June 16, 2018

League of Women Voters of Florida, Inc., et al. v. Detzner

United States District Court for the Northern District of Florida

Report of Jonathan Rodden, PhD

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I. INTRODUCTION AND SUMMARY

The prevailing interpretation of Florida state law prevents county election administrators from placing early voting locations on campuses of Florida's public colleges and universities. I have been asked by plaintiffs' counsel to examine whether this policy generates spatial inequalities in access to early voting locations within and across metropolitan areas in Florida, and if so, what populations are most affected by these inequalities. My approach is to examine travel times to the nearest early voting location for each of Florida's metropolitan census block groups, taking into account rates of automobile access. My key findings can be summarized as follows:

1. In communities with the largest public universities, travel times to the nearest early voting location are significantly longer in census block groups with large dormitory populations and large populations of college students.
2. This is true of the communities surrounding the University of Florida, Florida State University, Florida A & M University, Florida Atlantic University, the University of Central Florida, the University of South Florida, the University of West Florida, Florida International University, and Florida Gulf Coast University. The only large university where this

relationship could *not* be discerned was the University of North Florida in Jacksonville, where rates of student automobile access are quite high.

3. As a result, communities with large residential universities displayed much greater spatial inequality in travel times from one neighborhood to another than those without such universities.
4. And communities with large residential universities displayed significantly larger overall travel times than those without.
5. These spatial inequalities in access to early voting locations fall most heavily on young people. Specifically, Floridians between the ages of 18 and 24 are three times as likely to live within two miles of the campus of a public college or university than are those above the age of 24.

II. QUALIFICATIONS

I am currently a tenured Professor of Political Science at Stanford University and the founder and director of the Stanford Spatial Social Science Lab ("the Lab")—a center for research and teaching with a focus on the analysis of geo-spatial data in the social sciences. Students and faculty members affiliated with the Lab are engaged in a variety of research projects involving large, fine-grained geo-spatial data sets including individual records of registered voters, Census data, survey responses, and election results at the level of polling places. Prior to my employment at Stanford, I was the Ford Professor of Political Science at the Massachusetts Institute of Technology. I received my Ph.D. from Yale University and my B.A. from the University of Michigan, Ann Arbor, both in political science. A copy of my current C.V. is included as Appendix C.

In my current academic work, I conduct research on the relationship between the geographic location of demographic and partisan groups, the drawing of electoral districts, and patterns of political representation. I have published papers using statistical methods to assess political geography and representation in a variety of academic journals including *Proceedings of the National Academy of Science*, *American Economic Review Papers and Proceedings*, the *Journal of Economic Perspectives*, the *Virginia Law Review*, the *American Journal of Political Science*, the *British Journal of Political Science*, the *Annual Review of Political Science*, and the *Journal of Politics.* One of these papers was recently selected by the American Political Science Association as the winner of the Michael Wallerstein Award for the best paper on political economy published in the last year.

I have recently written a series of papers, along with my co-author, Jowei Chen, using automated redistricting algorithms to assess partisan gerrymandering. This work has been published in the *Quarterly Journal of Political Science* and *Election Law Journal*, and featured in more popular publications like the *Wall Street Journal*, the *New York Times*, and *Boston Review*. I am currently writing a book, to be published by *Basic Books* in 2019, on the relationship between political districts, the residential geography of social groups, and their political representation in the United States and other countries that use winner-take-all electoral districts.

I have expertise in the use of large data sets and geographic information systems (GIS), and do research and teaching in the area of applied statistics. My PhD students frequently take academic and private sector jobs as statisticians and data scientists. I frequently work with geo-coded voter files and other large administrative data sets, including in a recent paper published in the *Annals of Internal Medicine.* I have developed a national data set of geo-coded precinct-level election results that has been used extensively in policy-oriented research related to redistricting and representation,[1] as well as with Census data from the United States and other countries.

I have been accepted and testified as an expert witness in five recent election law cases: *Romo v. Detzner,* No. 2012-CA-000412 (Fla. Cir. Ct. 2012); *Mo. State Conference of the NAACP* v. *Ferguson-Florissant Sch. Dist.,* No. 4:2014-CV-02077 (E.D. Mo. 2014); *Lee v. Va. State Bd. of Elections,* No. 3:15-CV-00357 (E.D. Va. 2015); *Arizona Democratic Party, et al. v. Michelle Regan, et al.* (No. 16-1065-PHX-DLR); and *Bethune-Hill v. Virginia State Board of Elections*. I also worked

[1] The dataset can be downloaded at http://projects.iq.harvard.edu/eda/home. The data can be visualized in an interactive web map, available at http://atlas.esri.com/Atlas/VoterAtlas.html.

with a coalition of academics to file an Amicus Brief in *Gill v. Whitford*. Much of this testimony had to do with geography and elections, and as in this case, my testimony in *Arizona Democratic Party, et al. v. Michelle Regan, et al.* focused on voting locations and travel times. I am being compensated at the rate of $500/hour for my work in this case.[2]

III. DATA SOURCES

This report draws on data from a number of sources. I have assembled data on population, population density, age, college student status, automobile availability, and college dormitory residence at the level of Florida census block groups from the most recent Five-Year American Community Survey (ACS). These data are disseminated by the National Historical GIS (nhgis.org), which also provides associated geo-spatial boundaries. I have also collected ACS data on population, population density, automobiles, income, race, and home ownership at the level of cities and census designated places. Data on citizen voting-age population come from the 2011-2015 Five-Year American Community Survey.[3] Data on early voting locations in place for the 2016 election come from the Florida Department of State

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[2] I was assisted in my analyses by William Marble, who is a Ph.D. student in the political science department at Stanford. He was compensated by Plaintiffs' counsel at a rate of $140/hour for his work. I reviewed and approved of all of his work. In my work as a political scientist, I typically rely upon the work of students like Mr. Marble to assist me with the type of analyses presented in this report in the same manner.

[3] https://www.census.gov/rdo/data/voting_age_population_by_citizenship_and_race_cvap.htm

(dos.myflorida.com). The addresses of these locations were geo-coded using Google Maps. Data on travel times to early voting locations via automobile, public transit, and walking were obtained from the Google distance matrix application program interface (API).[4] Additional data related to automobiles on campus were collected from campus parking and transportation offices, and from US News and World Report. Data on college enrollments and employment were collected from the National Center for Education Statistics (NCES),[5] as well as web pages of individual universities. Information about the location of colleges and universities was obtained from a dataset created by the Oak Ridge National Laboratory and disseminated by the United States Geological Survey (USGS).[6]

IV. DORMITORIES, EARLY VOTING LOCATIONS, AND TRAVEL TIMES

Florida is home to twelve public universities with multiple campuses, 28 state colleges and community colleges, and many additional private institutions of higher learning. Three of the five largest public universities in the United States, and four of the top ten, are in Florida. These public universities are very important parts of the communities in which they are located, not only because of their very high

4 https://developers.google.com/maps/documentation/distance-matrix/intro
5 https://nces.ed.gov/ipeds
6 https://www.sciencebase.gov/catalog/item/4f4e4acee4b07f02db67fb39

enrollments, but also because they are major employers. For many of Florida's public universities, a large share of the local population spends time on campus during the work week.

Table 1 provides an overview, based on the most recent data from the National Center for Education, of the number of students and university employees, in the fall of 2016, at each of Florida's largest public universities. The Table also includes information on the citizen voting-age population for the city with which the university is associated. Cities are among the units considered as "census places" by the United States Census Department. To get a sense for the importance of the university in the community, the fourth column sums up students and employees and divides by the citizen voting-age population of the city that surrounds the university.

In cases like Gainesville, Tallahassee, or Boca Raton, the size of the community in which the university is embedded is captured rather well by the citizen voting-age population. However, some cities, like Jacksonville, have very expansive boundaries that actually include surrounding rural areas, while other cities, like Orlando, have tight boundaries that do not include much of what local residents would consider to be parts of the Orlando metropolitan area.

Table 1: University employment, enrollment, and local citizen voting-age population

	Total Staff, 2016	Total Enrollment, 2016	City CVAP	University affiliates as share of city CVAP	Urbanized area CVAP	University affiliates as share of urbanized area CVAP
University of Florida, Gainesville	14,706	52,367	126,465	53.0%	131,675	50.9%
Florida State University, Tallahassee	6,938	41,173	185,395	26.0%	166,480	28.9%
University of Central Florida, Orlando	5,961	64,088	250,225	28.0%	1,005,960	7.0%
University of South Florida, Tampa	7,905	42,861	348,935	14.5%	1,762,795	2.9%
Florida International University, Miami	5,973	55,003	215,690	28.3%	3,493,919	1.7%
Florida Atlantic University, Boca Raton	3,467	30,541	88,185	38.6%	3,493,919	1.0%
University of North Florida, Jacksonville	2,083	15,762	837,535	2.1%	733,285	2.4%
University of West Florida, Pensacola	1,861	12,966	52,505	28.2%	224,175	6.6%
Florida Gulf Coast University, Fort Myers	1,594	14,821	66,165	24.8%	381,570	4.3%

Note: Boca Raton is located in what the Census Department considers to be the Miami urbanized area. Fort Myers is located in the Cape Coral urbanized area. Pensacola is located in an urbanized area that spills well over into Alabama.

Thus in the penultimate column of Table 1, I have included the citizen voting-age population of what the Census Department designates as the larger "urbanized area" in which the university is located.[7] The last column displays university affiliates as a share of the citizen voting-age population of the urbanized area.

In many cases, the university's students and employees account for a very substantial share of the local population, and in a handful of cases, they are dominant. For example, it appears that more than half of the citizen voting-age population of Gainesville is either a student or employee of the university of Florida. Florida Atlantic University is not large relative to the entire Southeast Florida population included in the "Miami urbanized area" figure, but its students and employees account for a large share of the population of Boca Raton proper. University affiliates make up somewhere between 26 and 29 percent of the Tallahassee population, depending on which denominator is used, and 28 percent of the citizen voting-age population of Pensacola proper.

These university campuses and their surrounding neighborhoods are disproportionately composed of young people. I have identified the census block groups that are within two miles of any of Florida's public colleges or universities (excluding community colleges).[9] While only around 2.8 percent of Florida's voting-age population above the age of 24 lives in these very compact areas, 8.3

[7] To calculate this, I collected CVAP data at the level of census block groups, and then used geo-spatial software to situate the centroids of block groups within the boundaries of urbanized areas, then aggregated the block-group-level CVAP estimates to the level of urbanized areas.
[9] Specifically, I use geo-spatial software to generate a two-mile circle around the geo-spatial coordinates of the university as defined by the United States Geological Survey, and examine the census block groups for which the centroid falls within that circle.

percent of Floridians between the ages of 18 and 24 live on campus or in very close proximity to a public college or university. In other words, the share of young people within two miles of the center of a public college or university is almost three times higher than the share of those over the age of 24.

In some cases, the university campus occupies a large portion of the real estate in the central part of a relatively compact city, and university students make up a large share of the local population. The University of Florida in Gainesville and Florida State University ("FSU") in Tallahassee are the clearest examples of such classic college towns. In each of these small cities, thousands of students live in high-density dormitories on a campus in the city center, and thousands of additional students live in rental housing in proximity to campus. The University of Florida occupies over 3 square miles in the middle of Gainesville, and FSU covers over 2.5 square miles in the middle of Tallahassee.

Most of Florida's largest universities, however, are situated in a rather different spatial setting. Orlando, Tampa, and Jacksonville are sprawling, low-density cities, and each is home to a large public university that is situated relatively far from the city center. The dormitories of the sprawling 1,400-acre exurban Orlando campus of the University of Central Florida are home to almost 12,000 students. The University of South Florida houses 7,700 students in dormitories on its 1,500-acre campus in the outer-ring exurbs of Tampa. The University of North

Florida is situated on 1,300 acres surrounded by a nature preserve in the distant exurbs of Jacksonville, and houses around 3,500 students in dormitories. Likewise, the University of West Florida houses around 1,500 dorm dwellers on its campus covering over two square miles of Ferry Pass, an exurb of Pensacola. And Florida Gulf Coast University houses 2,670 students on its 800-acre campus in the distant exurbs of Fort Myers. In Southeast Florida, over 4,000 students live in dorms on the 800-acre campus of Florida Atlantic University on a former military base in Boca Raton, but large new dorms are currently under construction, and the university plans to bring its capacity up to 10,000.[10] Finally, further down the coast, around 3,000 students live in dormitories in the urban Miami setting of Florida International University.

In all three settings—college towns, sprawling exurbs, and urban Miami—election administrators face a specific challenge. Thousands of young registered voters live in dormitories in close proximity to one another in relatively high density, and a large share of them do not have access to automobiles. For instance, according to data provided by the University of Florida to the U.S. News and World Report, only 18 percent of their students have access to an automobile. Sometimes the campus is surrounded by student-dominated rental housing where automobile ownership rates are also low. In addition, with the exception of Miami, the rest of

[10] http://www.sun-sentinel.com/news/education/fl-fau-housing-boom-20161119-story.html

the surrounding metro area is usually dominated by residents of single-family houses with access to one or more automobile. The exurban campuses are self-contained communities—islands of high population density that are often surrounded by nature preserves, massive parking lots for commuters, and/or low-density housing that is poorly served by public transit.

Thus, a policy of explicitly avoiding the placement of early voting locations on college campuses requires election administrators to avoid 1) the most densely populated neighborhoods in the region, and 2) the areas with the least access to automobiles. In the college towns, this means excluding a large swath of the most dense and central real estate in the city and requiring its carless residents to find transportation to other neighborhoods. In the exurban universities, it means that thousands of individuals must negotiate a sparse bus schedule and find their way to a public library or similar location in the surrounding off-campus neighborhoods.

The main purpose of this report is to measure the asymmetry in burdens associated with this limitation on the placement of early voting locations by focusing on travel times. I ask the following questions: First, do individuals living in census block groups with large dormitory populations face longer travel times to and from existing early voting locations than those living elsewhere in the surrounding community? Second, if so, are communities containing large concentrations of dormitory dwellers characterized by a greater level of inequality in travel times across the community than otherwise-similar communities? Third, are travel times longer on average in communities with large college dormitory populations than similar communities without such populations?

The main unit of analysis in this study is the census block group—a geographic unit that includes, on average, around 1,500 people. It is the lowest geographic level at which the United States Census Department, in its American Community Survey, assembles data on the availability of automobiles, the number of college students, and the number of dormitory dwellers. I obtain the geographic coordinates of the centroid of each census block group, as well as the geographic coordinates of each early voting location used in the 2016 general election. Using the Google Distance Matrix application (API), I obtain several values for each block group centroid: the fastest travel time to an early voting location via automobile, and the fastest travel time to an early voting location via public transit. The distance matrix application provides access not only to the familiar routing and traffic information used to obtain the fastest automobile route between locations, but also data on train and bus schedules and routes. These data are provided and updated directly by local transportation authorities. Users can enter a specific departure day and time, and the algorithm finds the closest departure from the nearest transit stop, calculates the time it takes to walk to the stop, and calculates the time spent *en route* to the destination.

For each census block group, I have obtained travel times to the five nearest early voting locations by automobile, by public transit on Tuesday at 9 AM, and by public transit on Saturday at noon, as well as by walking. For each of these travel options, I find the shortest travel time among the five nearest early voting locations. My goal is to provide a summary statistic capturing the round-trip travel time experienced by residents of each block group in metropolitan Florida. In order to do this, I obtain data for each block group on the share of households with access to at least one automobile. I then take a weighted average of the travel time by car, and the quicker of the travel time by either walking or, in the vast majority of cases, by public transportation. Auto travel times are weighted by the share of households with access to a vehicle, and non-auto travel times are weighted by the share of households *without* access to a vehicle. I obtain separate values for trips on Tuesdays at 9 AM and Saturdays at noon.

