THE AFFECT OF THE BUILT ENVIRONMENT NEAR FIXED GUIDEWAY TRANSIT SYSTEMS ON MODE SPLIT AND VEHICLE OWNERSHIP

PRESENTED FOR: RMLUI
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Presented by Anthony Avery

PURPOSE

What are these data?

- Researchable by anyone with a computer
- Meant to stimulate discussion, thought, and research
- Generally follow the scientific method
- Analyzed to provide guidance for Aurora moving forward

What aren't they?

- Statistically significant
- Peer reviewed
- Meant to reflect academic standards

PROCESS

Hypothesis

- The built environment plays a role in how we experience our city.
- Increasing the urban form and development intensity in transit areas will reduce SOV commute mode split and reduce automobile ownership

Iteration #1

- Higher population densities will result in lower single-occupancy vehicle (SOV) mode split, higher transit ridership, and lower vehicle ownership

PROCESS

Identification

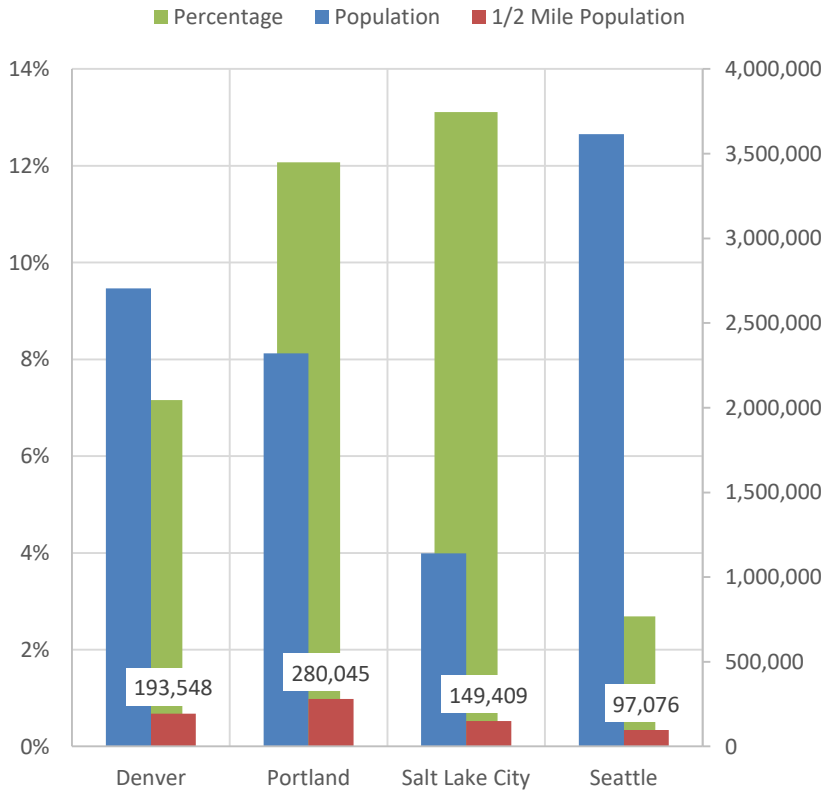
- Started with just Metro Denver
  - Metro Denver has only 19 stations open >10 years as of 2015. Wanted a larger sample size.
  - Expanded to Salt Lake City, Portland, and Seattle. 165 open stations in 2015 with population figures.
  - Growing metro regions with active populations and proximity to outdoor recreation

Data Collection

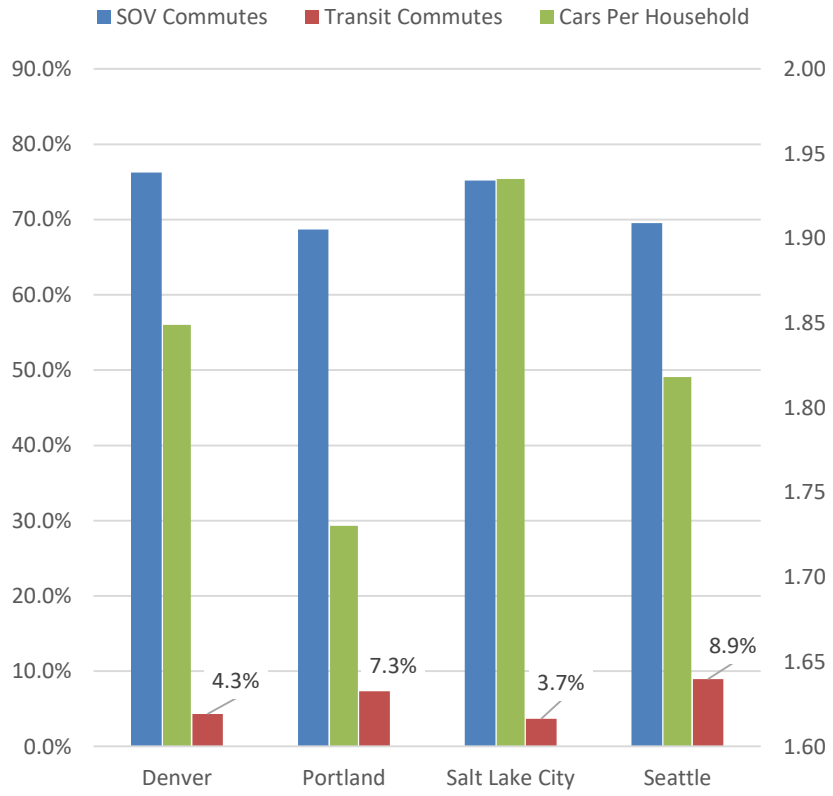
- Station Data
  - Trimet.org, rtd-denver.com, rideuta.com, soundtransit.org
  - Identified all stations, park and ride stations w/ parking spaces, year each station opened
  - FOIA requests or public website to get boarding data at each station
- Missouri Census Data Center
  - 2011 – 2015 ACS block groups within ½ mile of LRT stations
  - Population, households, vehicle ownership, income, home ownership, commute mode split

