Will Car-less Millennials Start Owning Cars Anytime Soon?

Dr. Giovanni Circella
School of Civil and Environmental Engineering, Georgia Institute of Technology and Institute of Transportation Studies, University of California, Davis
gcircella@ucdavis.edu

Evanston, IL
February 23, 2017
Mobility of Millennials in California

Interest in better understanding:

- The relationships among *millennials’ personal attitudes, lifestyles and actual behaviors*

  ...*do they behave differently from previous generations?*

- Impact of *classical* (economic and non-economic) variables vs. *specific factors affecting millennials’ choices* (e.g. adoption of technology, shared mobility, etc.)

- Their *aspirations for/opinions about life and future mobility* (e.g. major life changes, purchase and use of cars vs. use of other modes)

---

(1) Seven tips for attracting Millennials, 2012, merchandisingmatters.com
(2) Martinmark, Golden gate bridge, 2014, stockfreeimages.com
“Millennials”

- Millennials comprise a large and active segment of the population
- Often described as heavy adopters of technology and social media
- Less dependent on cars, and adaptable to the sharing economy
- Suffered economic recession, and now climbing the income ladder
- Often prefer urban locations and social lifestyles (at least in some regions)
- The focus is mainly on urban population...
Potential Factors Affecting the Mobility of Millennials

<table>
<thead>
<tr>
<th>Economic</th>
<th>Auto Costs</th>
<th>Technology</th>
<th>Demographic Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recession</td>
<td>Gasoline</td>
<td>Communication technology</td>
<td>Delayed marriage</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Auto insurance</td>
<td>Transportation technology (Über)</td>
<td>Fewer children</td>
</tr>
<tr>
<td></td>
<td>Driver’s education</td>
<td></td>
<td>Boomerang</td>
</tr>
<tr>
<td></td>
<td>Auto repairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other fees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Location</td>
<td>Cultural</td>
<td>Regulatory Changes</td>
<td>Alternative Modes</td>
</tr>
<tr>
<td>More likely to move to and live in cities</td>
<td>Environmentalists</td>
<td>Graduated Driver’s Licensing</td>
<td>Better transit</td>
</tr>
<tr>
<td></td>
<td>Less materialistic</td>
<td>Texting while driving laws</td>
<td>Improved infrastructure for walking/biking</td>
</tr>
</tbody>
</table>
Common Limitations of Previous Studies

Lack of information on key variables:
• e.g. *personal attitudes and preferences* for studies based on the analysis of National Household Travel Survey data

Use of non-random samples:
• e.g. *convenience samples* for studies on university students
California Millennial Study

- Statewide study of emerging trends in transportation in California

- Design of a detailed online survey to collect information from millennials

- Survey distributed through an opinion panel to a sample of Millennials (18-34) and Generation X (35-50) during fall 2015

- Quota sampling by geographic region and neighborhood type

- Part of a longitudinal study of millennials’ behavior (with rotating panel)
California Millennial Study

• Statewide study of emerging trends in transportation in California

• Design of a detailed online survey to collect information from millennials

• Survey distributed through an opinion panel to a sample of Millennials (18-34) and Generation X (35-50) during fall 2015

• Quota sampling by geographic region and neighborhood type

• Part of a longitudinal study of millennials’ behavior (with rotating panel)

• Lew Fulton

• Pat Mokhtarian

• Susan Handy

• Farzad Alemi

• Rosaria Berliner

• Kate Tiedeman

• Yongsung Lee
Survey Content

A. Individual Attitudes and Preferences (general, environmental, technology, lifestyles, etc.)
B. Online Social Media and Adoption of Technology
C. Residential Location and Living Arrangements
D. Employment and Work/Study Activities
E. Transportation Mode Perceptions
F. Current Travel Behavior
G. Shared Mobility Services (e.g. car-sharing, Uber, Lyft, etc.)
H. Driver’s License and Vehicle Ownership
I. Previous Travel Behavior and Residential Location
J. Aspirations for/Opinions about Future Mobility
K. Sociodemographic Traits
**Section A: Your Opinions on Various Topics**

To begin, we’d like to learn more about your opinions on various issues related to transportation, residential location and lifestyles. This will give us a more complete context for understanding your answers to later questions. We want your honest opinion on each statement contained in the next three tables (or your best guess, for topics you are not very familiar with) – there are no “right” or “wrong” answers in this survey!