A problem with this approach is that the United States Census Department only tracks the availability of automobiles for households. Unfortunately, unlike students living in private apartments, dorm-dwellers are considered to be living in so-called "group quarters," which are not households, and, as a result, the census contains no information about automobile ownership for them. To deal with this problem, I have attempted to obtain additional information about the prevalence of automobile access among students living in campus housing by examining university online information and contacting their offices of parking and transportation. I have also examined data collected by US News and World Report, which for some universities, reports an estimate of the share of all students who bring a car to campus. Unfortunately, however, this is not the same thing as the share of all dorm-dwellers who have access to a car on campus. Because of the prevalence of commuting by car at many of Florida's exurban universities, the share of dorm-dwellers with a car on campus will often be substantially lower than the overall share of students. In cases where I was unsuccessful in obtaining supplementary information, I have imputed this field using several alternative assumptions about campus automobile ownership. I discuss these assumptions in the case studies below, and present results based on alternative assumptions in an appendix.

A final issue concerns the time that transit users must spend waiting for the bus or train. While the Google database considers the time spent walking from one's starting point to the nearest bus stop, it assumes that the bus departs instantly upon the passenger's arrival at the stop. Any public transportation user knows this is unrealistic. I therefore assume a very conservative average wait time of 10 minutes in each direction. I have also calculated estimates with a wait time of 20 minutes in each direction, which might be more realistic in the exurban universities with very limited bus schedules. Moreover, one might favor the estimates using the longer wait time assumption when one considers that even if users in possession of a bus schedule might be able to minimize their wait time on the outbound trip, they must simply wait for the next bus after waiting in line and voting, which in exurban parts of Florida is likely to come only twice each hour.

I proceed in two steps. First, I analyze differences in travel times *within* communities that contain large dormitory populations. This analysis begins with case studies of Florida's largest public universities with significant dormitory populations. For each of these communities, I examine the difference in travel times between census blocks that contain large dormitory populations and those that do not. I also examine surrounding neighborhoods with student-oriented rental housing. This analysis culminates in an analysis of differences in travel times between census block groups within metropolitan areas throughout all of Florida.

Second, I explore differences *across* Florida's metropolitan areas. That is, after establishing that within metropolitan areas, travel times are substantially different in neighborhoods with large dormitory populations than in those without, I ask whether there are similar patterns of heterogeneity in travel times in other comparable cities that are lacking substantial dormitory populations. Embedding census block groups in cities and census designated places, I ask whether otherwise similar communities have similar mean travel times, and whether their neighborhoods exhibit similar spreads around those means. In order to conduct this comparative analysis, for each community with a large dormitory population, I identify a set of communities with characteristics that are as similar as possible in terms of population size, population density, the share of households without vehicles, median income, and renters as a share of households, but where there is not a large dormitory population.

V. DIFFERENCES IN TRAVEL TIMES WITHIN COMMUNITIES

Let us begin with Florida's two large college towns—Gainesville and Tallahassee—and then move on to explore Miami's urban public universities, and then some of Florida's largest sprawling suburban and exurban campuses, and finally, put all of metropolitan Florida together in one combined analysis.

Gainesville

With over 52,000 students, the University of Florida is the fifth largest university in the United States by enrollment, and its campus covers over three square-miles in the middle of Gainesville. As can be seen in Figure 1 below, college students are spread throughout the city, but are especially concentrated in the dormitories on campus and in apartments and rental houses in the surrounding census block groups. Block groups where more than 75 percent of the over-18 population is composed of dorm dwellers are outlined in bold black. According to the American Community Survey, these tightly packed dorms in the middle of the city house over 9,000 people. The next map shows that the campus and surrounding student housing are by far the most densely populated parts of the city. The third Gainesville map displays the share of households without an automobile.[11] Those without automobiles are concentrated on campus, in the surrounding student neighborhoods, and in other student neighborhoods located along the bus route that travels to campus.

[11] The University of Florida reports that around 18 percent of students living on campus have a car available, so I use that figure to impute the automobile data for the dorm segment of the population.

Figure 1: College Student Population in Gainesville, Florida

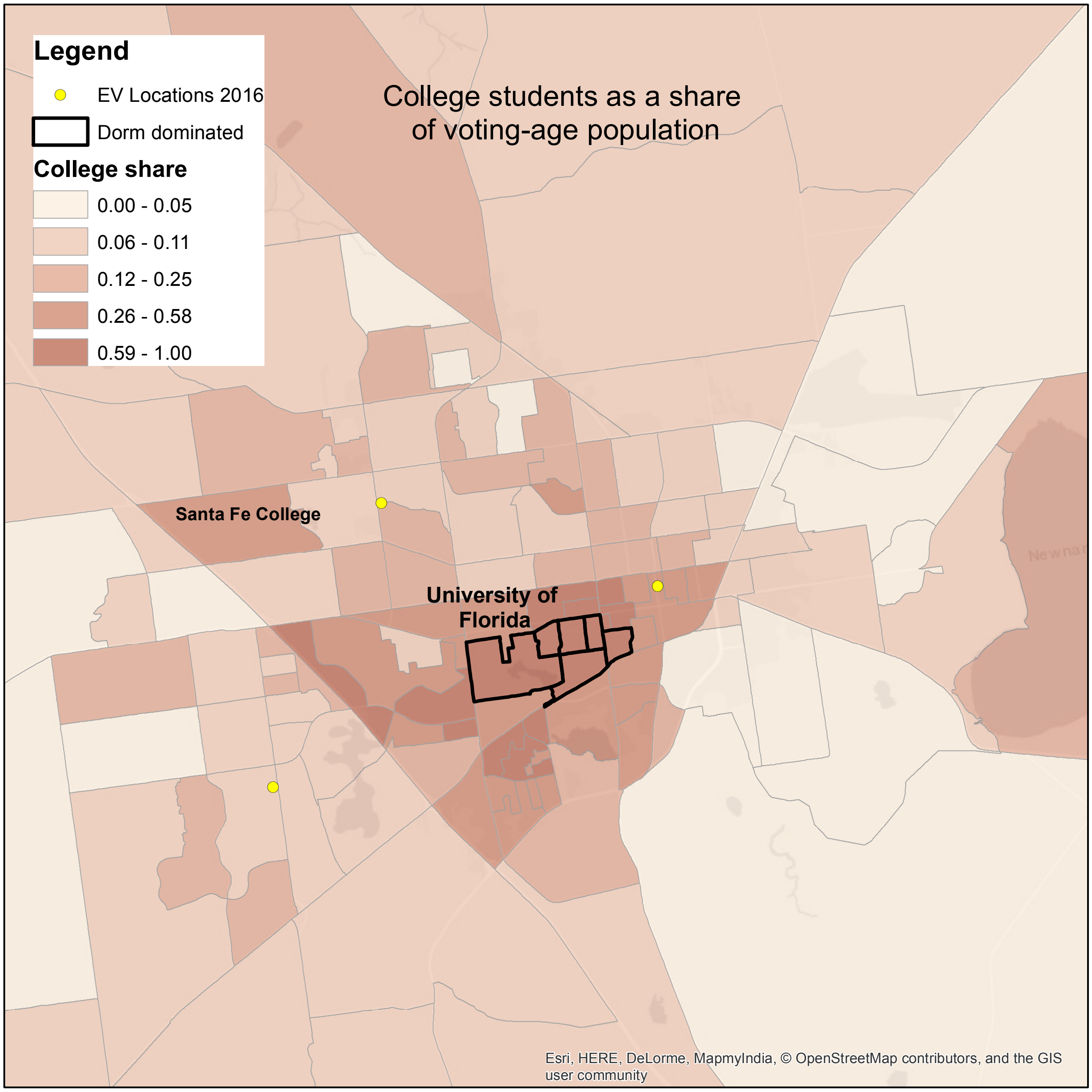


Figure 2: Population Density in Gainesville, Florida

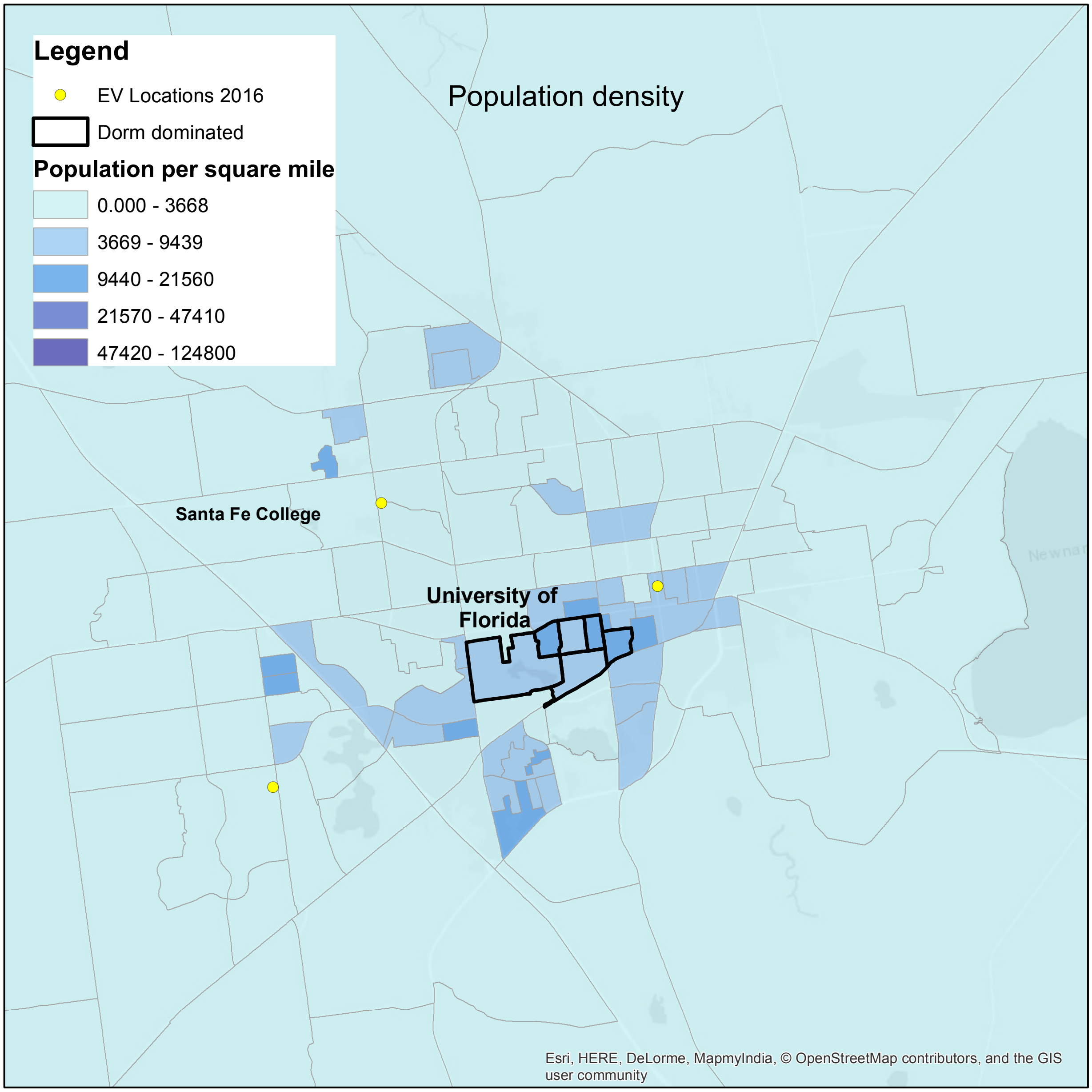


Figure 3: Automobiles in Gainesville, Florida

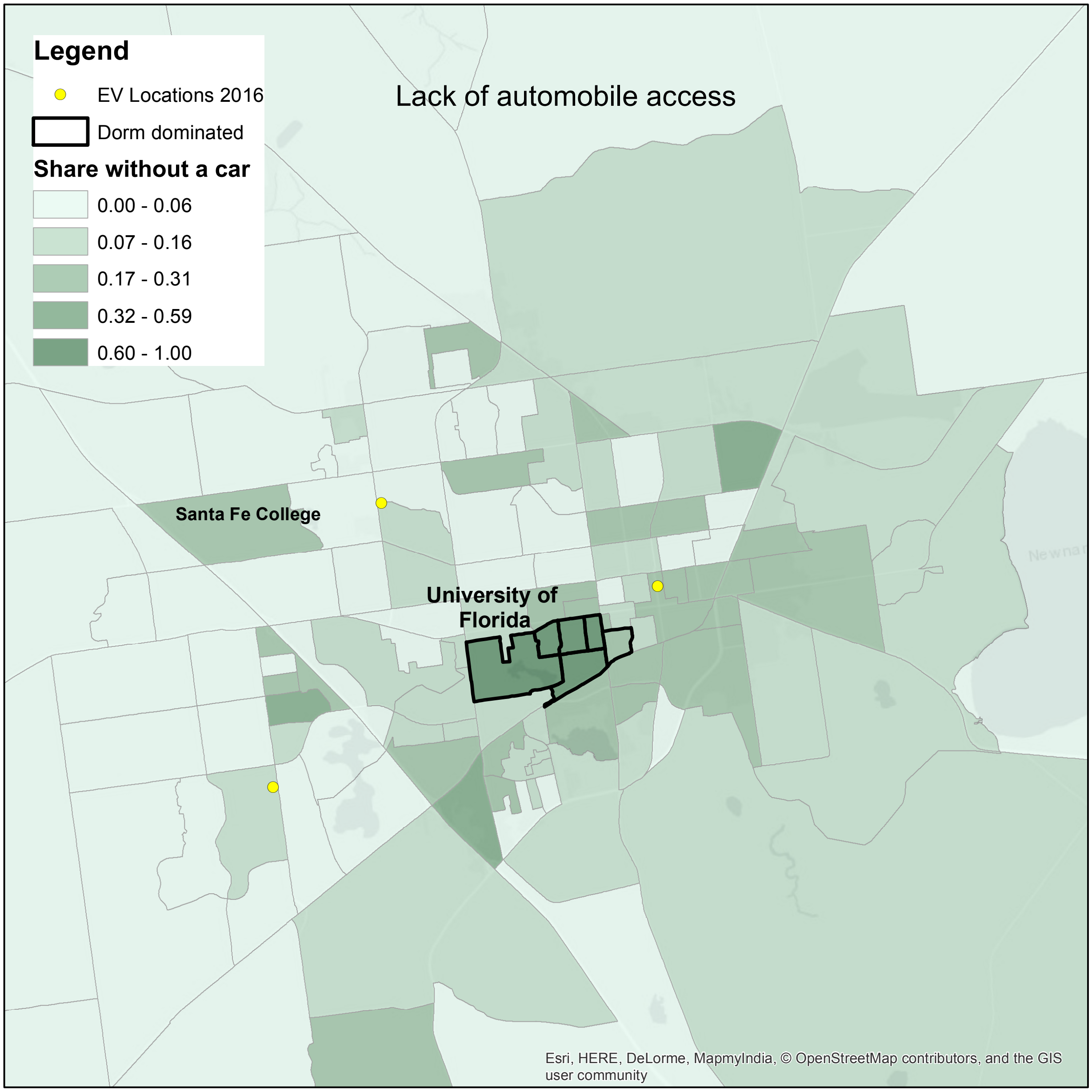
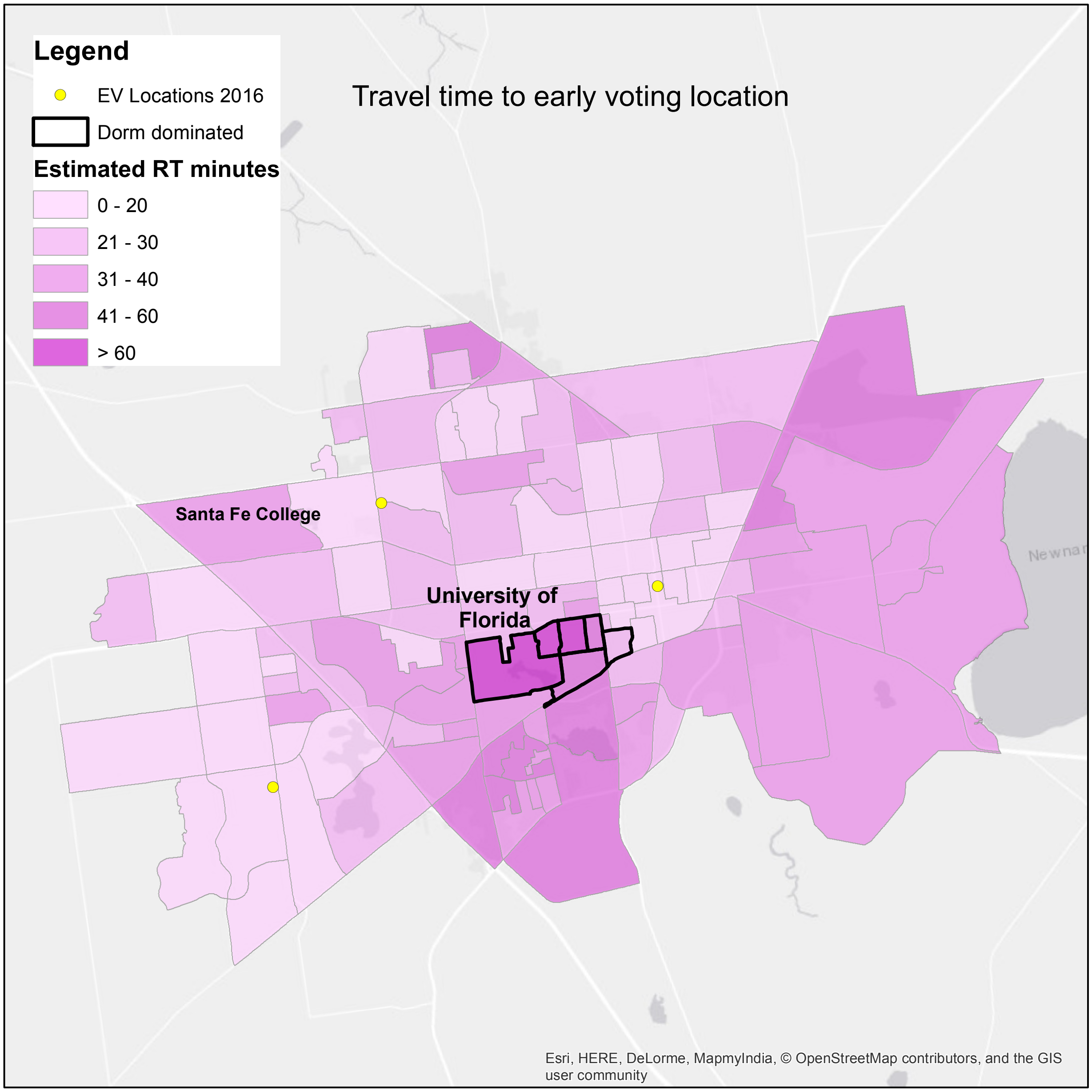