POPULATION CHARACTERISTICS

MSA Total and TOD Population

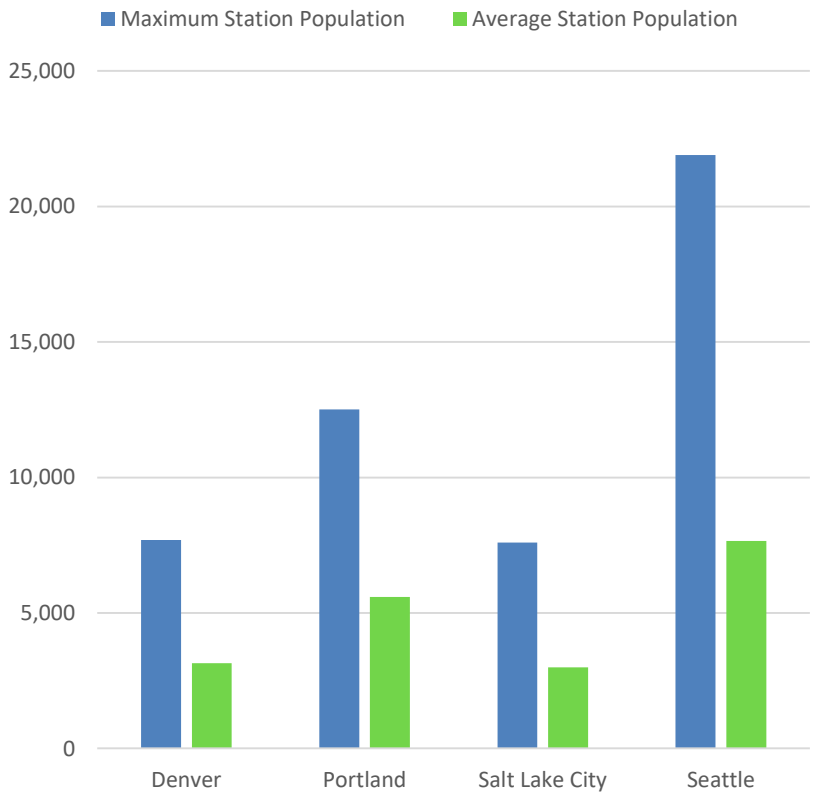


MSA Commute and Auto Ownership

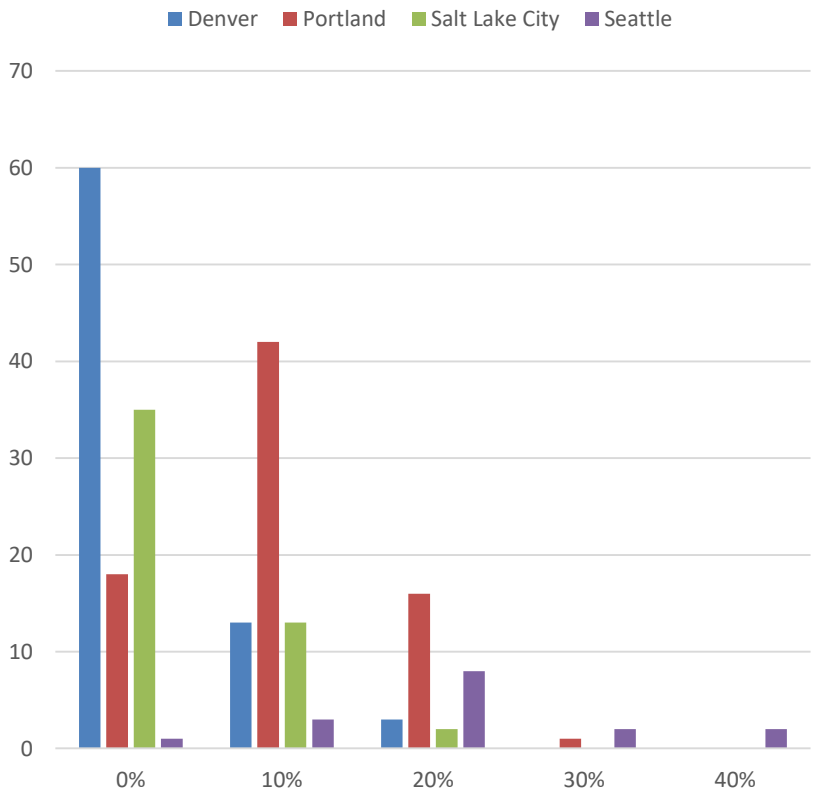


POPULATION CHARACTERISTICS

Station Area Average and Max Density

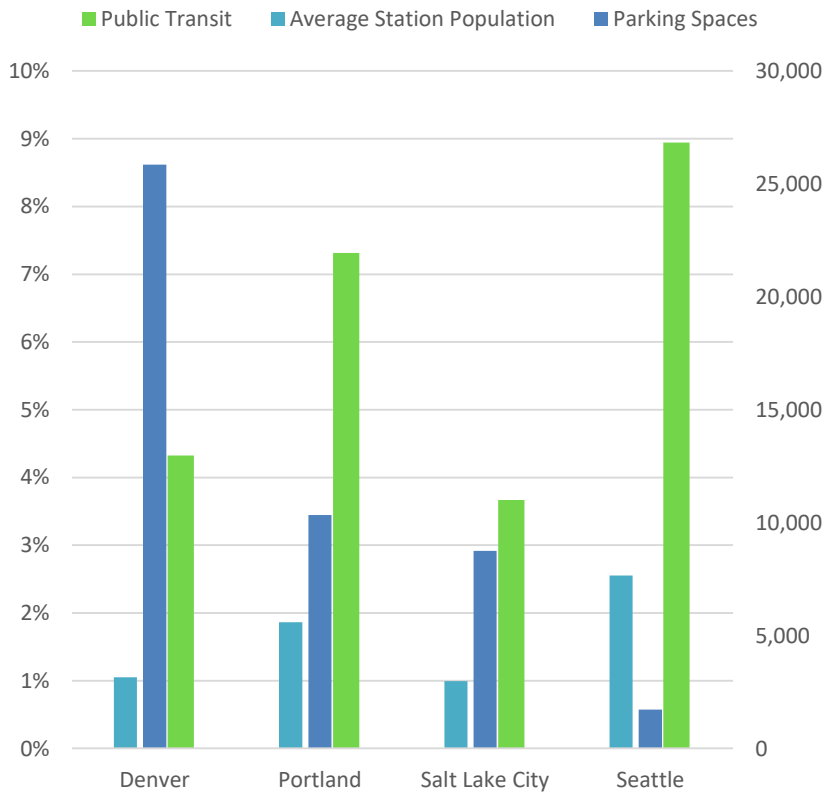


Number of Stations by Transit Mode Split

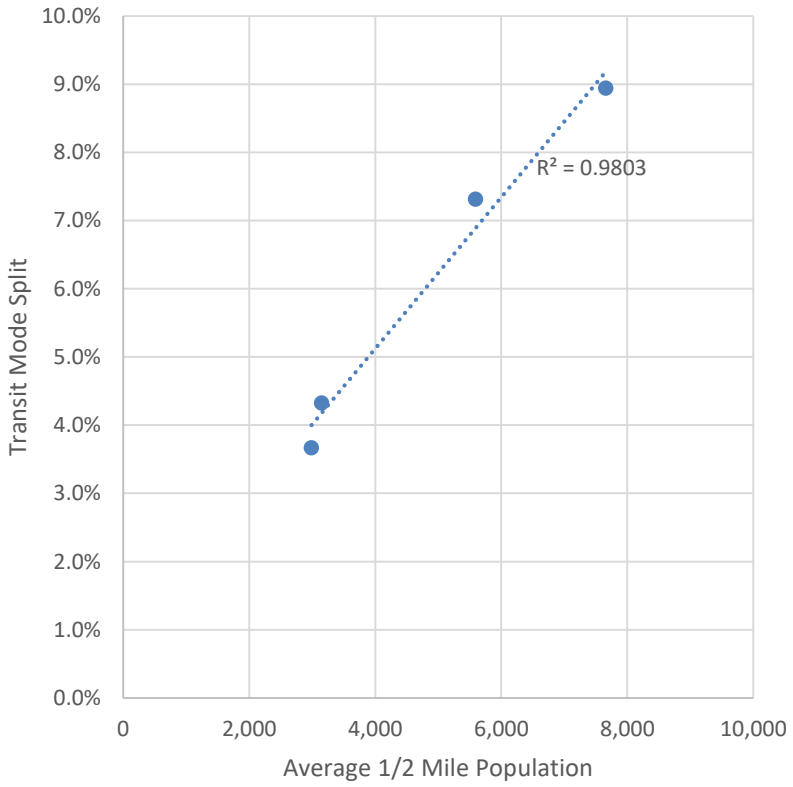


POPULATION CHARACTERISTICS

Parking Spaces and Transit Mode Split

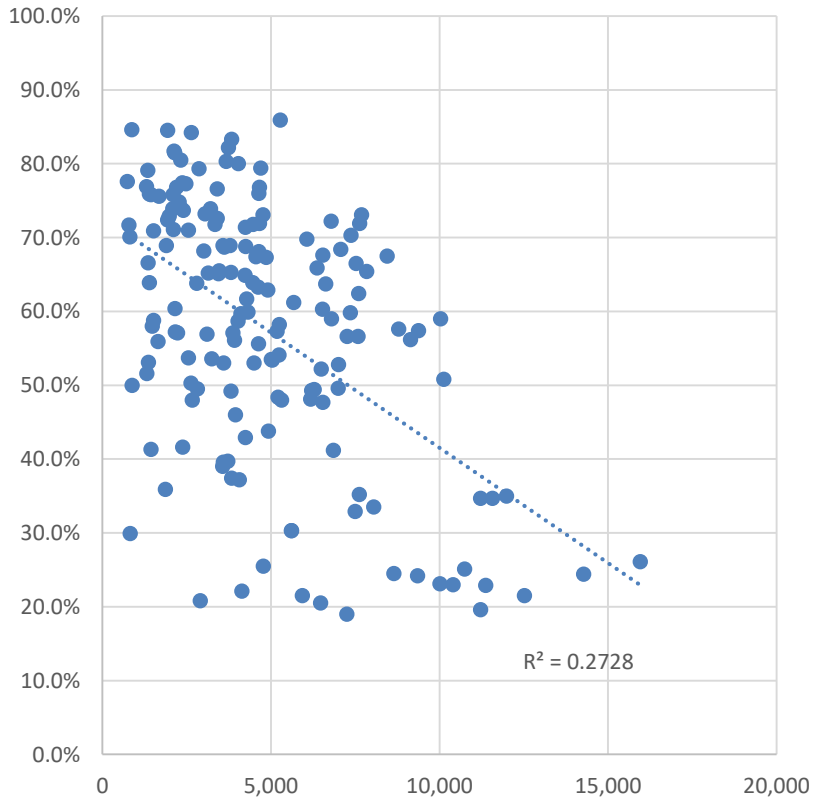


Average Station Population and Mode Split

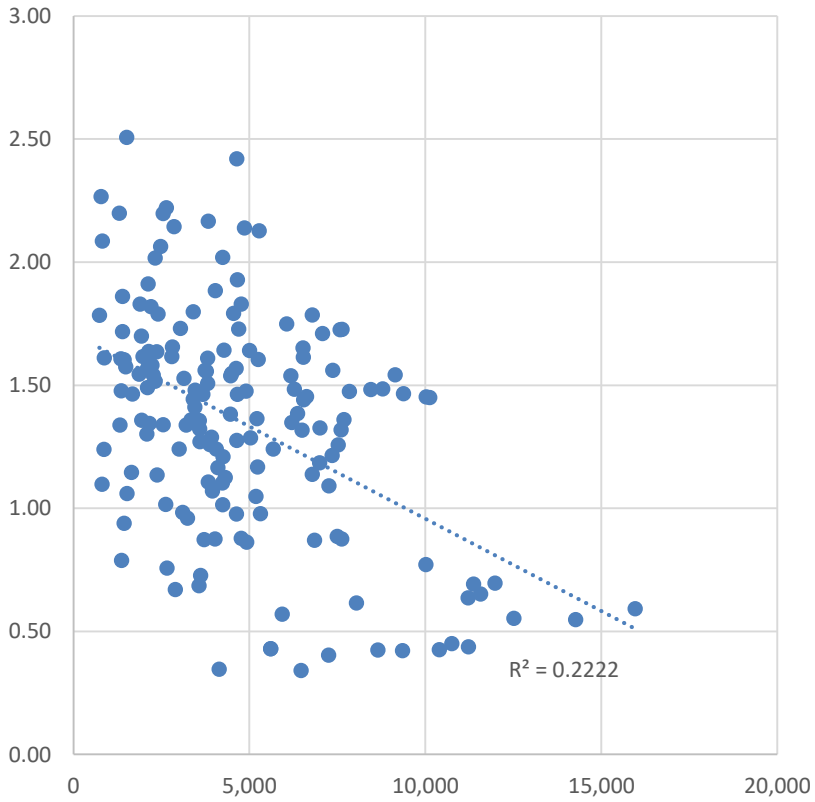


POPULATION TRENDS

SOV Mode Split by Population within ½ Mile of Station



Auto Ownership Per Household by Population within ½ Mile of Station



RESULTS

Iteration #1

- Higher population densities will result in lower single-occupancy vehicle (SOV) mode split, higher transit ridership, and lower vehicle ownership