Please choose the response that most closely fits your reaction to each of the following statements.

(1 of 3) Your opinions and preferences about personal lifestyles and residential location

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I prefer to live close to transit, even if it means I’ll have a smaller home and live in a more crowded area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting regular exercise is very important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like sticking to a routine.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I prefer to live in a spacious home, even if it is farther from public transportation and most destinations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individuals should generally put the needs of the group ahead of their own.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doing two or more activities at the same time is the most efficient way to use my time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like the idea of having different types of businesses (such as stores, offices, post office, bank, library) mixed in with the homes in my neighborhood.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The importance of exercise is overrated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What is the Impact of Emerging Technologies?

- Smartphones (GPS, access to more info)
- Increasing opportunities to multitask
- Integrated ride-sharing / shared mobility
- Lower levels of car-ownership
- Extend range of public transportation
Car Ownership vs. Shared Mobility

UBER
The Dataset
All cases were geocoded based on residential location.

We **weighted** the dataset to correct for the quota-based sampling on *age, region* and *neighborhood type*.

We also applied **IPF raking** to represent California’s population by
1. *Race and Ethnicity*
2. *Employment/Student Status*
3. *Gender*
4. *Presence of Children*
5. *Household Income*
We integrated data from other sources, e.g. US Census, US EPA Smart Location Data, Walkscore.com, etc.

We classified the NH type as *urban, suburban* or *rural*, based on land use features at the census tract.
A Transient, Green Generation

"I'm still trying to figure out my career (e.g. what I want to do, where I'll end up)"

"I prefer to live close to transit even if it means I'll have a smaller home and live in a more crowded area"

"I'm already well-established in my field of work"

"We should raise the price of gasoline to reduce the negative impacts on the environment"
"I avoid doing things that I know my friends would not approve"

"Use smartphone to decide which means of transportation, or combinations of multiple means, to use for a trip"

"Having Wi-Fi and/or 3G/4G connectivity everywhere I go is essential to me"

"Use smartphone to identify possible destinations (e.g. restaurant, cafe, etc.)"
Individual Attitudes and Preferences

- We applied factor analysis to the 66 attitudinal statements in the survey, and extracted 17 factors.
Millennial Multitaskers

Multi-tasking activity during last commute trip

- I used non-electronic items for other purpose (e.g. read a book, etc.)
- I used smartphone for other purpose
- I used laptop or tablet for other purposes
- I use non-electronic items for work/study purpose (e.g. read a book, wrote some notes,...)
- I used smartphone for work/study purpose
- I used laptop or tablet for work/study purpose
- I talked on the phone
- I talked to other travelers

<table>
<thead>
<tr>
<th>Activity</th>
<th>Generation X</th>
<th>Millennials</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use non-electronic items for other purpose</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>I used smartphone for other purpose</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>I used laptop or tablet for other purposes</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>I use non-electronic items for work/study</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>purpose (e.g. read a book, wrote some notes,...)</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>I used smartphone for work/study purpose</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>I used laptop or tablet for work/study purpose</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>I talked on the phone</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>I talked to other travelers</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Most Recent Commute - Mode Choice

**Millennials**
- Drive alone: 68.7%
- Carpool: 9.3%
- Public transit: 9.2%
- Work-/school-provided bus or shuttle: 1.0%
- Motorcycle or motor-scooter: 0.4%
- Uber/Lyft: 0.6%
- Bike or e-bike: 2.9%
- Other: 1.9%
- Walk or skateboard: 6.1%

**Generation X**
- Drive alone: 74.6%
- Carpool: 7.0%
- Public transit: 8.4%
- Work-/school-provided bus or shuttle: 0.1%
- Motorcycle or motor-scooter: 0.4%
- Uber/Lyft: 0.4%
- Bike or e-bike: 1.5%
- Walk or skateboard: 4.7%
- Other: 2.8%

*N=1776, weighted sample*
Adoption of Technology

Consistent with expectations, millennials are found to:

- Drive less
- Multitask during their commute
- Use smartphone apps and technology services more often. For example:
Residential Location and Travel Multimodality

