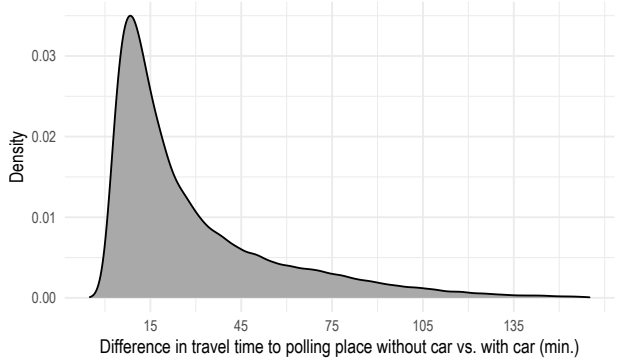

Figure A3: Differences in minutes to travel to polls with and without a car.

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

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

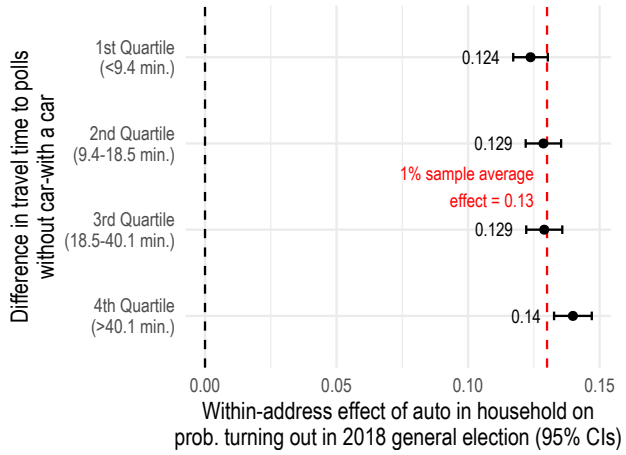

Figure A4: Within-address differences in participation rates, by travel time to polls.

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

	Dependent variable:			
	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^2	0.220	0.226	0.220	0.215
Adjusted R^2	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.[10] 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.

[10] 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.