Analysis #1

- Low R-Value suggests lack of strong relationship.
- It appears that there may be an upper limit to SOV mode split and automobile ownership related to density above 7,000 persons per square mile.
  - Lack of data points in SLC and Denver mean this could be regionally dependent.

PROCESS

Collect Additional Data

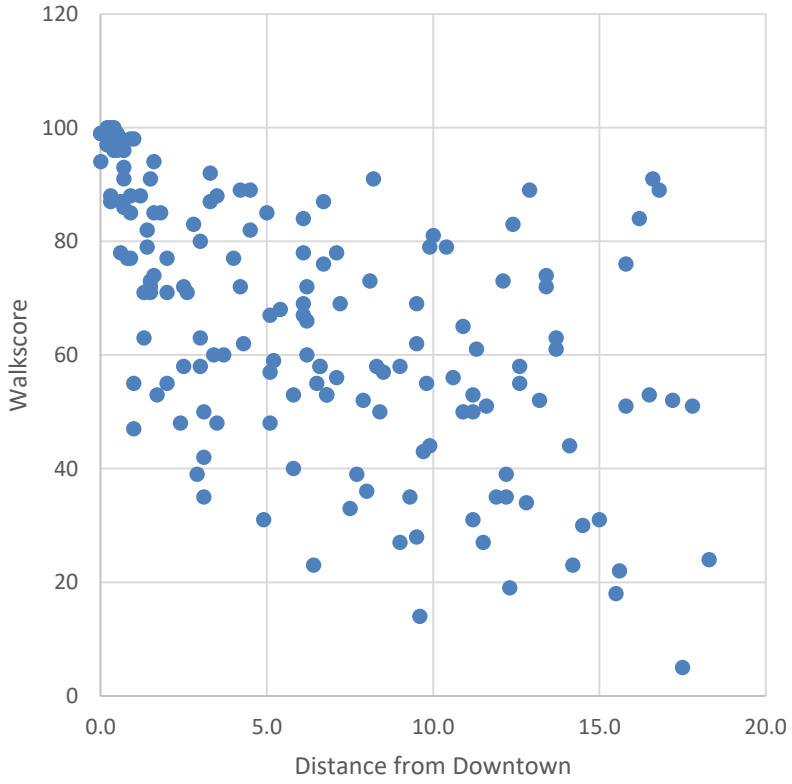
- Measured walking distance from each station to the Downtown core
- Collected Walkscore for all stations, Transitscore and Bikescore for those available

Iteration #2

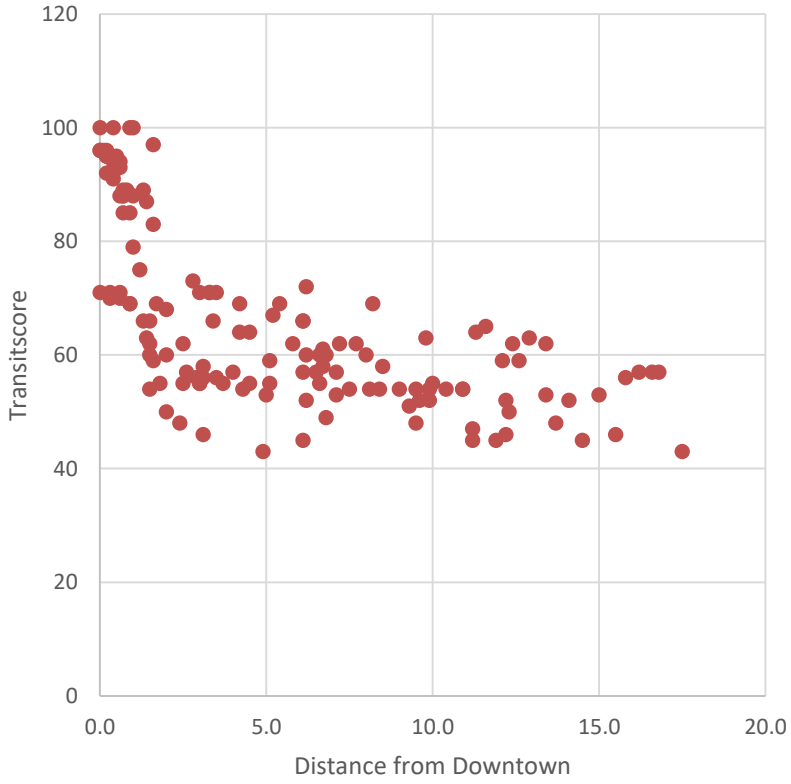
- A higher Walkscore or Transitscore will result in a lower SOV mode split and lower automobile ownership

WALKSCORE AND TRANSITSCORE

Where are the Walkscores?

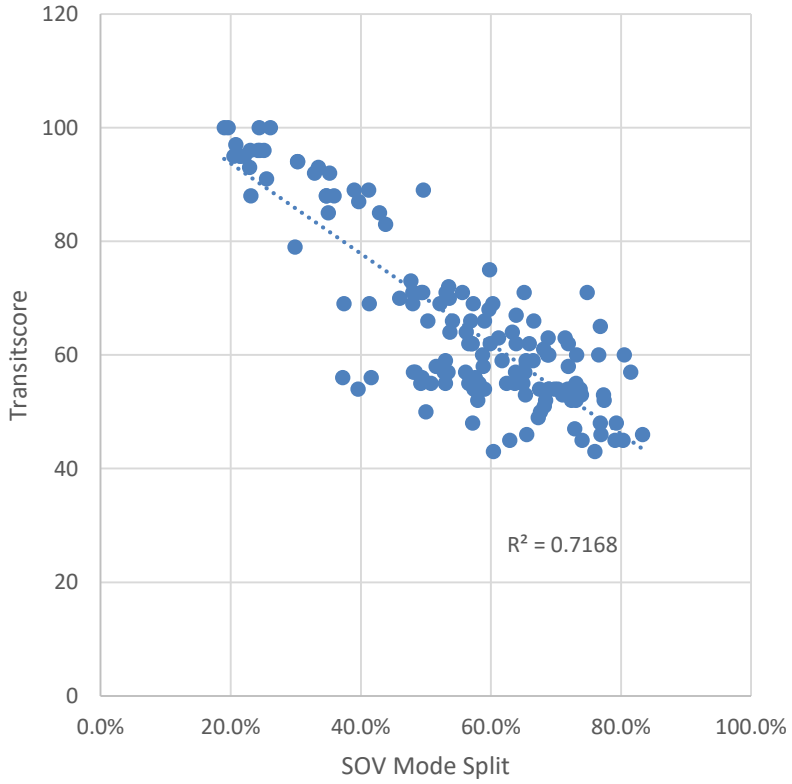


Where are the Transitscores?