Figure 4: Travel to Early Voting Locations in Gainesville, Florida



The final Gainesville map displays estimated round-trip travel times to the nearest 2016 early voting location. Recall that for each block group, the travel times are weighted means of auto and transit times, where the weights are based on rates of automobile accessibility. The estimates displayed in this map assume travel on a Tuesday morning, and assume that bus riders must wait 10 minutes. The early voting destinations are displayed with yellow dots. The map makes it clear that travel times are substantially longer for the campus and surrounding area than in most residential parts of Gainesville. To see this more clearly, we can simply calculate the median travel time for all census block groups in metropolitan Alachua County where more than half of the population lives in a dormitory, and the median travel time for all other metropolitan census block groups. These values are displayed in Table 2.

Table 2: Summary of Travel Times in Alachua County

Alachua County	
	Median RT travel time (minutes)
Dorm block groups	61
Non-dorm block groups	25

Table 2 demonstrates that the estimated round-trip travel time is over an hour from the census block groups that are dominated by dormitories, but only 25 minutes for the rest of metropolitan Alachua County.[12]

Another way to examine the relationship between dorm population and travel times is to estimate a simple linear regression in which the travel time is the dependent variable, and the dorm population share is the independent variable. I estimate this regression for the 105 metropolitan Alachua census block groups for which transit data were available and present the results in the first columns of Table 3.

Table 3: Travel Time Regression Results in Alachua County

Alachua County Travel Time Regressions

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	41.04	(4.60)	***			
College share				27.7	(3.90)	***
Constant	26	(1.10)	***	20.6	(1.63)	***
Observations	105			105		

*** Significant at the .001 level

[12] If I assume a 15-minute transit wait time on each end rather than 10, the median dorm travel time expands to 69 minutes.

These regressions are weighted by the population of each block group. The coefficient for "share in dorms" is easy to interpret and is consistent with the simple comparison of medians. Going from a census block group without any dormitory population to one with 100 percent dorm population is associated with an increase in travel time by 41 minutes.

It is also useful to look beyond the dormitory population. The maps above reveal that many carless college students live away from campus, especially along bus lines. The right-hand side of Table 3 presents regressions that take a different approach. I estimate the same type of simple linear regression, weighted by block-group population, but use college students as a share of all voting-age residents as the independent variable. In this case, the coefficient means that going from a block group with zero college students to one that is composed exclusively of college students is associated with an increase in travel time of 28 minutes.

These numbers are not surprising. Consider a typical University of Florida student living in a dormitory—like Hume Hall— in the center of campus, who wishes to carve out time to cast an early ballot at the closest location, which is the Alachua County Supervisor of Elections office on North Main Street, roughly 2.5 miles away. The best option would be to walk 10 minutes to the Reitz Student Union, wait for the 46 bus, ride the bus for 9 stops, disembark at the Alachua County

Courthouse, and then walk 8 blocks to the destination—a process that would take 30 minutes in each direction without any wait time for the bus on either end. Alternatively, consider a typical non-student in Gainesville, who would simply face a ten to twelve-minute drive to the nearest early voting location.

The sprawling University of Florida campus is home to thousands of carless students who live in dormitories. Thousands of additional carless students take the bus to campus every day. Due to the density and lack of automobile access among this population, if election administrators had the goal of minimizing disparities in early voting access throughout metro Gainesville population, an on-campus early voting location would be an obvious choice. The attractiveness of such a location is even clearer when one considers employees of the university in addition to students, taking into consideration that University of Florida students and employees make up around half of the citizen voting-age population in Gainesville.

Tallahassee

Florida State University is slightly smaller than the University of Florida, with an enrollment of around 42,000 and a campus size of 2.5 square miles. The spatial distribution of dorms, students, automobiles, and travel times in Tallahassee has much in common with Gainesville. As shown in the maps below, students are concentrated not only in dorms on campus, but also in surrounding rental housing, especially to the West and North of the campus. The university and associated rental housing are by far the densest parts of Tallahassee, and as shown in Figure 7, these areas have large carless populations. As with the University of Florida, Florida State's campus is situated just to the West of downtown, and there is an early voting location located downtown. In this case, it is only 1.5 miles away, at the Leon County Courthouse on South Monroe Street. A student living in the Ragans Hall residential complex would walk for two minutes to the bus stop, and then wait for the F bus, which comes twice each hour. The student would take the bus for 6 stops, and then walk the remaining half of a mile to the destination. According to Google Transit, this process would take 17 minutes without any wait times, but in the case of a bus that only arrives every 30 minutes, wait times would be substantial.

Figure 8 provides a map of travel times, based on calculations that assume a rather conservative 10-minute wait time. As in Gainesville, we see that travel times are significantly longer not only on campus, but also in the student-oriented residential areas to the West and North. In order to calculate travel times in a handful of block groups, as described above, it was necessary to obtain supplemental information on automobile access beyond the ACS, because dorm dwellers are not considered to be residents of "households." In this case, I received information (via email) from the FSU parking and transportation office indicating that in 2016, 53 percent of all FSU students applied for an on-campus parking permit. However, this number includes the vast majority (82 percent) of FSU students who live off campus, many of whom drive to campus each day. The share of dorm dwellers with cars is undoubtedly much lower. Figure 8 is based on an assumption that 40 percent of dorm-dwellers have automobiles. I also use this assumption to produce Tables 4 and 5, which are identical to the tables introduced above. Table 4 compares medians of dorm-dominated block groups with medians for the rest of the Tallahassee area, and Table 5 provides results of regressions of travel times on dorm dwellers and college students as a share of the voting-age population.