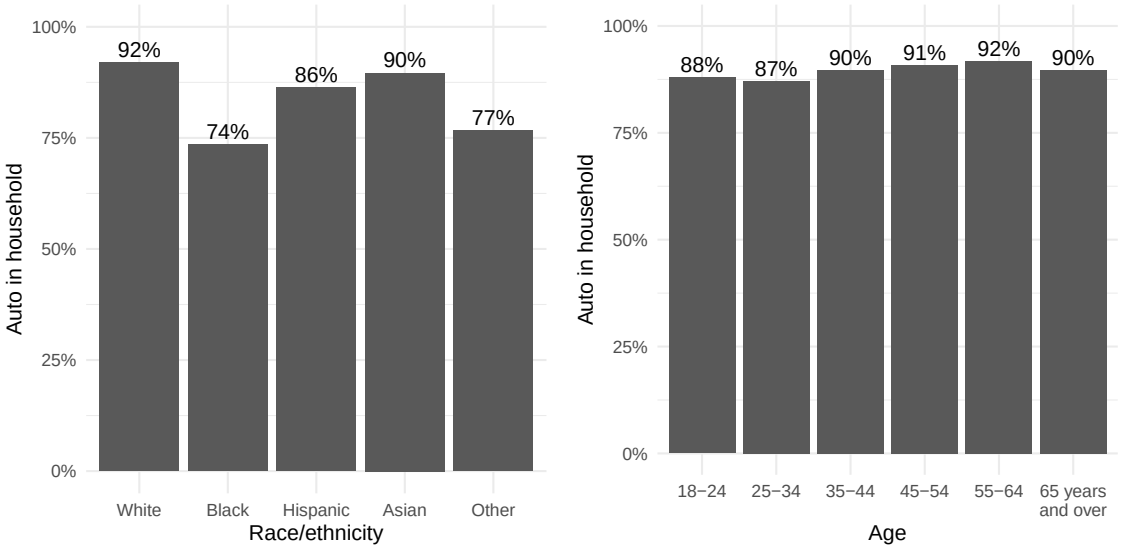

Figure A5: Differences in Car Access among Race and Age Subgroups

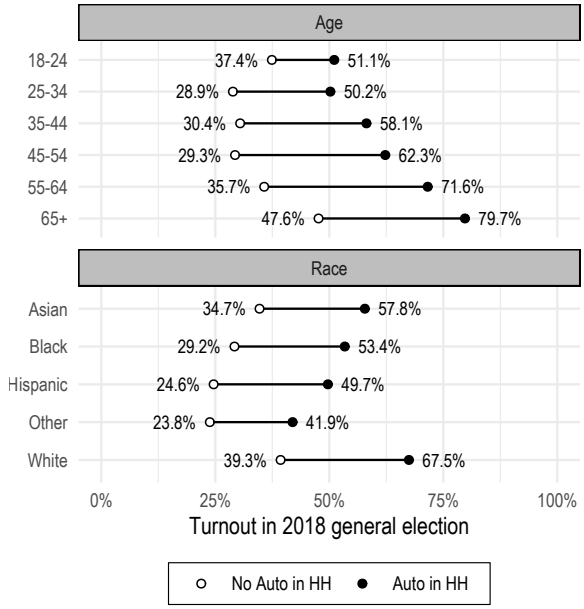

Figure A6: Differences in Turnout by Car Ownership among Age and Race Subgroups

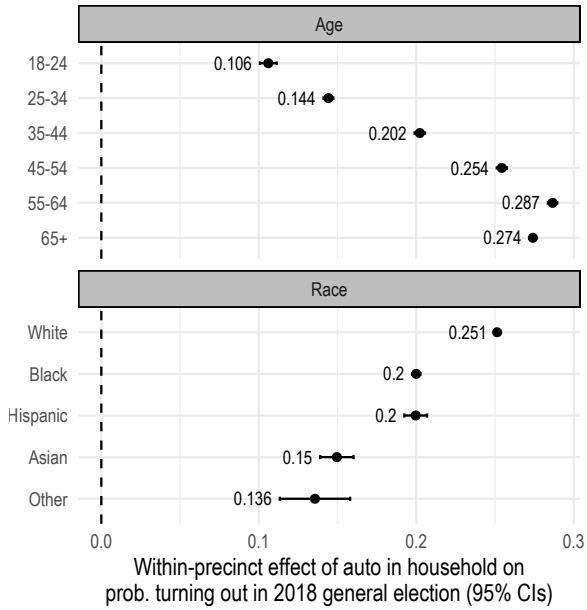

Figure A7: Differential effects of car access by race and age

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

	Dependent variable:					
	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*	0.144*	0.202*	0.254*	0.287*	0.274*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Male	−0.045*	−0.055*	−0.045*	−0.018*	−0.014*	0.012*
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
White	0.042*	0.060*	0.051*	0.039*	0.050*	0.057*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
FE for Precinct	✓	✓	✓	✓	✓	✓
Observations	397,722	958,711	988,012	1,137,469	1,275,008	1,650,635
R^2	0.063	0.081	0.088	0.095	0.097	0.101
Adjusted R^2	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