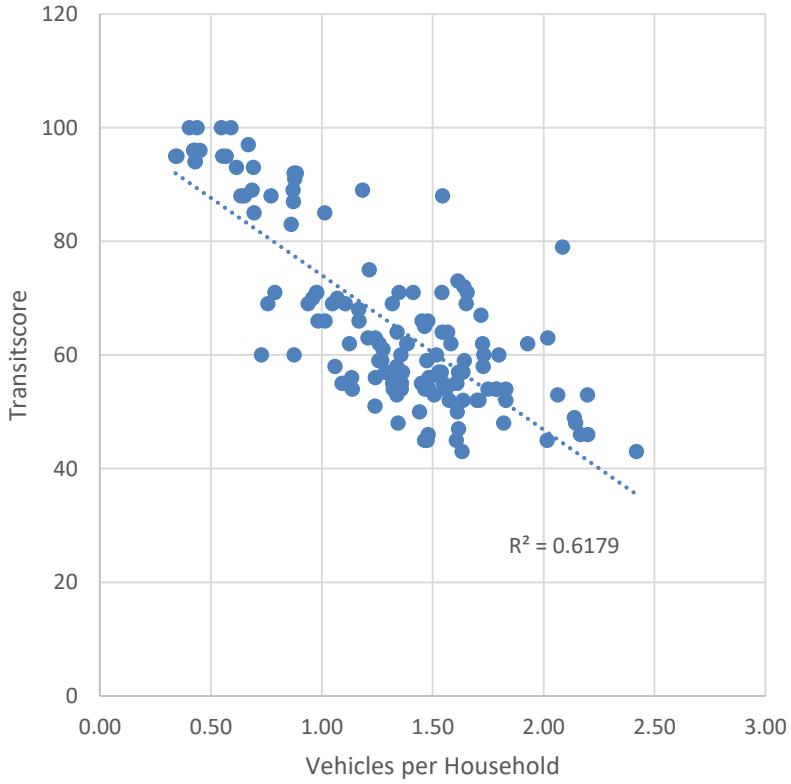


WALKSCORE AND TRANSITSCORE

Transitscore and SOV Mode Split

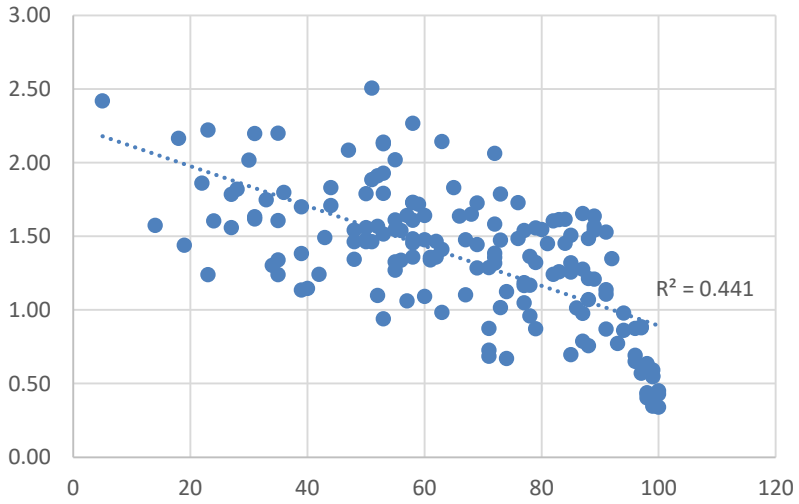


Transitscore and Vehicle Ownership

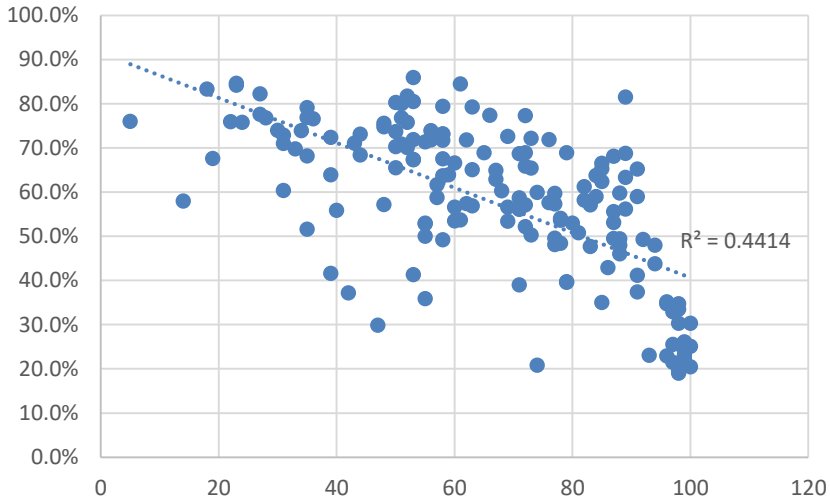


WALKSCORE AND TRANSITSCORE

Walkscore and Household Automobile Ownership

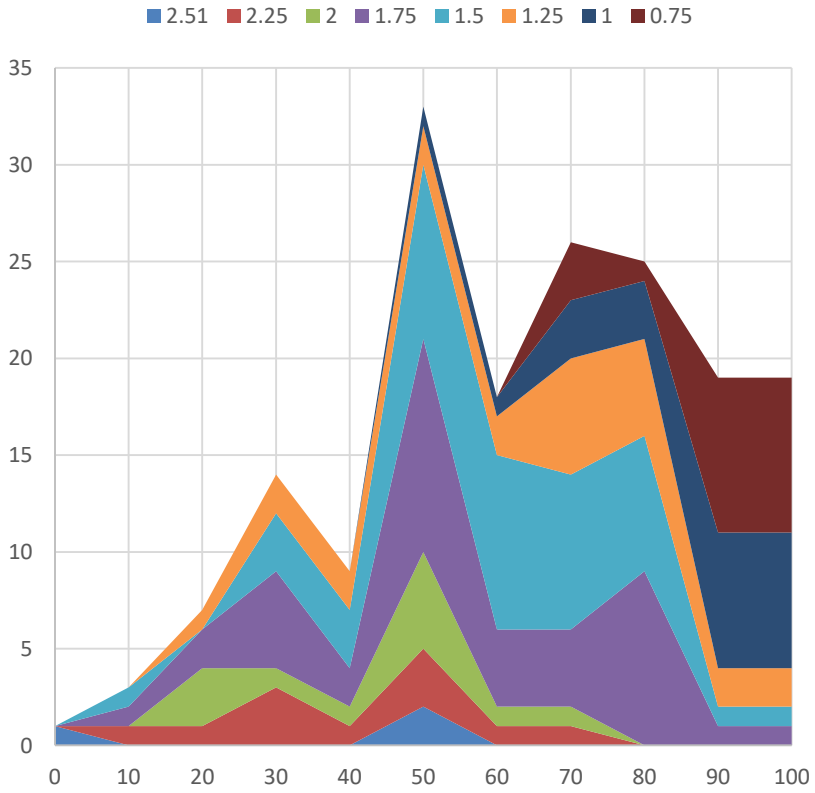


Walkscore and SOV Mode Split

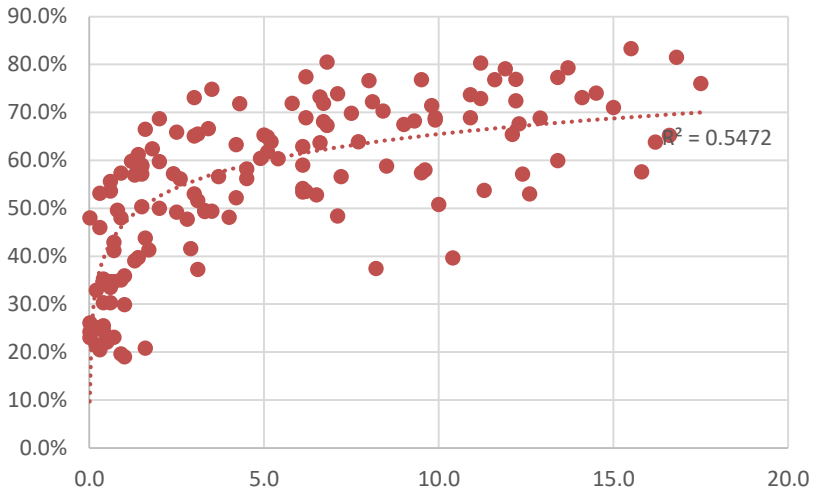


WALKSCORE AND TRANSITSCORE

Walkscore and Household Automobile Ownership



SOV Rate by Distance from Downtown



RESULTS

Iteration #2

- A higher Walkscore or Transitscore will result in a lower SOV mode split and lower automobile ownership

Analysis #2

- There initially appeared to be an upper limit to auto ownership and SOV mode split when compared to Walkscore. Up on a closer examination, however, the results appear more directly correlated to distance from Downtown. This is a variable that is not controllable by jurisdictions that don't host the business core.
- It does make a case for providing less parking and more housing in close-in neighborhoods.