Figure 5: College Student Population in Tallahassee, Florida

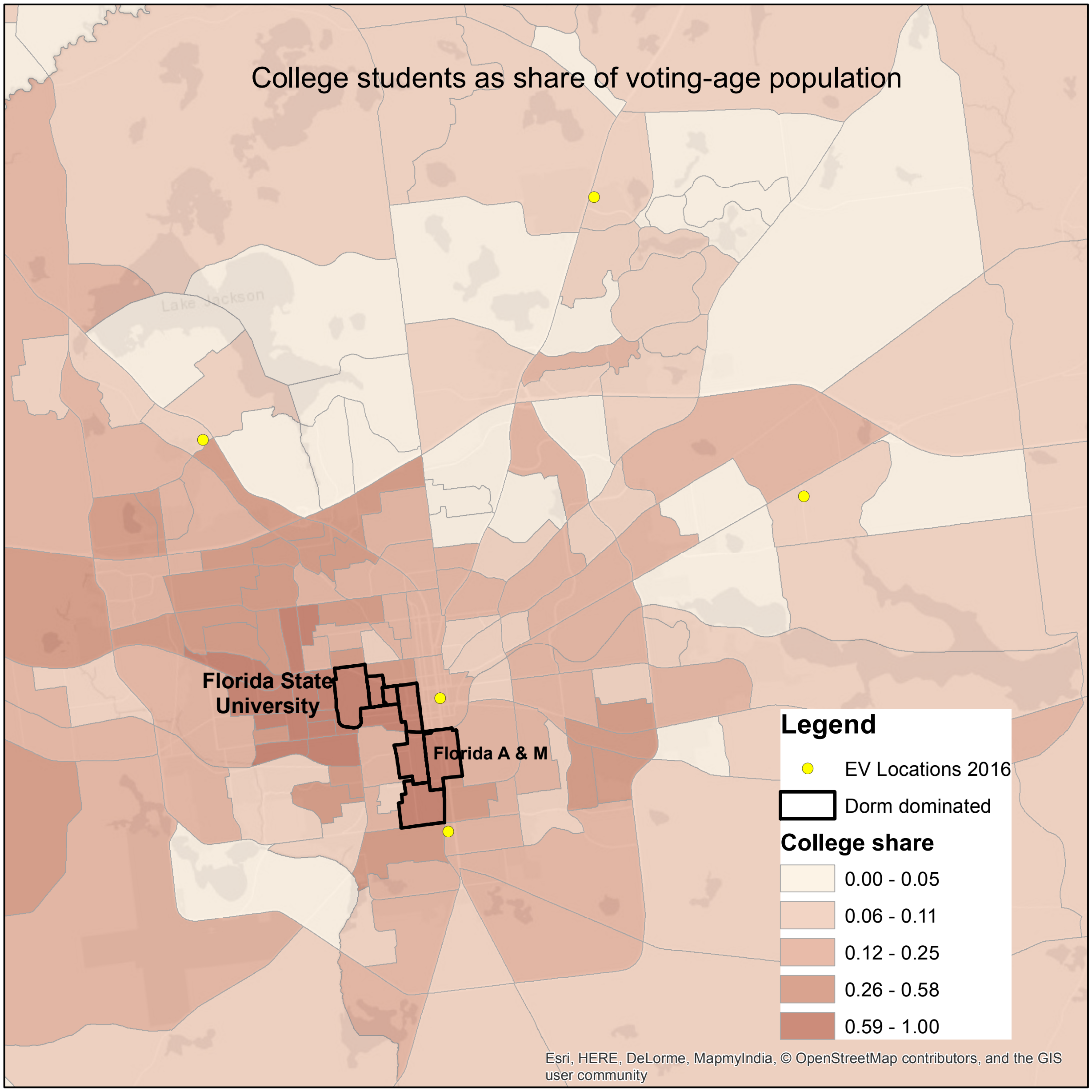


Figure 6: Population Density in Tallahassee, Florida

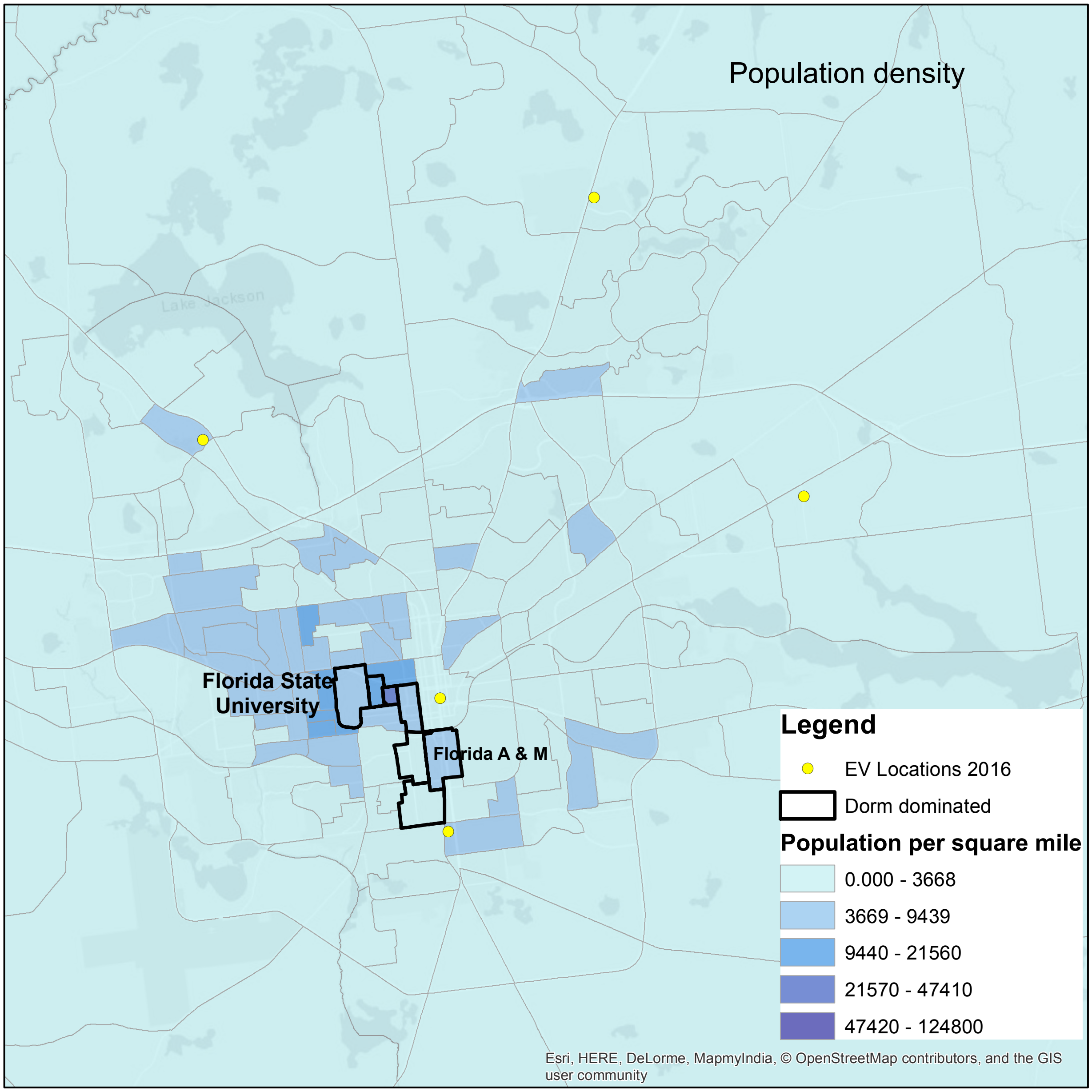


Figure 7: Automobiles in Tallahassee, Florida

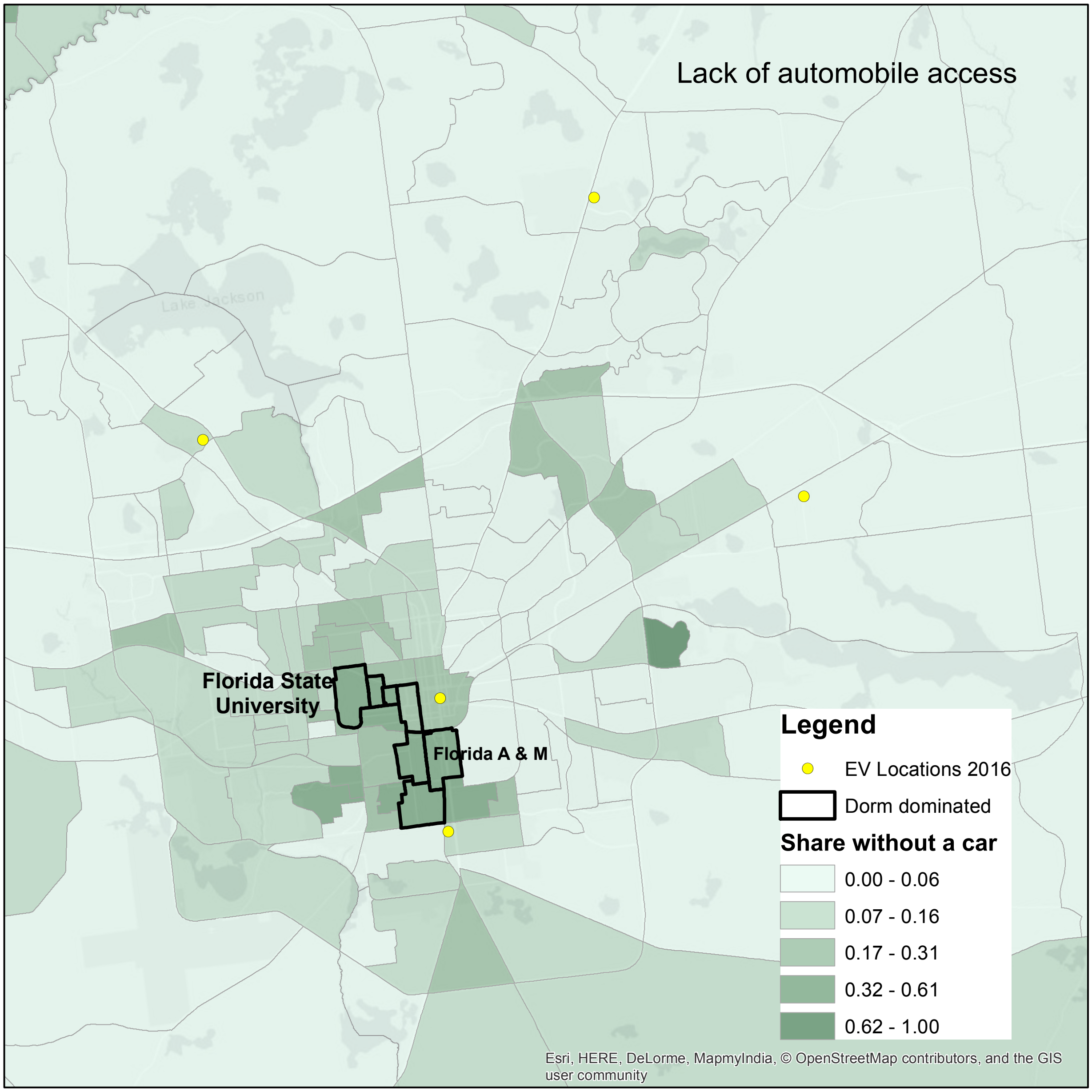


Figure 8: Travel to Early Voting Locations in Tallahassee, Florida

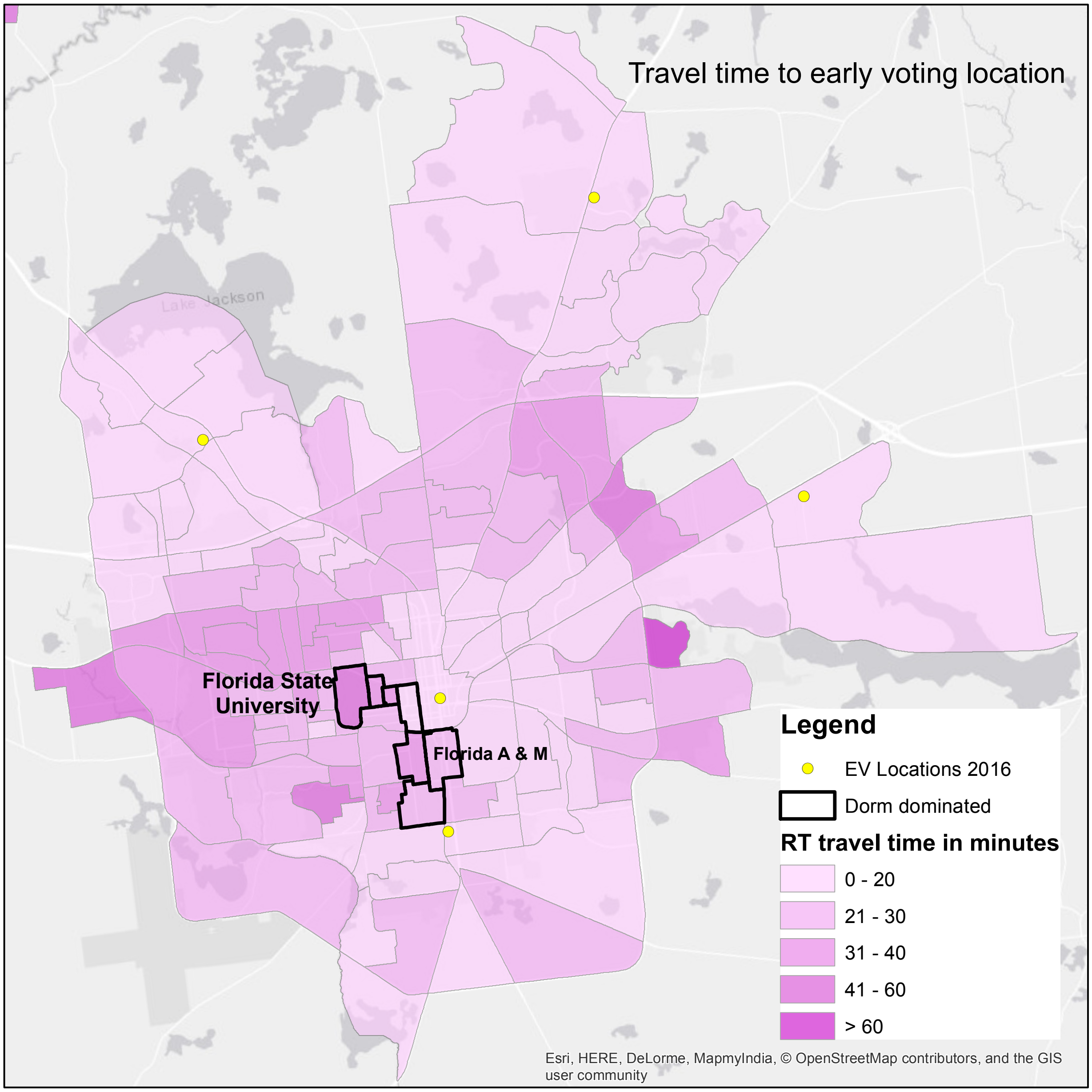


Table 4: Summary of Travel Times in Leon County

Leon County	
	Median RT travel time (minutes)
Dorm block groups	40
Non-dorm block groups	21

Table 5: Travel Time Regression Results in Leon County

Leon County Travel Time Regressions						
	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	17.90	(4.60)	***			
College share				16.4	(2.90)	***
Constant	22	(0.84)	***	18.3	(1.10)	***
Observations	135			135		

*** Significant at the .001 level

Table 4 reveals that travel times for dorm dwellers, while lower than in Gainesville owing to the closer proximity to downtown, are substantially higher—

almost double—for dorm-dwellers than for other residents of Tallahassee. If I assume a more realistic 15-minute wait time, the travel time for dorm block groups increases to 46 minutes.

Next, Table Five adopts the regression approach introduced above. It indicates that going from a dorm-free to a dorm-dominated block group is associated with an 18-minute increase in travel time, and going from a student-free to a student-dominated block group is associated with a 16-minute increase in travel time.

However, these are likely to be under-estimates of the true difference, since I have assumed a rather high rate of automobile ownership among dorm dwellers, and a rather low wait time for transit users. Alternatively, one might worry that perhaps auto access is just as high among dorm dwellers as it is among commuting students. I explore this possibility in the appendix, where I present results that assume auto ownership for dorm-dwellers at the rate of 50 percent. The tables in the appendix reveal that the cross-block-group differences are only very slightly attenuated under this assumption (by four minutes) and remain substantively and statistically significant.

In sum, Tallahassee is also a setting where the presence of a large, sprawling campus in the center of the city, with a large carless dorm population and surrounding carless student renter population, creates a pronounced asymmetry in access to early voting locations between students and non-students when the campus cannot be used as an early voting location.

Miami

Let us now consider a rather different type of university setting: urban Miami. Florida International University (FIU), with an enrollment of almost 57,000, is the fourth largest public university in the United States. As shown in the maps below, it is located in a denser urban setting. Student populations and carless households are somewhat concentrated near FIU, as well as the University of Miami in Coral Gables to the East. Unfortunately, FIU does not provide information about the availability of cars for its dormitory residents. However, the share of all students bringing a car to campus at the University of Miami is 38 percent according to U.S. News and World Report. Let us assume that FIU is somewhat similar to the University of Miami or Florida State, and although the actual rate of automobile possession among dorm dwellers might be lower, let us adopt an assumption of 40 percent, relegating other assumptions to the appendix.