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

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

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

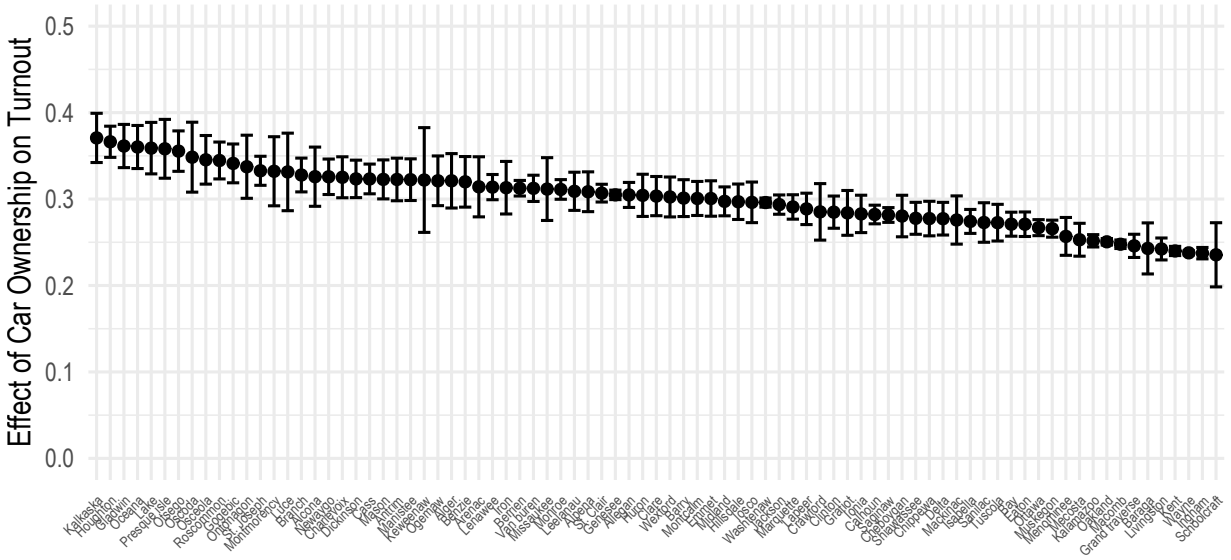

Figure A8: Effect of Car Ownership by County, 2018 General Election

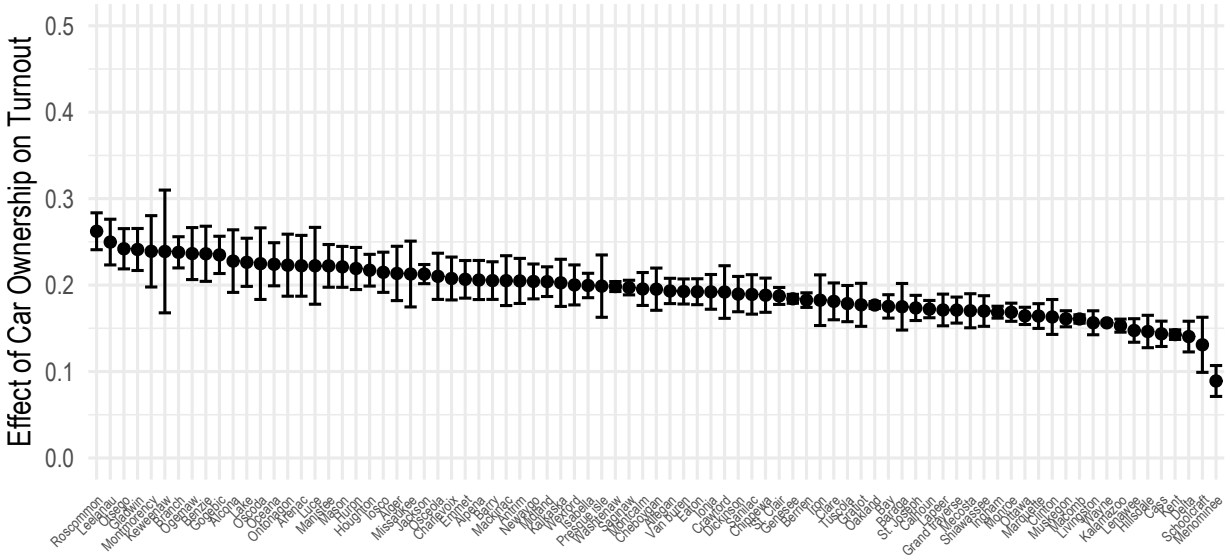

Figure A9: Effect of Car Ownership by County, 2018 Primary Election

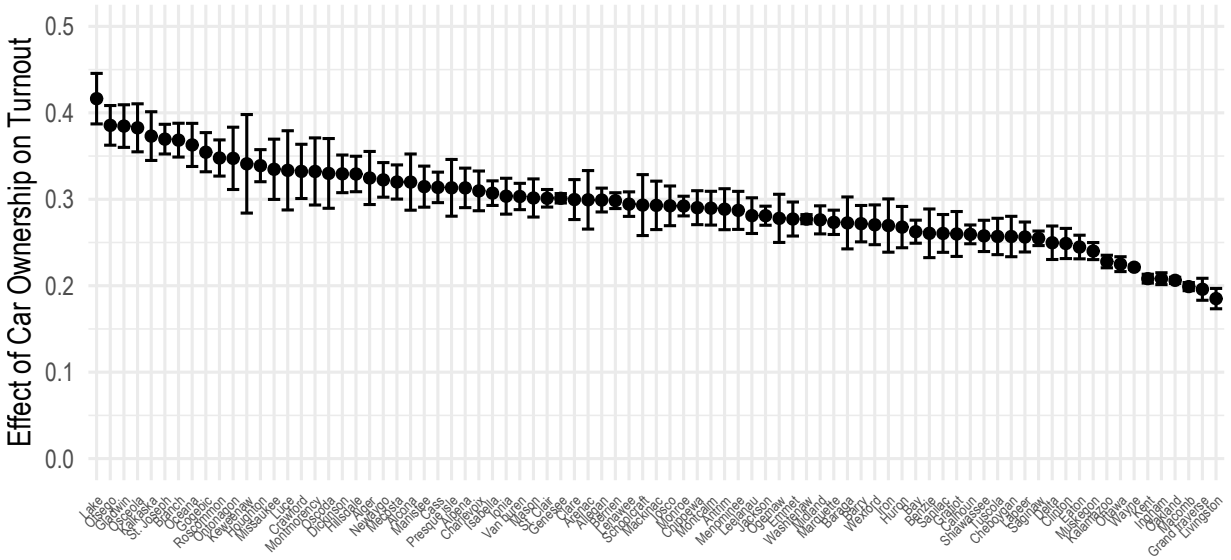

Figure A10: Effect of Car Ownership by County, 2016 General Election

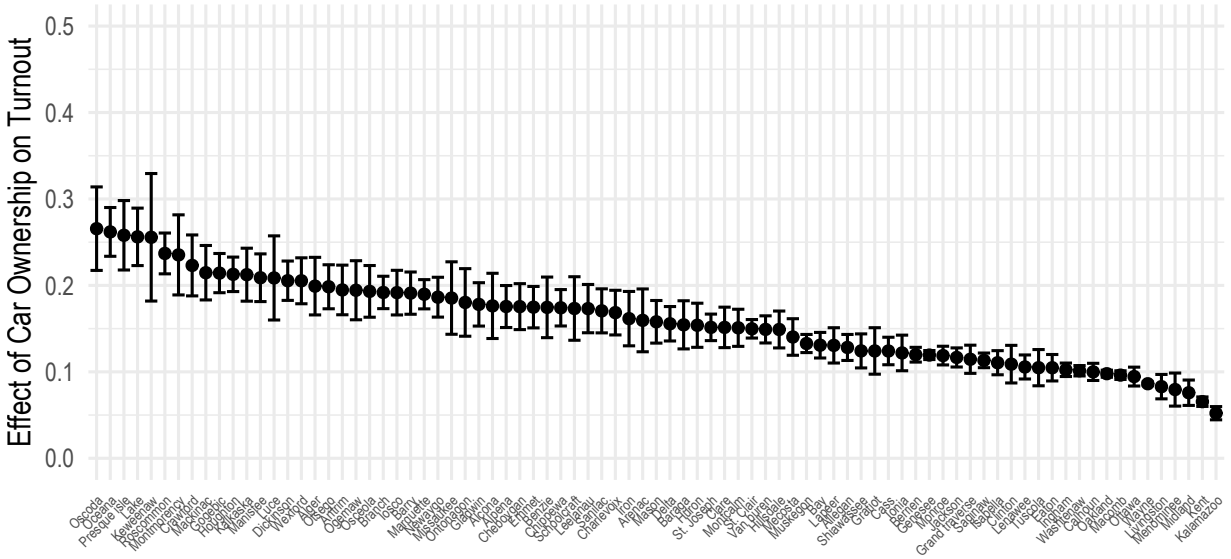

Figure A11: Effect of Car Ownership by County, 2016 Primary Election

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,[11] 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.

[11] `https://wc.wustl.edu/american-panel-survey`

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

	Dependent variable:	
	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	0.136***
	(0.040)	(0.042)
Race/Eth.: Other, non-Hispanic	−0.163***	−0.054
	(0.048)	(0.052)
Race/Eth.: Hispanic	−0.145***	−0.019
	(0.035)	(0.039)
Race/Eth.: 2+ Races, non-Hispanic	−0.067	−0.033
	(0.071)	(0.075)
Female	−0.041**	−0.022
	(0.021)	(0.021)
Education: High school degree	0.164**	−0.027
	(0.070)	(0.079)
Education: Some college	0.250***	0.076
	(0.067)	(0.075)
Education: Bachelor's degree or higher	0.317***	0.151**
	(0.066)	(0.074)
Age: 30-44	0.100**	0.076
	(0.044)	(0.050)
Age: 45-59	0.277***	0.217***
	(0.042)	(0.047)
Age: 60+	0.364***	0.342***
	(0.041)	(0.046)
Constant	0.123	0.405***
	(0.081)	(0.091)
Observations	1,378	1,167
R^2	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