PROCESS

Collect Additional Data

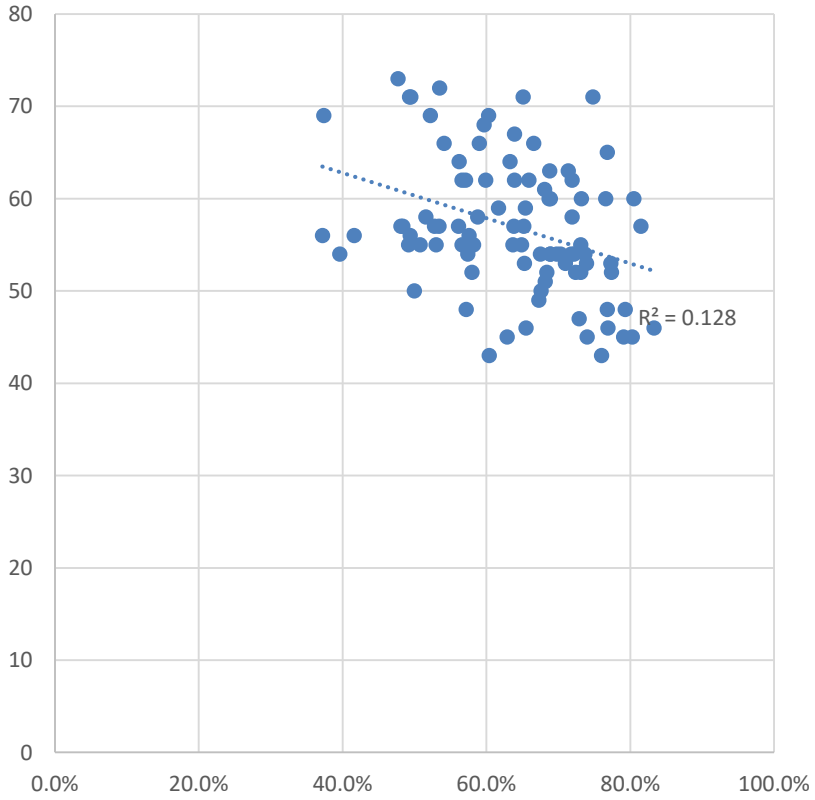
- Isolate stations two or more miles away from Downtown
- Identify connectivity index, max block length, max residential walking ratio to station, and number of links.

Iteration #3

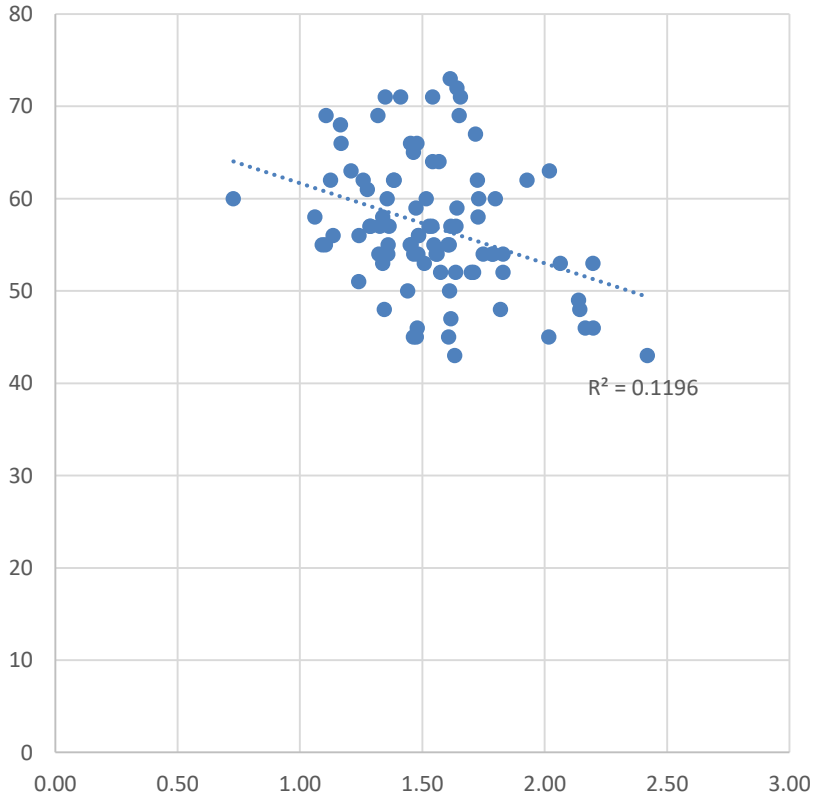
- Do the correlations between Walkscore and Transitscore scale to locations outside the Downtown Core and close-in neighborhoods?
- Is ease of access to the station area predictive of transit ridership, SOV use, or vehicle ownership?