Figure 9: College Student Population in Miami, Florida

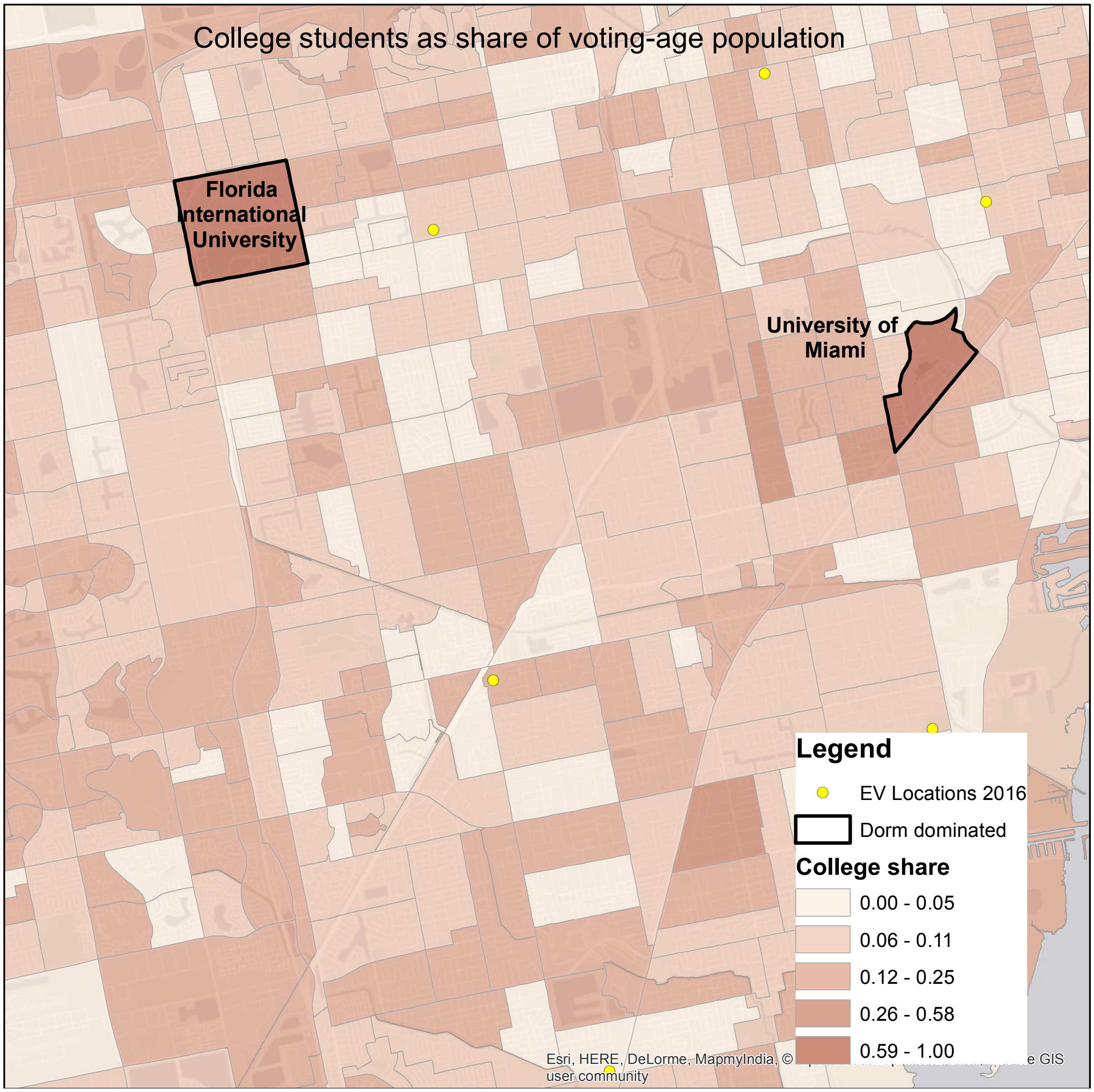


Figure 10: Population Density in Miami, Florida

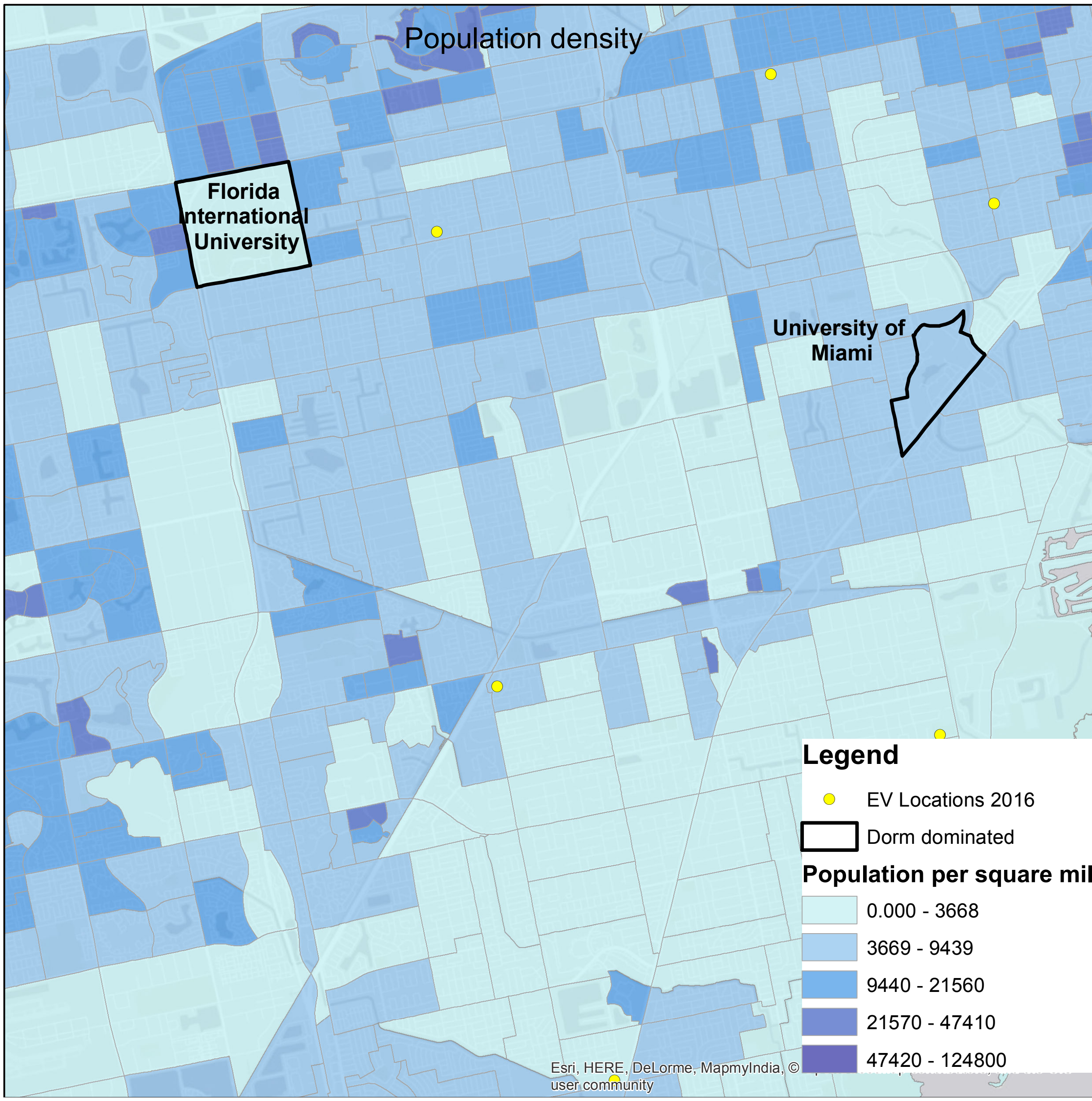


Figure 11: Automobiles in Miami, Florida

Figure 12: Travel to Early Voting Locations in Miami, Florida

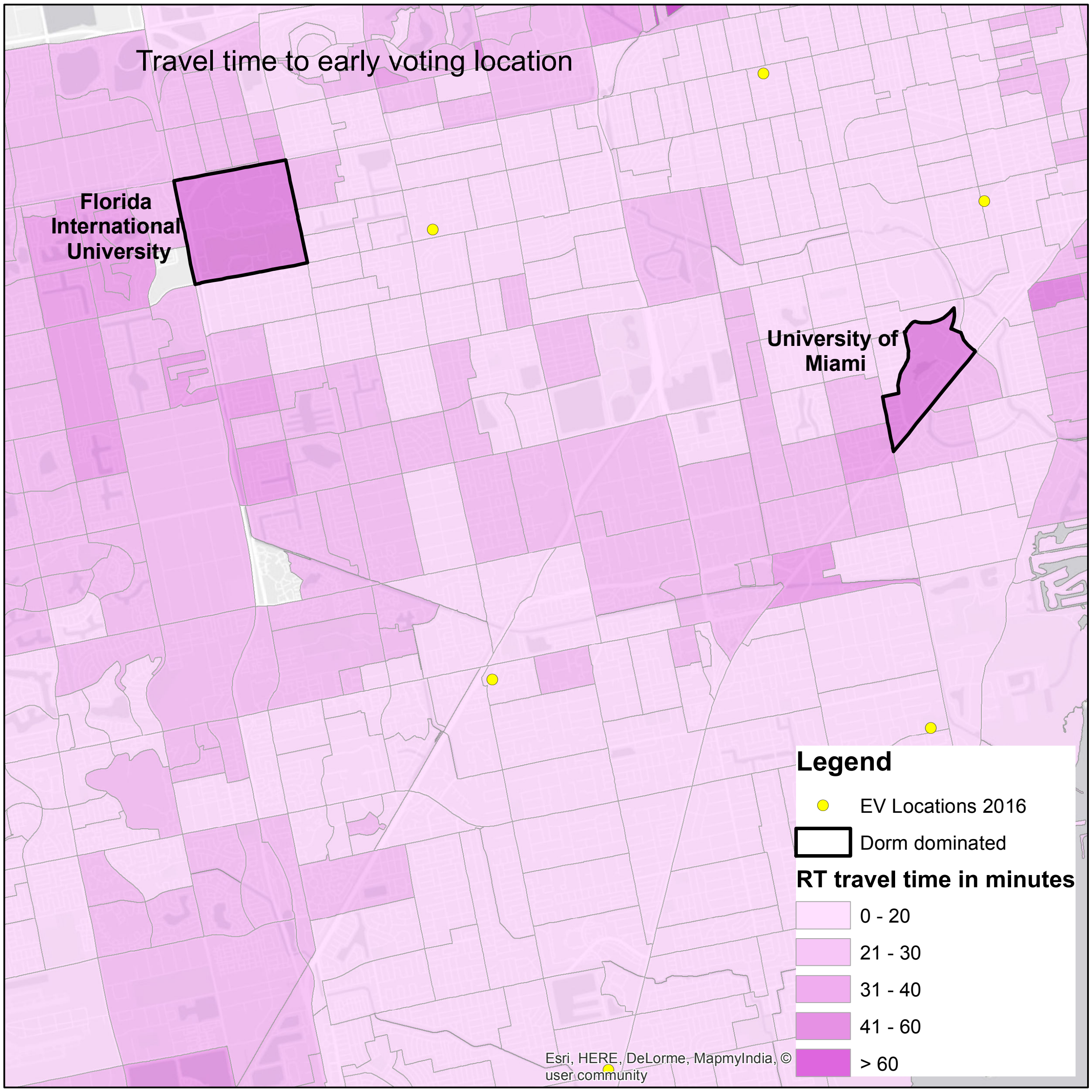


Table 6: Summary of Travel Times in Miami-Dade County

Miami-Dade County	
	Median RT travel time (minutes)
Dorm block groups	43
Non-dorm block groups	20

Even in this urban setting, Table 6 indicates that residents of dorm-dominated block groups face travel times that are roughly double those of residents of non-dorm areas in Miami-Dade County.

Table 7: Travel Time Regression Results in Miami-Dade County

Miami-Dade County Travel Time Regressions						
	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	28.13	(3.45)	***			
College share				13.08	(2.90)	***
Constant	20.66	(0.19)	***	19.69	(0.31)	***
Observations	1541			1541		

*** Significant at the .001 level

Table 7 indicates that going from a block group with zero dorm population to one with 100 percent dorm population is associated with a 28-minute increase in travel time. And going from a block group without students to one completely dominated by students is associated with a 13-minute increase in travel time. The appendix reveals that these stark differences do not go away if we assume higher rates of automobile access among dorm dwellers, and they are larger if we assume a lower rate of automobile access.

Orlando

The University of Central Florida (UCF) is substantially larger than the University of Florida, Florida State University, and Florida International University. In fact, it is the largest university in the United States by enrollment, with over 66,000 students in 2018. Over 11,000 of those students live in dorms or affiliated campus housing.[13] However, the setting for this massive concentration of students is quite different than Tallahassee, Gainesville, or Miami, where the universities are centrally located in relatively dense cities. The UCF campus is located on a 1,400-acre campus in exurban Orlando, surrounded by a sprawling research park, a nature preserve, and low-density exurban single-family homes. The maps below provide a good overview of the spatial setting. Students are concentrated in campus housing

[13] https://www.ucf.edu/about-ucf/facts/

but also in surrounding residential neighborhoods. The university is an island of high density in a low-density area. While rates of automobile access are very high in suburban Orlando in general, the households around the university, not surprisingly, are characterized by relatively low automobile access.

As for the university dormitories, I have been unable to find any information about automobile access, either from online materials or from the US News and World Report, and enquiries to the parking and transportation office have not been answered. At the low end, automobile ownership rates might be less than 20 percent, as at the University of Florida, or on the high end, they might resemble the University of South Florida—another exurban university with a mix of commuters and a large residential dorm population. The University of South Florida reported an overall automobile rate of 58 percent, but again, the rate is almost surely substantially lower for dorm dwellers. The best approach with UCF, then, is to consider a range of possible automobile rates among dorm dwellers. In the appendix, I consider a range from 20 percent to 60 percent. Here, I split the difference and present results based on an assumption of 40 percent.