WALKSCORE AND TRANSITSCORE

Transitscore and SOV Mode Split

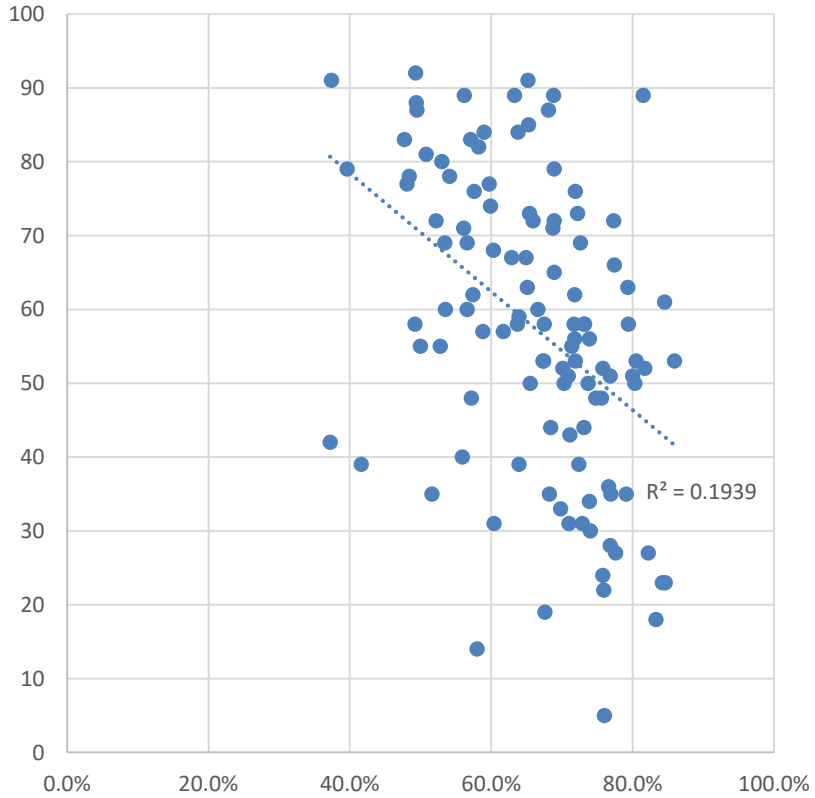


Transitscore and Vehicle Ownership

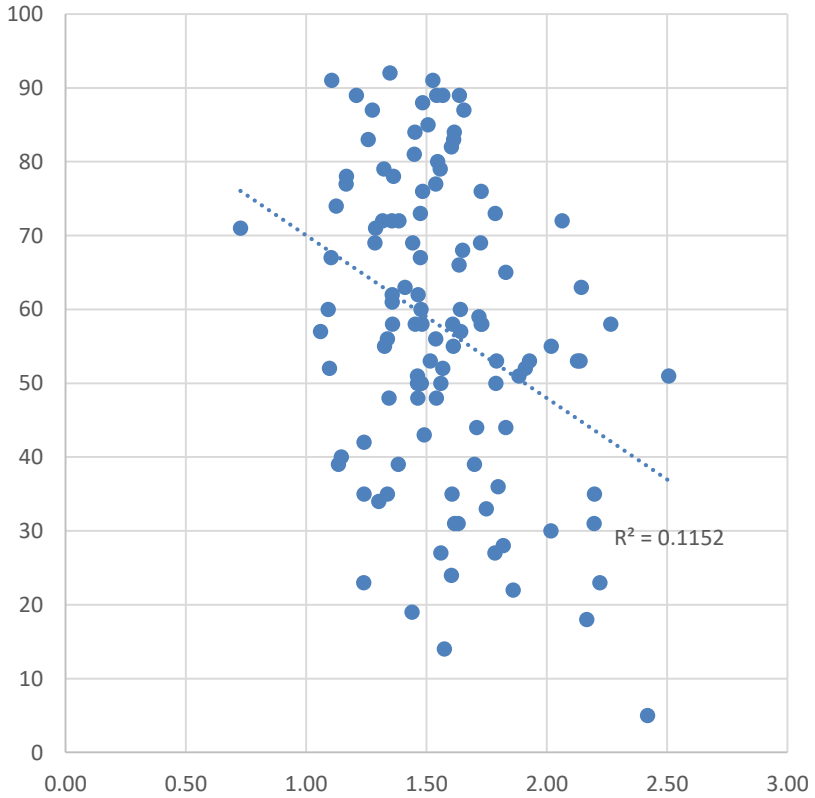


WALKSCORE AND TRANSITSCORE

Walkscore and SOV Mode Split



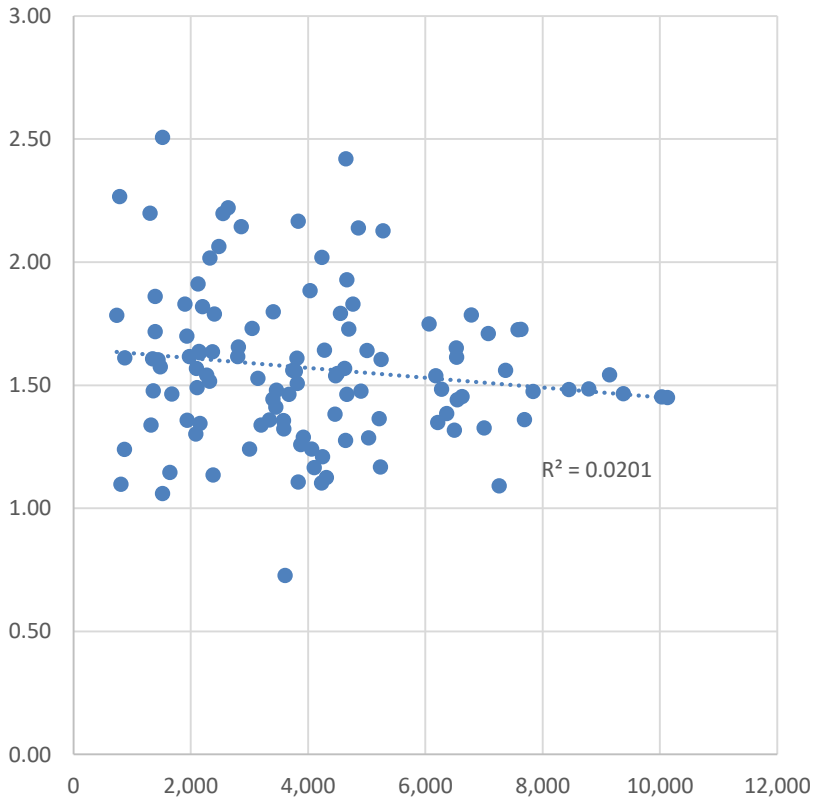
Walkscore and Vehicle Ownership



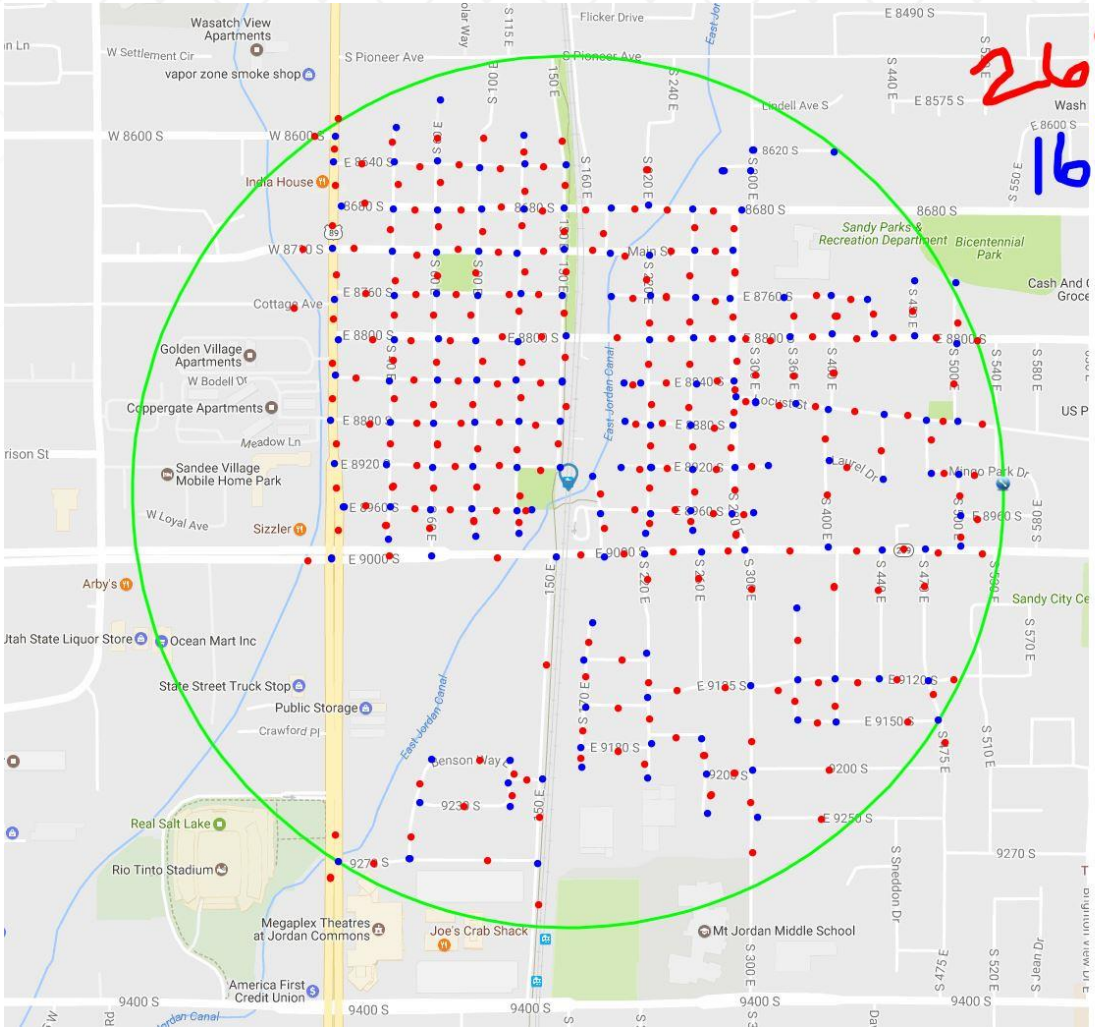
WALKSCORE AND TRANSITSCORE

Population and SOV Mode Split

Population and Vehicle Ownership

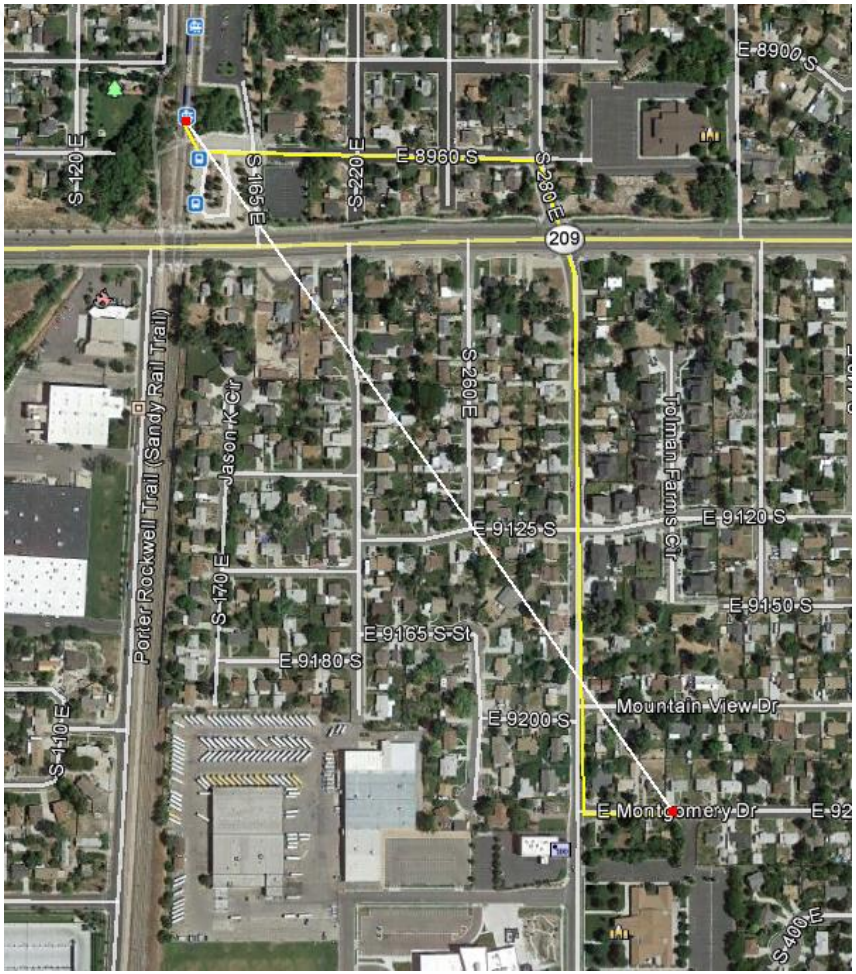


CONNECTIVITY INDEX



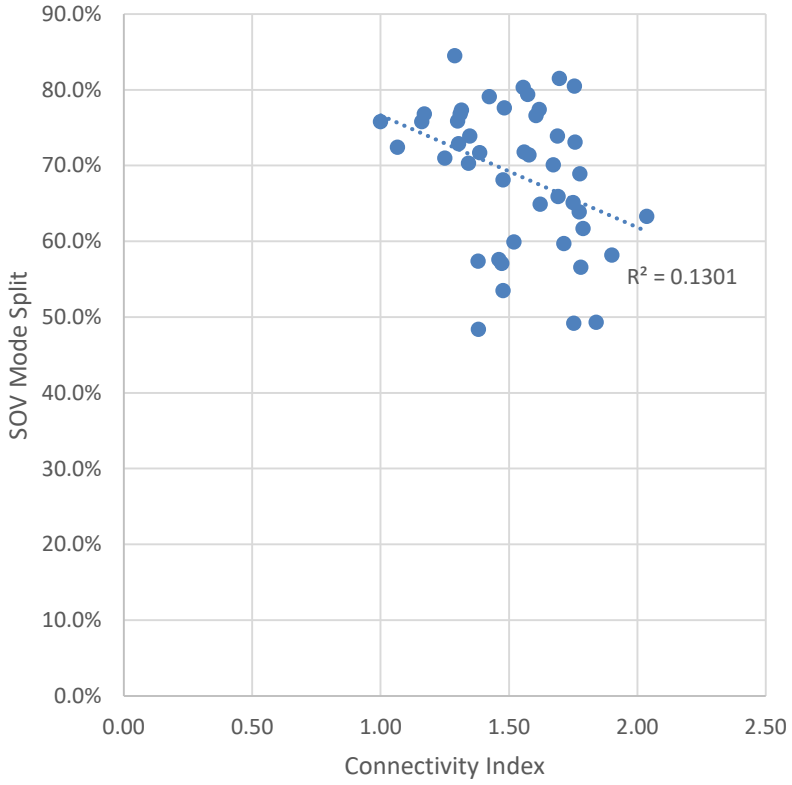
CONNECTIVITY INDEX

- Connectivity Index
  - Number of links divided by number of nodes
- Residential Walking Ratio
  - Most direct “on-the-ground” walking route divided by “as the crow flies” distance from station
- Max Block Length
  - Longest block length between intersecting streets that allow a person to move to a different part of the street grid
- Number of Links
  - Used as a proxy for identifying block size

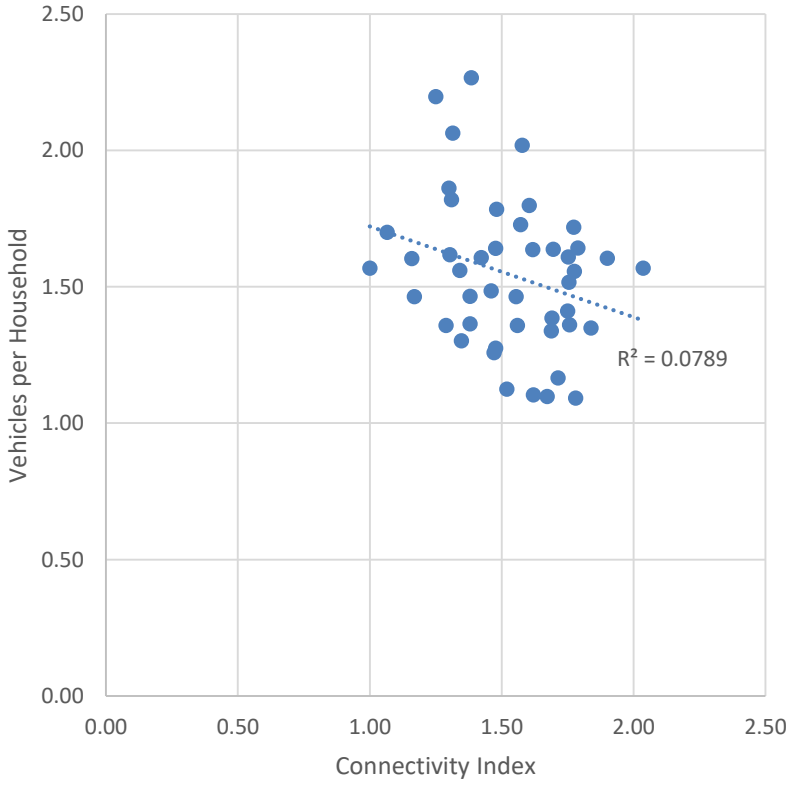


CONNECTIVITY

Connectivity Index and SOV

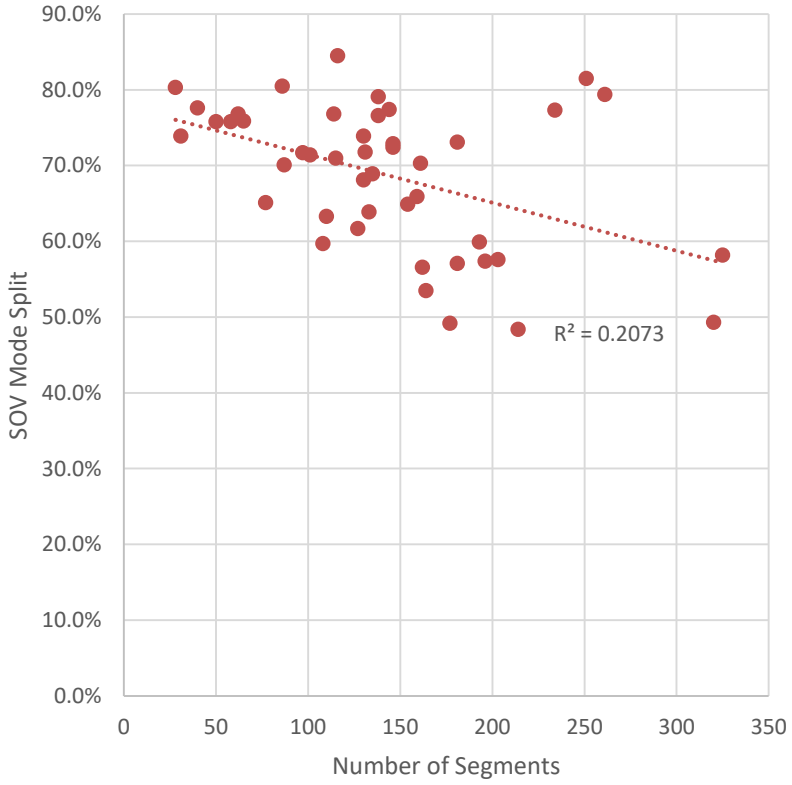


Connectivity Index and Vehicle Ownership

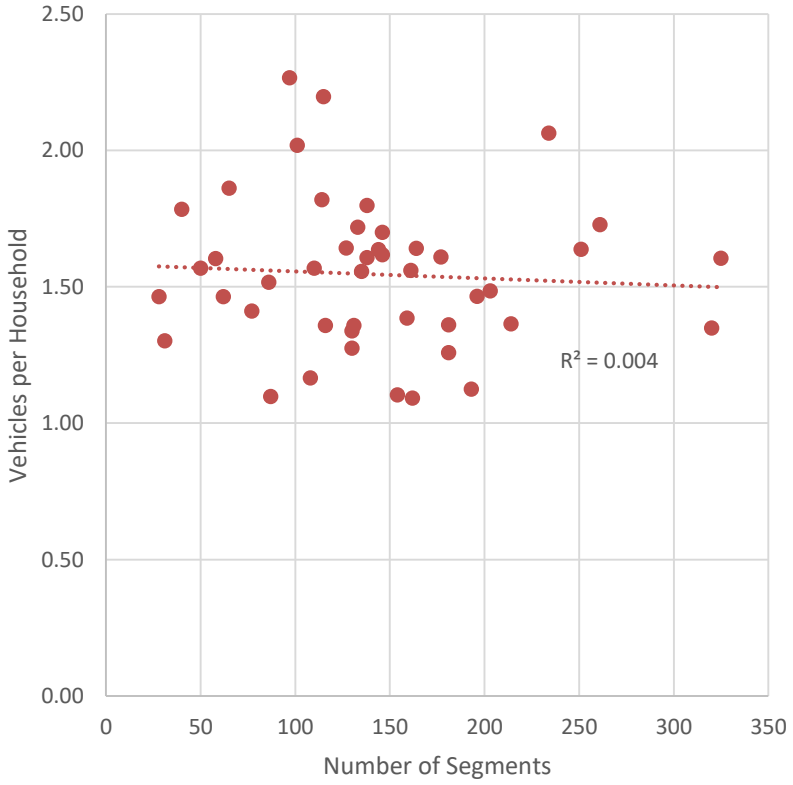


CONNECTIVITY

Number of Links and SOV

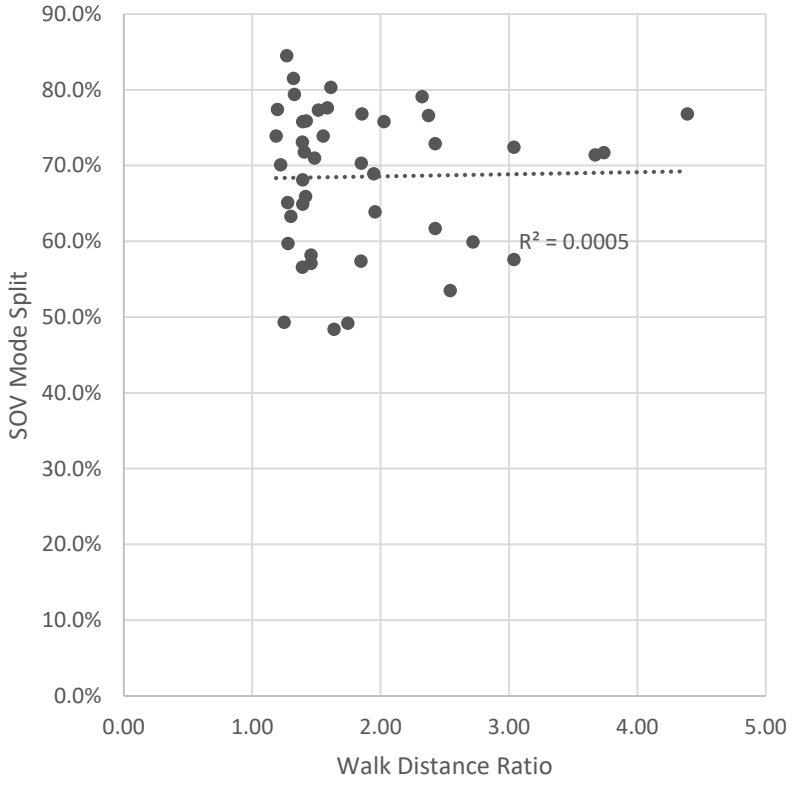


Number of Links and Vehicle Ownership

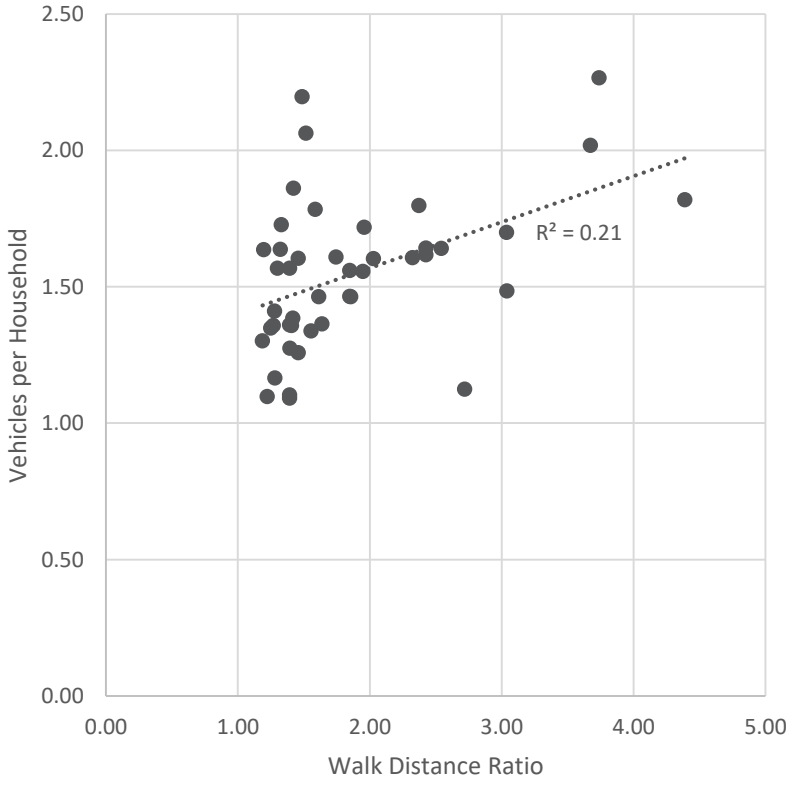


CONNECTIVITY

Walk Distance Ratio and SOV



Walk Distance Ratio and Vehicle Ownership



RESULTS

Iteration #3

- Do the correlations between Walkscore and Transitscore scale to locations outside the Downtown Core and close-in neighborhoods?
- Is ease of access to the station area predictive of transit ridership, SOV use, or vehicle ownership?

Analysis #3

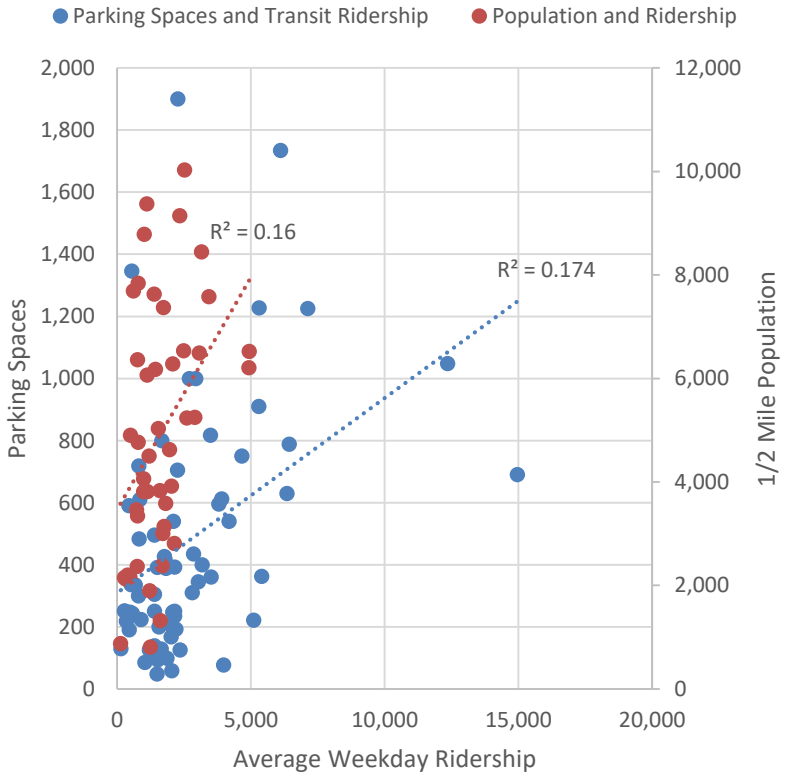
- Very high Walkscores may reduce the number of vehicles owned, but any impact is minimal.
- The initial results do not look promising to provide a predictive indicator of SOV mode split, transit mode split, or vehicle ownership.
- The data collection for this analysis is incomplete. Additional data are needed to finalize the results.

RESULTS

Bonus Results

- Do any of the data collected indicate an increase in the number of riders?