Figure 13: College Student Population in Suburban Orlando, Florida

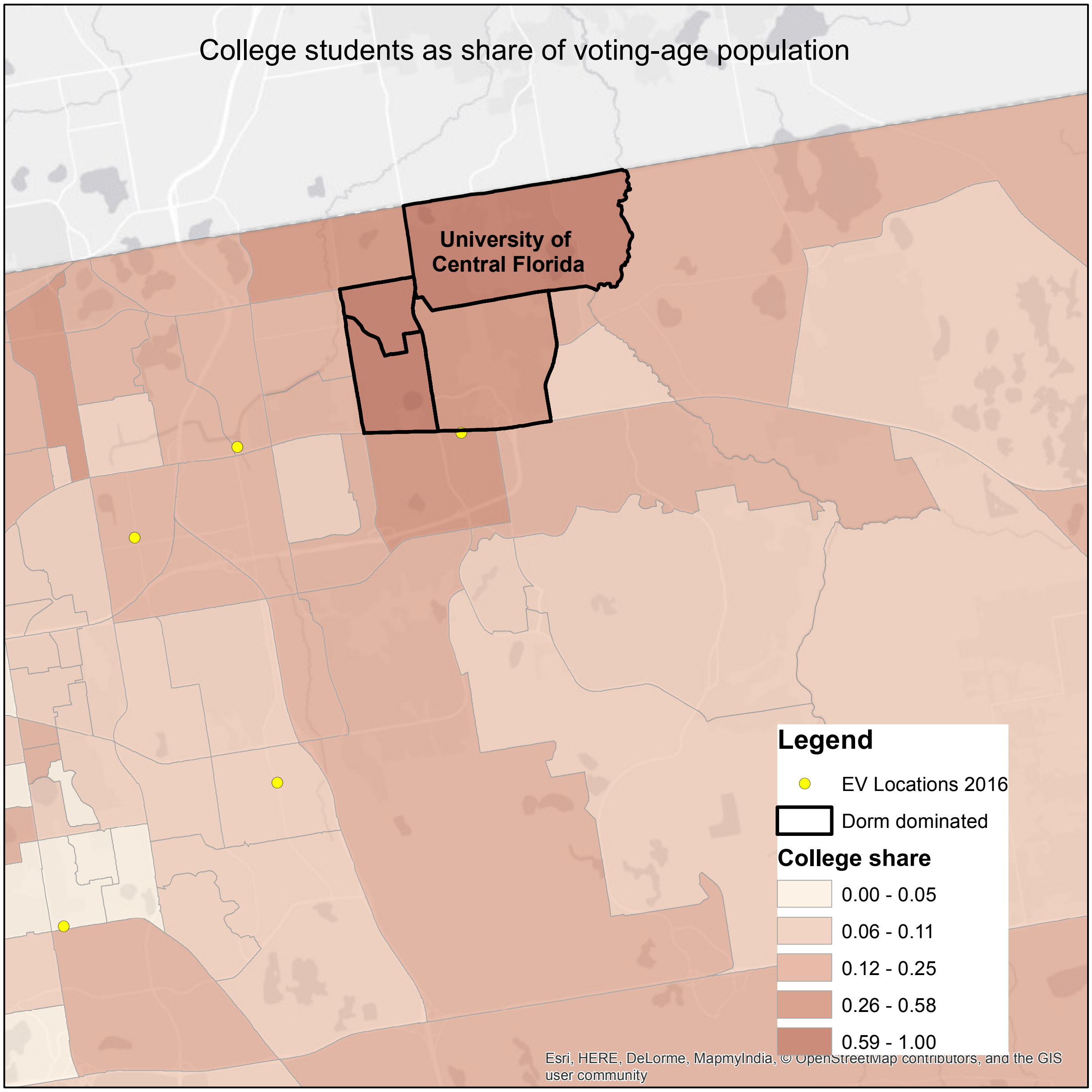


Figure 14: Population Density in Suburban Orlando, Florida

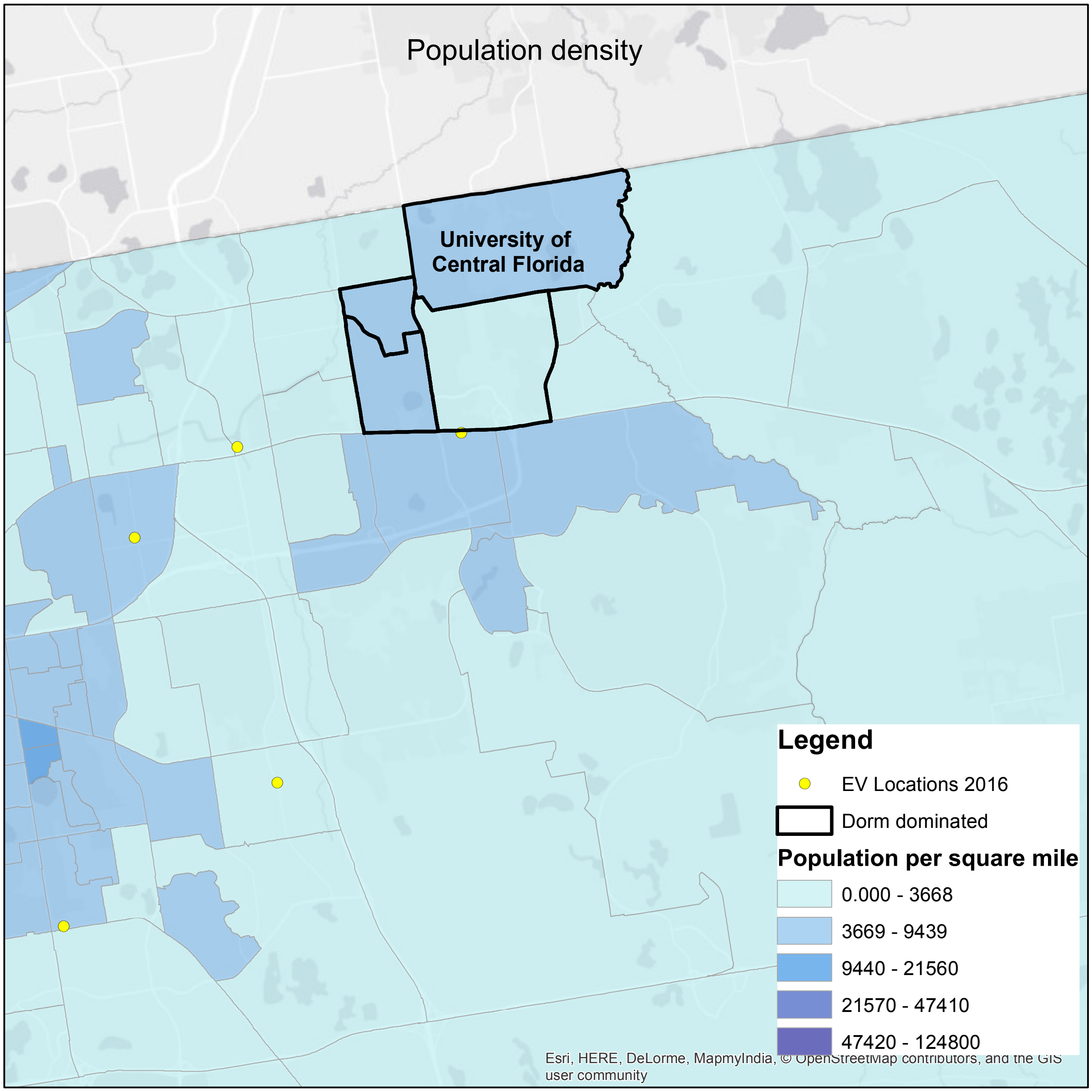


Figure 15: Automobiles in Suburban Orlando, Florida

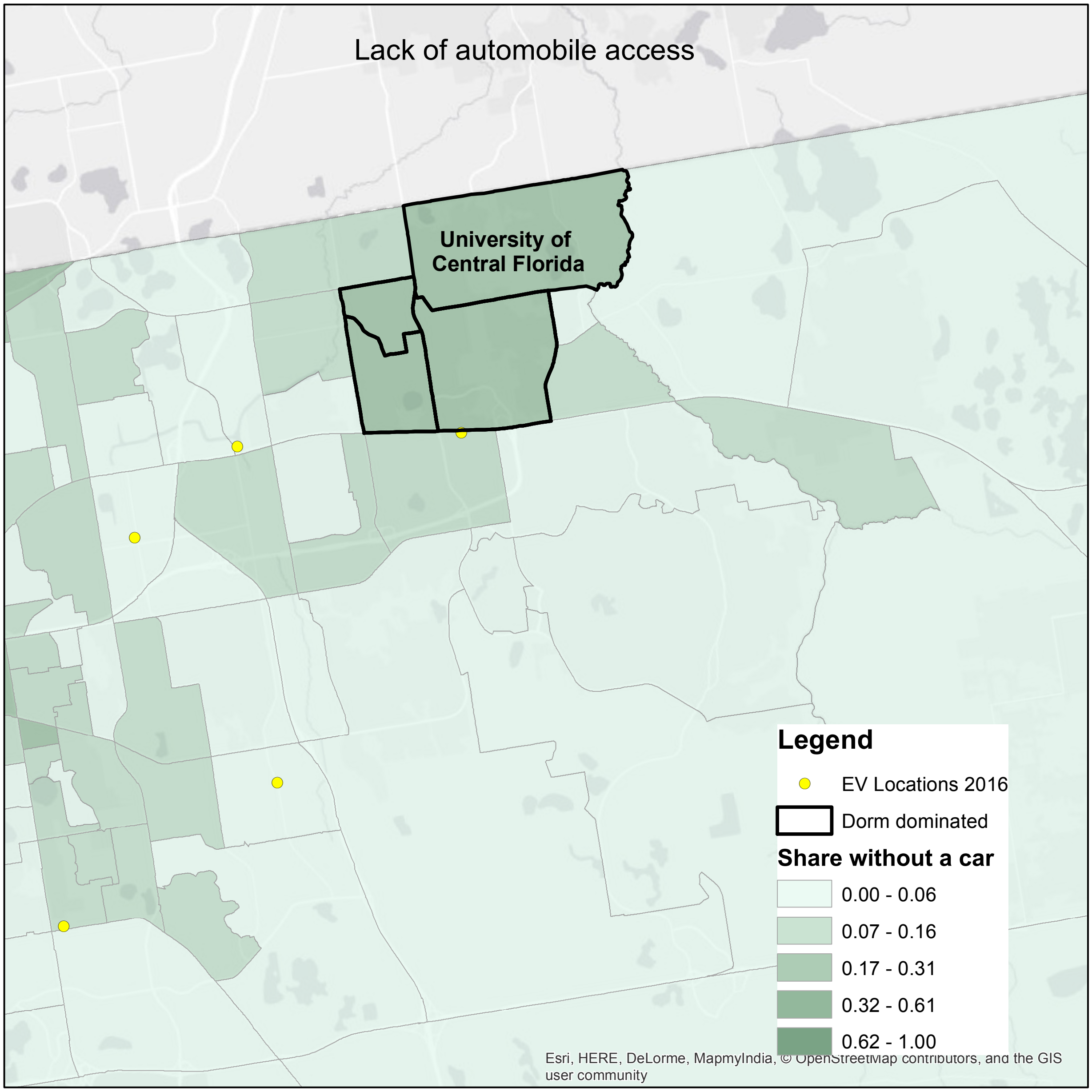


Figure 16: Travel to Early Voting Locations in Suburban Orlando, Florida

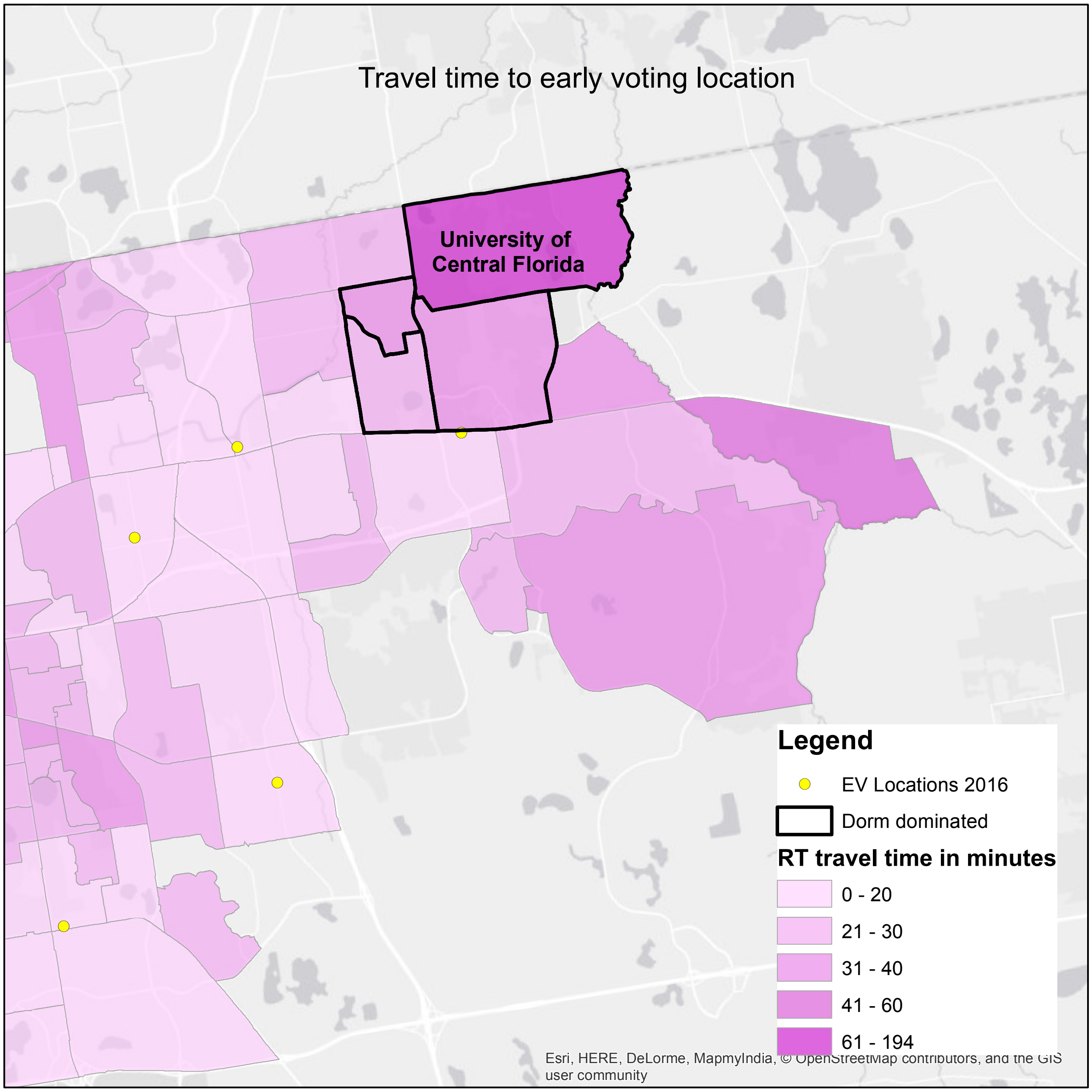


Table 8: Summary of Travel Times in Orange County

Orange County	
	Median RT travel time (minutes)
Dorm block groups	46
Non-dorm block groups	23

Table 8 indicates that when we assume a rate of car-availability of 40 percent among dorm-dwellers, the travel time of dorm-dwellers is roughly twice that of the rest of metro Orange County. The tables in the appendix indicate that with an assumed auto rate of 20 percent among dorm dwellers, the dorm travel time increases to almost an hour, whereas with an assumption of 60 percent, it shrinks to 35 minutes.

The regressions in Table 9 indicate that going from zero dorm population to 100 percent dorm population is associated with an increase in travel time of over an hour, and going from zero to 100 percent college population is associated with an increase of 45 minutes. The tables in the appendix indicate that the difference attenuates somewhat as one assumes higher rates of auto access among dorm dwellers, but remains quite large even at high rates of assumed auto ownership.[14]

[14] Note that the median travel time in Table 5 is relatively low. This is because the vast majority of the dorm population lives in the main Northern census block group, which has a much higher

Table 9: Travel Time Regression Results in Orange County

Orange County Travel Time Regressions

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	66.90	(6.70)	***			
College share				44.71	(5.70)	***
Constant	24.6	(0.61)	***	21	(0.87)	***
Observations	340			340		

*** Significant at the .001 level

The maps above indicate that an early voting location has been placed in the nearest possible public library in the vicinity of the UCF campus, about 2.7 miles from the center of campus. The Northern border of the UCF campus is the county boundary, and the Western boundary is a research park, so it is evidently not possible to select a closer public building to the main part of campus without locating the early voting location on the campus itself. A carless UCF student starting out in the center of campus would walk 10 minutes to the bus stop, wait for a bus that arrives twice each hour, ride the bus for 15 stops down North Alafaya Trail, and then walk

travel time, but Table 5 takes the median of all four block groups that contain dorms. The dorms in the two Southern campus block groups have lower travel times to the Alafaya library.

for a half mile along a busy divided highway to reach the Alafaya Branch Library. This process would take 40 minutes each way, without any time built in for waiting.

In sum, the UCF area contains a massive dorm population that is larger than many of Florida's towns, yet in this case, it is a densely populated town, with its own restaurants and stores, where election administrators are not permitted to place an early voting location. Even if election administrators try to overcome this constraint by choosing the closest possible off-campus location, they are still constrained by geography and the public transit system to create a large asymmetry in travel times between residents of the UCF community and others in the surrounding area and the rest of the county.

Tampa

With an enrollment that has now surpassed 50,500 students, the University of South Florida (USF) is the 10th largest university in the United States. It shares many features with UCF. It is located on a large suburban campus, and its student body consists of commuters as well as a substantial number of on-campus dorm-dwellers—in this case 7,700 of them. There is also a concentration of students in the block groups surrounding the campus. The campus itself does not appear to be especially dense on the map below, but this is because a large portion of the campus block group is occupied by a golf course and nature preserve. In general, the campus dorms and surrounding student neighborhoods are among the densest areas in Tampa.

According to US News and World Report, 58 percent of students have cars, but given the prevalence of commuting to USF by car, the automobile share among dorm dwellers is likely lower. In figures 19 and 20 below and in the tables that follow, I use an assumption of 50 percent auto availability among the dorm population, but again, the appendix presents information about what happens to the estimates if we assume lower and higher rates of auto ownership. Figure 19 shows that while carless households are spread throughout urban Tampa, there is a concentration near the university. And as in suburban Orlando, travel times to the nearest early voting location are much higher in and around the university than elsewhere in Tampa. This can be visualized in Figure 20, and it is measured in Tables 10 and 11.

Figure 17: College Student Population in Suburban Tampa, Florida

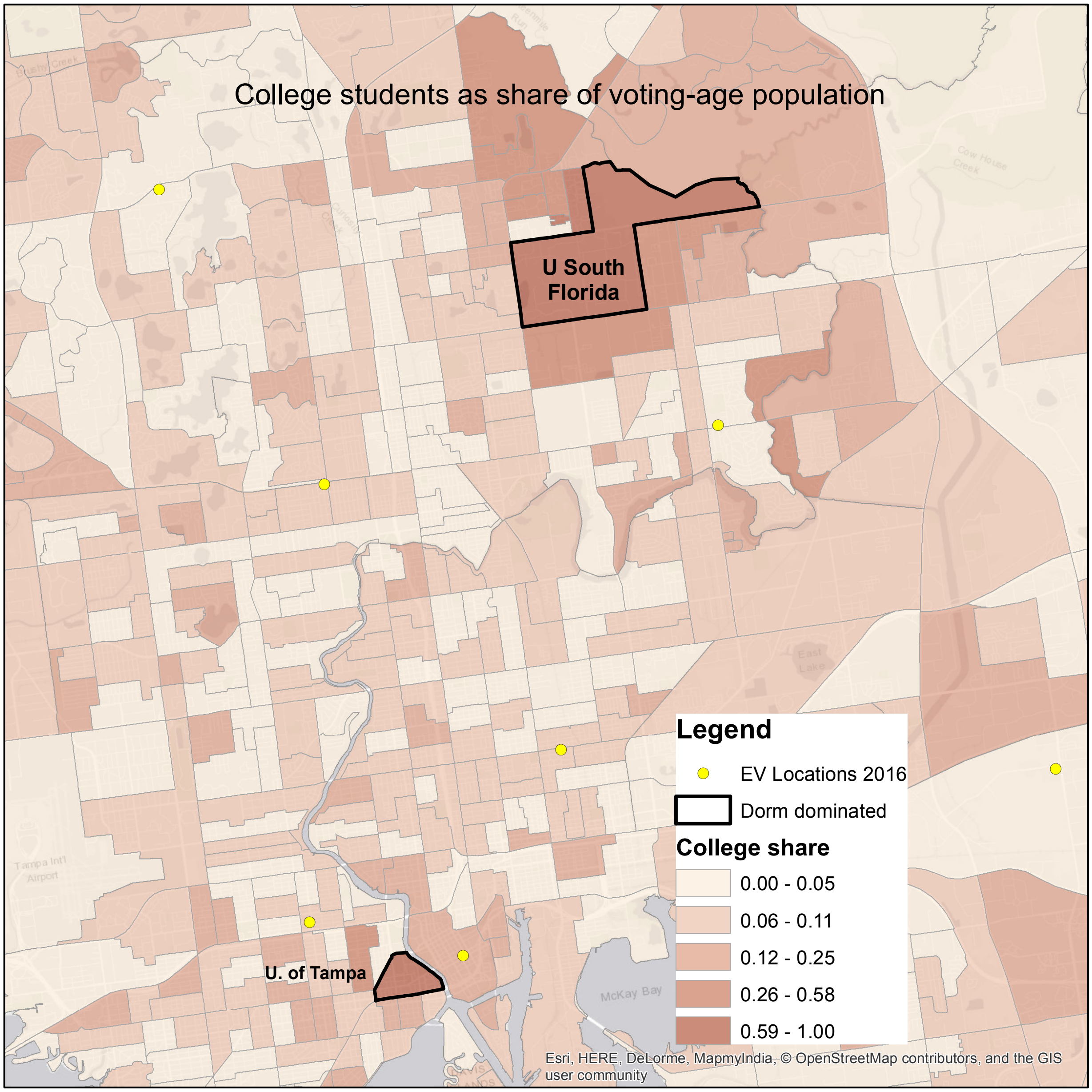


Figure 18: Population Density in Suburban Tampa, Florida

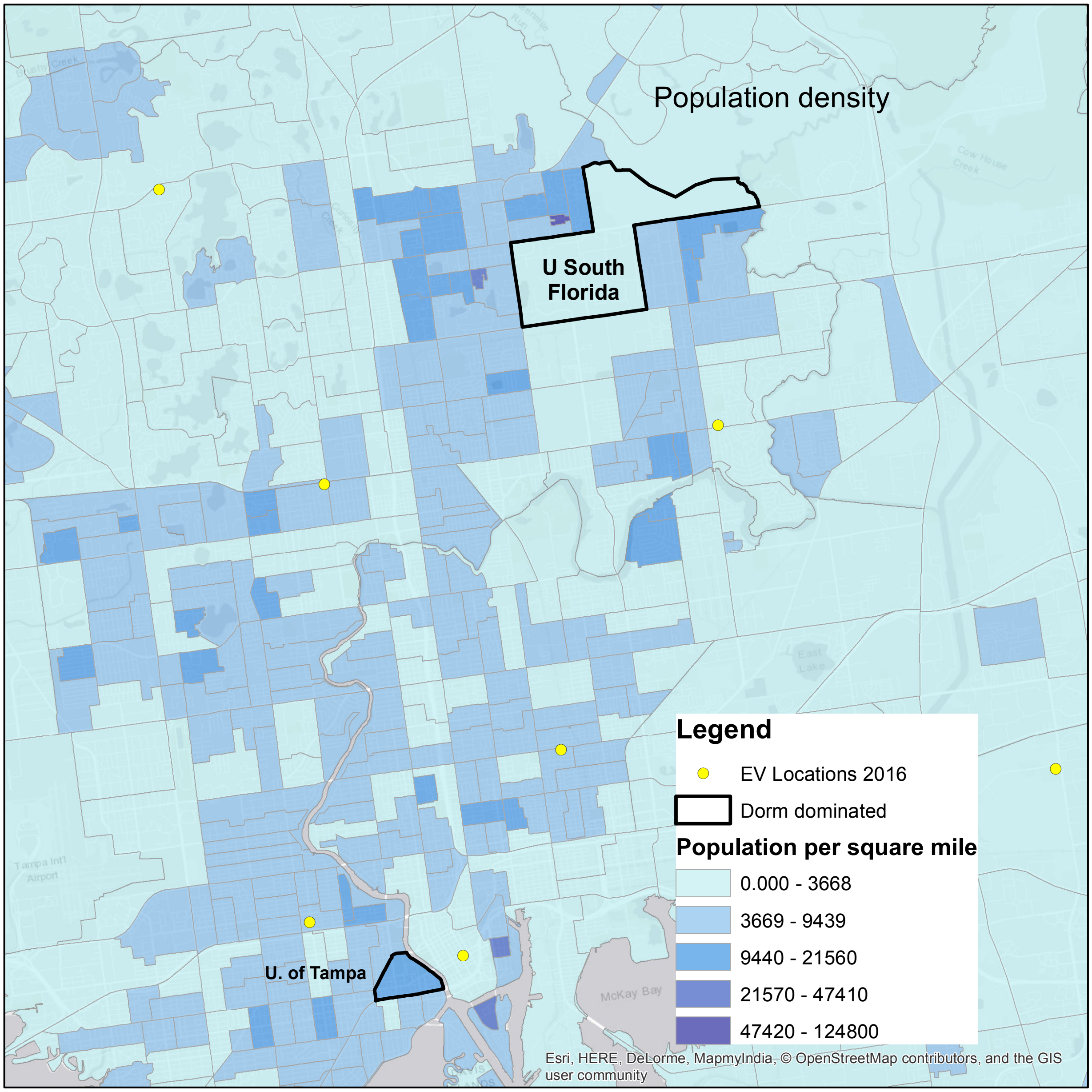


Figure 19: Automobiles in Suburban Tampa, Florida

Figure 20: Travel to Early Voting Locations in Suburban Tampa, Florida

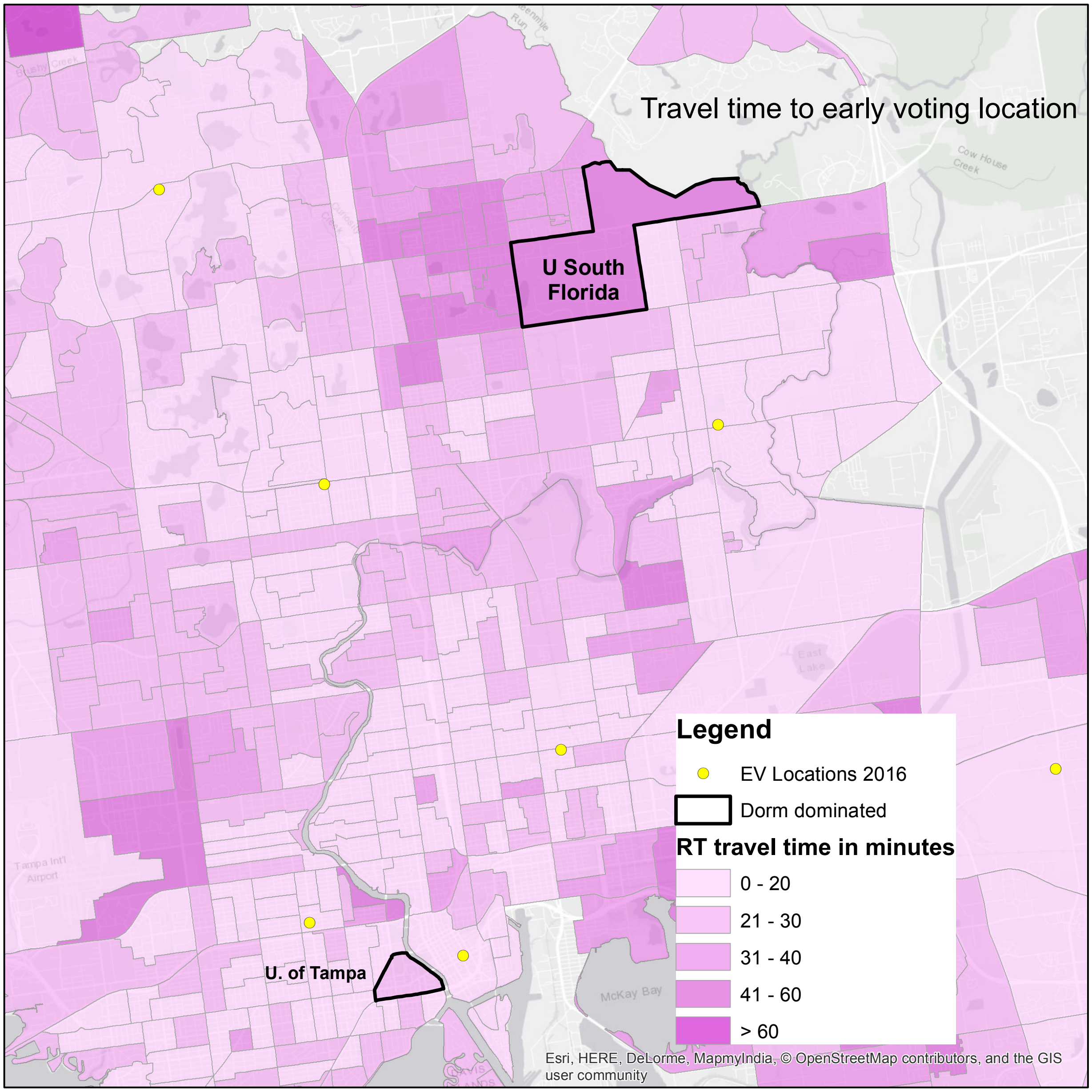


Table 10: Summary of Travel Times in Hillsborough County

Hillsborough County	Median RT travel time (minutes)
Dorm block groups	39
Non-dorm block groups	20

Table 11: Travel Time Regression Results in Hillsborough County

Hillsborough County Travel Time Regressions

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	21.30	(4.20)	***			
College share				14.2	(3.30)	***
Constant	22	(0.36)	***	21	(0.46)	***
Observations	712			712		

*** Significant at the .001 level

The story at USF is rather similar to that at the University of Central Florida. In this case, the nearest early voting location is almost 4 miles from the center of campus, but the bus service is a bit more convenient. In a pattern that is now familiar, travel time for dorm dwellers is roughly double that of the rest of the county.

Other suburban campuses

UCF and USF are among the largest suburban campuses in Florida, and indeed the United States, but Florida has several additional suburban public universities with substantial on-campus residential populations. Florida Atlantic University in Boca Raton has an enrollment over 30,000, with well above 4,000 on-campus residents. The University of North Florida, with an enrollment around 16,000, is situated on 1,300 acres surrounded by a nature preserve in the distant exurbs of Jacksonville, and houses around 3,500 students in dormitories. Florida Gulf Coast University has over 14,000 enrolled students, and houses 2,670 of them on its 800-acre campus in the distant exurbs of Fort Myers. The University of West Florida has an enrollment of around 10,000, and houses around 1,500 dorm dwellers on its campus covering over two square miles of Ferry Pass, an exurb of Pensacola.

Florida Atlantic has perhaps more in common with the classic college towns, in that the campus is centrally located in Boca Raton, and the dorm population is quite large and growing. Note also from Table 1 above that the students and employees of the university make up a share of Boca Raton's population that rivals the University of Florida in Gainesville. Unfortunately, I have been unable to obtain information about automobile access on campus at FAU. In the tables below, I assume that auto access among dorm-dwellers is 60 percent, but since this may very well be too high or low, I explore a range of alternative assumptions in the appendix. Table 12 indicates that with the assumption of 60 percent auto access among dorm dwellers, the difference in travel times is around 15 minutes when contrasting block groups dominated by dorms and those that are not. The regression approach in Table 13 provides a similar estimate. In the appendix, we can see that the travel time for dorm-dominated block groups is double that of the non-dorm areas if we assume a 40 percent auto access rate among dorm-dwellers. However, if we assume what is almost surely an unrealistically high rate of auto access of 80 percent, the difference between dorm and non-dorm areas fades away. Finally, note that in Palm Beach County, where students of a wide variety of colleges and universities are spread throughout the county, there is no relationship between college students as a share of the population and travel times.

Table 12: Summary of Travel Times in Palm Beach County

Palm Beach County	Median RT travel time (minutes)
Dorm block groups	38
Non-dorm block groups	23

Table 13: Travel Time Regression Results in Palm Beach County

Palm Beach County Travel Time Regressions

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	15.29	(6.73)	**			
College share				-9.89	(5.28)	
Constant	23.48	(0.34)	***	24.18	(0.49)	***
Observations	765			765		

*** Significant at the .001 level
** Significant at .05 level

The other remaining public universities mentioned above are located on a campus in a low density setting on the exurban fringes of town, and each features a concentration of dorm-dwellers on a campus that is somewhat isolated from the rest of the community. In most cases, public transportation is limited and not very convenient. However, each of these suburban schools has large parking facilities. According to information provided to US News and World Report, 85 percent of students at the West Florida, 95 percent at North Florida, and 89 percent at Florida

Gulf Coast have a car on campus. But again, it seems quite likely that the rates are lower for dorm dwellers. In each of the tables below, I assume a rate of auto availability among dorm dwellers of 80 percent, while other assumptions are considered in the appendix.

Table 14: Summary of Travel Times in Duval County

Duval County	
	Median RT travel time (minutes)
Dorm block groups	22
Non-dorm block groups	21

Tables 14 and 15 examine Duval County, home to metropolitan Jacksonville and the University of North Florida. There are only two dorm-dominated census block groups in Duval County, and only one of them is associated with UNF. I find no evidence of substantial difference in travel time between these block groups and the remaining 441 block groups in metropolitan Jacksonville.

Table 15: Travel Time Regression Results in Duval County

Duval County Travel Time Regressions						
	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	3.92	(6.12)				
College share				-0.99	(5.21)	
Constant	21.6	(0.37)	***	21.7	(0.55)	***
Observations	443			443		

*** Significant at the .001 level

Next, I consider Florida Gulf Coast University, which is especially isolated on a parklike campus in the middle of a nature preserve 17 miles from downtown Fort Myers.

Table 16: Summary of Travel Times in Lee County

Lee County	
	Median RT travel time (minutes)
Dorm block groups	51
Non-dorm block groups	22

The tables indicate that Florida Gulf Coast University resembles UCF and USF. The estimated travel time is around 50 minutes for the FGCU campus, and is substantially higher for dorm-dwellers and students than for the rest of the Lee County population.

Table 17: Travel Time Regression Results in Lee County

Lee County Travel Time Regressions

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	29.67	(7.60)	***			
College share				14.18	(6.75)	**
Constant	23.3	(0.52)	***	22.68	(0.64)	***
Observations	383			383		

*** Significant at the .001 level

Next, I examine Escambia County, home to Pensacola and the University of West Florida. Again, travel times for dorm dwellers and college students are substantially higher than for the rest of the metropolitan area. In fact, tables 18 and

19 are based on an assumption of 80 percent automobile access among dorm dwellers, which is likely too high. The appendix presents the data with the assumption of 60 percent automobile ownership among dorm dwellers. Under this assumption, the dorm travel time increases to 50 minutes.

Table 18: Summary of Travel Times in Escambia County

Escambia County	
	Median RT travel time (minutes)
Dorm block groups	33
Non-dorm block groups	22

Table 19: Travel Time Regression Results in Escambia County

Escambia County Travel Time Regressions						
	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	22.44	(6.62)	***			
College share				24.83	(6.26)	***
Constant	23.94	(0.85)	***	22.1	(1.01)	***
Observations	158			158		

*** Significant at the .001 level

Putting it all together

The foregoing analysis examined travel times to early voting locations for each of the largest public universities in Florida with a substantial on-campus population. I compared travel times for block groups with substantial dormitory populations with travel times for the rest of the metropolitan area in which the university was located. I demonstrated that with the exception of the University of Northern Florida—where it appears that a very large majority of dorm-dwellers has access to automobiles and bus service is somewhat better—all of the other eight cases demonstrated a pronounced difference in travel times between dorm-dominated block groups and the rest of the metropolitan area. The same can be said more broadly about student-dominated block groups vis-à-vis the rest of the metro area, with the exception of Duval and Palm Beach Counties. Finally, it is useful to move beyond these case studies of large public universities, putting all of Florida's counties together, including not just the counties already addressed, but all metropolitan block groups in all remaining Florida counties. This brings into the analysis a variety of additional colleges and universities with residential populations, including Bethune-Cookman, Florida Southern College, Flagler College, Rollins College, and Stetson University among many others.[16]

Table 20: Pooled Travel Time Regression Results

Pooled Regressions, all counties

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	31.08	(6.05)	**			
College share				17.41	(4.43)	***
Constant	22.67	(0.04)	***	21.5	(0.34)	***
Observations	8,826			8,826		

*** Significant at the .001 level
Includes county-level fixed effects

First, in this statewide data set, the median travel time estimate for the metropolitan block groups where less than half of the population lives in a dorm is 21 minutes. In the 31 dorm-dominated block groups, it is almost double: 40 minutes.

[16] For each of the counties mentioned above, I use the same estimate of auto availability mentioned in the text. For the remainder of the counties, I assume a rate of 50 percent auto availability for dorm residents.

In the same spirit as the analysis above, I have also estimated regressions, where the travel time for each block group is the dependent variable, and the independent variables are, once again, the share of the voting-age population living in a dorm, and the share of the voting-age population that is a college student. I include fixed effect for counties, so that the regression coefficients capture variation *within* counties. This regression coefficients indicate that going from a block group with zero dorm population to one with 100 percent dorm population is associated with a 31-minute increase in travel time to the nearest early voting location. This difference is highly statistically significant.

VI. DIFFERENCES ACROSS METRO AREAS

Thus far, we have seen that within metropolitan areas, travel times to early voting locations are significantly longer in areas dominated by dormitories and student populations than in areas without such populations. This asymmetry emerges because communities with a large university presence tend to have a dense clustering of population—often with low rates of auto access—where election administrators are prohibited from placing early voting locations. Next, it is useful to examine whether such university communities are different from communities that do *not* have these dense zones without early voting locations. In particular, I ask two questions. First, do such communities have lower overall travel times? Second, do they demonstrate lower levels of travel-time inequality across block groups?

To conduct this analysis, it is useful to find communities that are as similar as possible to those examined above, but that do *not* have substantial dormitory population clusters. In order to achieve this, I examine census "places" where dorm dwellers are at least five percent of the voting-age population, and I compare them with specific places that have dorm populations below 5 percent. I have also examined a wide variety of additional "cut-points" for differentiating census places with and without substantial dormitory populations. Census places are typically incorporated places, such as self-governing cities, towns, and villages, but this designation also includes census designated places (CDPs), which are unincorporated small communities identified by the census department. For instance, The University of South Florida is in the incorporated city of Tampa, while The University of West Florida is in Ferry Pass CDP.

I conduct a statistical procedure called "nearest neighbor matching." For each community that has a dorm population above five percent, the procedure finds the most similar census places in Florida that lack a significant dormitory population. The matching criteria used to define whether a place is "similar" include the size of the population, the share of the population without automobiles, renters as a share of households, median income, and population density. These factors are likely to influence travel times and are related to the presence of a college or university. Therefore, finding communities that are as similar as possible on these factors should enable appropriate comparisons that allow me to assess the impact of having a residential university population on travel times. When I use a cut-point of five percent dorm dwellers as a share of the voting-age population, there are 17 census places that qualify as having significant dorm populations.[17]

Gainesville and Tallahassee actually have the same match: Fort Lauderdale, which is a useful comparison since it has no dormitory population. The (population-weighted) mean travel time for all of Fort Lauderdale's census block groups was 21 minutes, and the standard deviation across block groups was around 8. The standard deviation is a measure of dispersion in travel times. A relatively low standard deviation, as in Fort Lauderdale, indicates that travel times for all of the block groups are relatively close to the mean. In other words, there is relatively little inequality in travel times from one block group to another. In Gainesville and Tallahassee, the average travel time was higher than in Fort Lauderdale, and there was also greater dispersion in travel times throughout the metro area. In Gainesville, the mean travel time was 29 minutes, with a standard deviation of 12. In Tallahassee, the mean travel time was 24 minutes, with a standard deviation of 10.