- Continued focus beyond two miles from Downtown. No trends emerge between the number of parking spaces provided, ½ mile population, and ridership.

Parking Spaces and Population



RESULTS

Bonus Results

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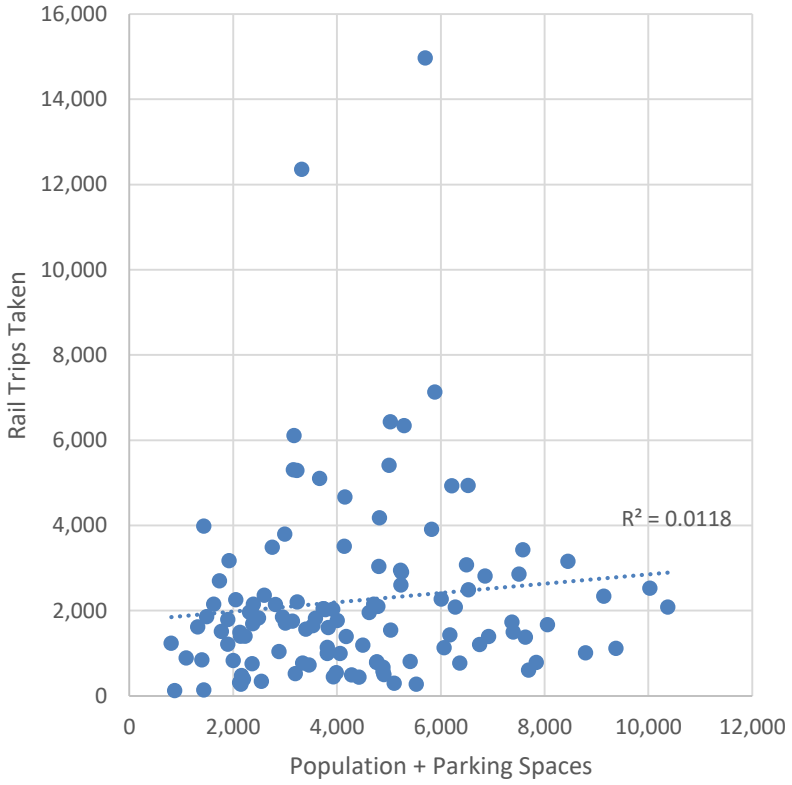
Parking + Population Ridership



SUMMARY

Quick Facts

- Proximity to the Downtown Core is the most influential variable identified in reducing SOV mode split and vehicle ownership.
- Population density in proximity of rail stations do not appear to affect either mode split nor vehicle ownership until after approximately 7,500 people per square mile.
- Building a more urban form or having more intense land uses don't appear to directly result in a lower SOV mode split or lower vehicle ownership.
- High urban form does not predict low vehicle ownership or SOV mode split, but it does appear that less urban form precludes these reductions.
- The most predictive variable identified, Transitscore, had zero locations with a score above 73 beyond 2.0 miles from the Downtown Core.
- Home ownership in station areas was most predictive of vehicle ownership rates.

CONTACT ME

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