[17] In order to verify that the places above and below the threshold are relatively similar on the variables used for matching, I have included balance statistics in Appendix C.

One might expect that since we are comparing means across over 100 block groups in relatively large communities, a difference in overall mean travel time might not show up if it is driven by a handful of university-dominated block groups. One might anticipate that perhaps non-dorm communities like Fort Lauderdale have their own idiosyncratic areas with longer travel times. Yet the overall travel times are clearly higher in Gainesville and Tallahassee than in Fort Lauderdale. And the higher standard deviation indicates that, due to the long travel times experienced on and around campus, there is also a higher inequality in travel times across neighborhoods.

Figure 21: Distribution of travel times across census block groups in Gainesville, Tallahassee, and Fort Lauderdale

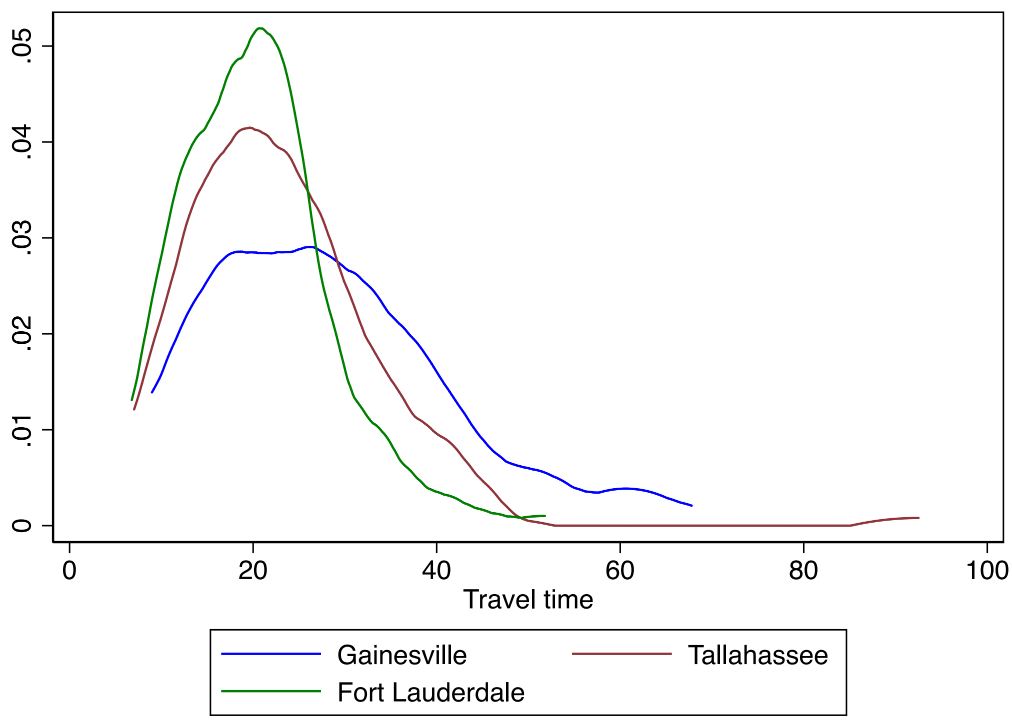


Figure 21 helps illustrate the difference between Gainesville and Tallahassee, on the one hand, and Fort Lauderdale on the other. Each colored line is a kernel density—that is, a smoothed histogram—that captures the distribution of travel times across census block groups in each city. Both of the college towns have a severe skew in the distribution. In each case, the right tail of the distribution corresponds to the university-dominated census block groups, where as we learned above, travel times are significantly longer than in the rest of the city. Fort Lauderdale does not have a large, dense zone in the center of the city without early voting locations, and while it still has a handful of census block groups with longer travel times, the right tail of its distribution does not include nearly as many block groups as the college towns, and as a result, its mean travel time is much lower.

Among the public universities examined above, there are two additional cases where the dorm population of the census place exceeds five percent: University CDP in Orange County (the home of the University of Central Florida) and University Park CDP in Miami-Dade (the home of Florida International University). A good match for University CDP in terms of population size, population density, rental share, median income, and carless share is Port Charlotte CDP, which has no dorm population. The mean travel time University CDP is 43 minutes, with a standard deviation of 20. The mean travel time for Port Charlotte, by contrast, is less than half, at 21 minutes, with a standard deviation of 8.5.

An excellent match for University Park in the Miami area is in the same neighborhood in Miami-Dade County: Coral Terrace. The mean travel time in University Park is 21 minutes with a standard deviation of 10. In Coral Terrace, where there is no dormitory population, the mean travel time is 14 minutes, with a standard deviation of 5.

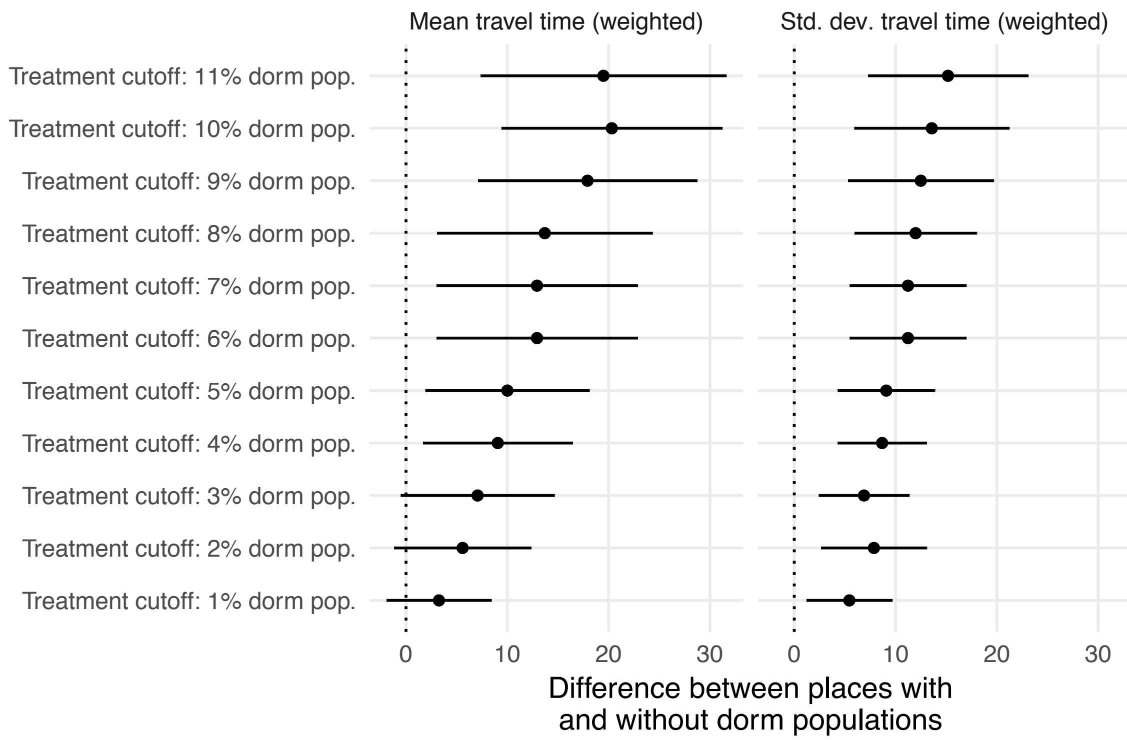
If we lower the threshold somewhat and consider a community to have a substantial dorm population when it exceeds 3 percent, we can examine two additional communities from the case studies above: Ferry Pass (home to U. of Western Florida) and Boca Raton (home of Florida Atlantic University). Ferry Pass has a mean travel time of 32 minutes, with a standard deviation of 19. The best matches without dorm population include Fort Walton Beach City, with a mean of 28 minutes and a standard deviation of 9, and Mount Dora City, with a mean of 24 minutes and a standard deviation of 7.

The dorm population of Boca Raton is only 3.8 percent of the voting-age population, with an average travel time of 23 minutes for the city, and a standard deviation of 9. The best match with zero dorm share is Kendall CDP, where the average travel time is only 17 minutes, and the standard deviation is 5.

In each of these case studies of communities with residential universities, matched communities without dorm populations had lower travel times, and less inequality in travel times across neighborhoods. It is useful to go beyond the case studies and extend this matching approach to the entire state. For each census place with a substantial dorm population, we can compare the mean travel times, as well as the heterogeneity in travel times, for the three best matches among communities without a substantial dorm population. This allows us to get a sense for the substance and statistical significance of these differences in travel times around the state. It also reassures us that the case studies above are not outliers, and that the same inferences can be drawn with a larger number of matched communities. I have conducted this analysis using a variety of cut-points to separate communities with and without substantial dorm populations. At one extreme, I treat the dorm population as substantial if it exceeds 1 percent of the voting-age population. With this very lax definition, there are 38 census places with substantial dorm populations. At the other extreme, I treat the dorm population as substantial if it exceeds 11 percent of the voting-age population. By this stringent definition, there are only 8 census places with a substantial dorm population.

For each cut-point, Figure 22 displays overall estimates of the difference in 1) population-weighted mean travel times and 2) population-weighted standard deviations across block groups, between matched "dorm" and "non-dorm" census places. The dots are the estimates, and the horizontal lines represent the extent of the 95 percent upper and lower confidence intervals.

Figure 22: Differences in block-group means and standard deviations of travel times between "dorm" census places and the three closest-matching "non-dorm" census places



Communities with a substantial dorm population have longer travel times no matter what cut-point is used. These differences are quite large—around 20 minutes—when we focus on communities with very large dorm populations. As we relax the threshold, the difference attenuates, but does not go away until we adopt a very lax threshold of around 2 percent. And on the right-hand side of the graph, we see that no matter what threshold we choose, communities with dorm populations always have greater inequalities in travel times across neighborhoods than their "non-dorm" matches.[19]

VII. CONCLUSIONS

If Florida's county election administrators set out to minimize variation in travel times across neighborhoods within metropolitan areas when choosing early voting locations under the current interpretation of Florida law, they face a significant constraint in communities with large public universities. These institutions often take up large amounts of real estate, and include large, dense populations of young voters that do not have access to automobiles, often in settings where public transportation is sparse. In many university areas, it appears that election administrators have already attempted to locate early voting locations in the closest possible public buildings to the campus, but even so, this report has shown that within metropolitan areas, travel times to early voting locations are significantly longer for people living in dorms and in rental housing in close proximity to college campuses than for the rest of the community. These differences are especially large in college towns and exurban universities with large residential populations.

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[19] Another way to establish this statewide relationship is to simply use the census-place-level data to estimate linear regressions of the means and standard deviations of travel times on dorm dwellers as a share of the population. This can be done with or without control variables. The result is the same. As the dorm population share increases, there is a substantial increase in the mean travel time to an early voting location. And as the dorm population share increases, there is a substantial increase in the inequality in travel times across neighborhoods. Computer code to conduct this analysis has been included with the materials accompanying this report.

Moreover, when compared with communities that do not have significant residential universities, these communities face larger average travel times overall, and greater inequality in travel times across neighborhoods. This report has shown that young people are disproportionately affected by this asymmetry in access to early voting locations.

Appendix A:

Alternative assumptions about automobile access among dorm dwellers

In the case studies in the main body of thetext, in several instances I made informed assumptions about the share of dorm-dwellers at various universities that had access to cars on campus. In this appendix, I present alternative versions of the tables in the text based on different plausible assumptions about automobile access on campus.

Table A1: Leon County, assume 50 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	36
Non-dorm block groups	21

Table A2: Leon County Travel Time Regressions, assume 50% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	13.50	(4.50)	***			
College share				14.8	(2.90)	***
Constant	22	(0.84)	***	18.6	(1.10)	***
Observations	135			135		

*** Significant at the .001 level

Table A3: Hillsborough County, assume 40 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	43
Non-dorm block groups	20

Table A4: Hillsborough County, assume 60 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	35
Non-dorm block groups	20

Table A5: Hillsborough County Travel Time Regressions, assume 40% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	25.80	(4.20)	***			
College share				16.9	(3.30)	***
Constant	22	(0.36)	***	20.8	(0.46)	***
Observations	712			712		

*** Significant at the .001 level

Table A6: Hillsborough County Travel Time Regressions, assume 60% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	16.80	(4.20)	***			
College share				11.5	(3.20)	***
Constant	22	(0.36)	***	21	(0.46)	***
Observations	712			712		

*** Significant at the .001 level

Table A7: Orange County, assume 20 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	57
Non-dorm block groups	23

Table A8: Orange County, assume 50 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	40
Non-dorm block groups	23

Table A9: Orange County, assume 60 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	35
Non-dorm block groups	23

Table A10: Orange County Travel Time Regressions, assume 20% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	92.30	(6.90)	***			
College share				63	(6.03)	***
Constant	24.6	(0.63)	***	19.5	(0.93)	***
Observations	340			340		

*** Significant at the .001 level

Table A11: Orange County Travel Time Regressions, assume 50% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	54.24	(6.60)	***			
College share				35.54	(5.53)	***
Constant	24.62	(0.61)	***	21.77	(0.86)	***
Observations	340			340		

*** Significant at the .001 level

Table A12: Orange County Travel Time Regressions, assume 60% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	41.54	(6.50)	***			
College share				26.39	(5.40)	***
Constant	24.63	(0.60)	***	22.54	(0.83)	***
Observations	340			340		

*** Significant at the .001 level

Table A13: Escambia County, assume 60 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	51
Non-dorm block groups	23

Table A14: Escambia County Travel Time Regressions, assume 60% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	44.71	(6.73)	***			
College share				44.32	(6.38)	***
Constant	23.97	(0.86)	***	20.8	(1.03)	***
Observations	158			158		

*** Significant at the .001 level

Table A15: Palm Beach County, assume 40 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	48
Non-dorm block groups	23

Table A16: Palm Beach County, assume 80 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	27
Non-dorm block groups	23

Table A17: Palm Beach County Travel Time Regressions, assume 40% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	26.13	(6.73)	**			
College share				-4.28	(5.33)	
Constant	23.45	(0.34)	***	23.85	(0.49)	***
Observations	765			765		

*** Significant at the .001 level
** Significant at the .05 level

Table A18: Palm Beach County Travel Time Regressions, assume 80% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	4.46	(6.72)				
College share				-15.5	(5.24)	
Constant	23.45	(0.34)	***	24.5	(0.48)	***
Observations	765			765		

*** Significant at the .001 level
** Significant at the .05 level

Table A19: Miami-Dade County, assume 30 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	46
Non-dorm block groups	20

Table A20: Miami-Dade County, assume 50 % of dorm residents have cars

	Median RT travel time (minutes)
Dorm block groups	39
Non-dorm block groups	20

Table A21: Miami-Dade County Travel Time Regressions, assume 30% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	32.87	(3.45)	***			
College share				15.93	(2.92)	***
Constant	20.66	(0.19)	***	19.47	(0.31)	***
Observations	1541			1541		

*** Significant at the .001 level

Table A22: Miami-Dade County Travel Time Regressions, assume 50% of dorm residents have cars

	Coefficient	Stand. Error		Coefficient	Stand. Error	
Share in dorms	23.40	(3.44)	***			
College share				10.23	(2.89)	***
Constant	20.66	(0.19)	***	19.91	(0.31)	***
Observations	1541			1541		

*** Significant at the .001 level

Appendix B:
Balance statistics for matching analysis

Variable	Dorm mean	Non-dorm mean	Difference in means	t-test p-value
Voting age population	35.85	27.97	7.88	0.56
% without access to transit	39.02	31.51	7.51	0.56
Median HH income (thousands)	50.88	53.26	-2.38	0.69
% of HH without cars	6.41	5.88	0.53	0.61
% of renters	12.33	10.74	1.59	0.41
% of white residents	71.94	75.33	-3.39	0.53
Population density	1.02	0.98	0.04	0.84