![Graph showing the relationship between average walk score of residence and percent of multimodal travelers by generation.](image)

- Generations:
  - Dependent millennials (red)
  - Independent millennials (yellow)
  - Gen Xers (gray)

- VMT per capita:
  - 75
  - 100
  - 125
  - 150

Legend:
- SACOG: San Francisco Bay Area
- SCAG: Southern California
- MTC: Metropolitan Transportation Commission
Adoption of Shared Mobility
## Shared Mobility Services

<table>
<thead>
<tr>
<th>Type of Services</th>
<th>Ownership and Operational Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carsharing</strong></td>
<td>• Fleet-based or peer-to-peer</td>
</tr>
<tr>
<td></td>
<td>• Round trip or one way</td>
</tr>
<tr>
<td></td>
<td><img src="CAR2GO.png" alt="Logos" /> <img src="zipcar.png" alt="Logos" /> <img src="TURO.png" alt="Logos" /></td>
</tr>
<tr>
<td><strong>Bikesharing</strong></td>
<td>• Fleet-based or peer-to-peer</td>
</tr>
<tr>
<td></td>
<td>• Dock-based or GPS-based</td>
</tr>
<tr>
<td><img src="BayAreaBikeShare.png" alt="Logos" /> <img src="Spinlister.png" alt="Logos" /> <img src="citibike.png" alt="Logos" /></td>
<td></td>
</tr>
<tr>
<td><strong>Dynamic Ridesharing</strong></td>
<td>• Private-public partnership</td>
</tr>
<tr>
<td></td>
<td>• Carpooling, vanpooling, and dynamic ridesharing</td>
</tr>
<tr>
<td><img src="scoop.png" alt="Logos" /> <img src="C.png" alt="Logos" /> <img src="lyft.png" alt="Logos" /> <img src="UBER.png" alt="Logos" /> <img src="Lyft.png" alt="Logos" /></td>
<td></td>
</tr>
<tr>
<td><strong>On-demand Ride Services</strong></td>
<td>• Private (may be subsidized by public in future)</td>
</tr>
<tr>
<td></td>
<td>• Uber X and Lyft; Uber pool and LyftLine</td>
</tr>
<tr>
<td><img src="UBER.png" alt="Logos" /> <img src="Lyft.png" alt="Logos" /></td>
<td></td>
</tr>
</tbody>
</table>
Use of Car-Sharing

Familiarity with and usage of car-sharing (e.g. Zipcar, Car2Go)

- I have never heard of it
- I have heard of it but I've never used it
- I use it when traveling away from home
- I use it in my hometown/city
- I use it in my hometown & away from home

N=2391, weighted sample
An Uber-Friendly Generation?

Familiarity with and usage of on-demand ride services (e.g. Uber, Lyft)

I have never heard of it
I have heard of it but I've never used it
I use it when traveling away from home
I use it in my hometown/city
I use it in my hometown & away from home

N=2391, weighted sample
Use of Car-Sharing
Use of Uber/Lyft
Users of Uber/Lyft

- Rural:
  - Users: 86%
  - Non-Users: 14%
- Suburban:
  - Users: 70%
  - Non-Users: 30%
- Urban:
  - Users: 56%
  - Non-Users: 44%

- Rural:
  - Users: 83%
  - Non-Users: 17%
- Suburban:
  - Users: 75%
  - Non-Users: 25%
- Urban:
  - Users: 60%
  - Non-Users: 40%

- Rural:
  - Users: 76%
  - Non-Users: 24%
- Suburban:
  - Users: 67%
  - Non-Users: 33%
- Urban:
  - Users: 44%
  - Non-Users: 56%

Map showing distribution of users and non-users across different regions.
What Replaces What?

Need a ride? Get a Lyft.
Impact of Last Uber Trip

- Reduced the amount of driving I did
- Reduced the amount of walking/biking I did
- Reduced my use of public transportation
- Increased the amount of walking/biking I did
- Increased my use of public transportation (improving flexibility)
- Increased my use of public transportation (improving access/egress)
- Other

Percentage of responses:

- Generation X
- Millennials
Millennials’ Behavior

- Millennials drive fewer VMT, on average, than older peers (in all NH types).
- Differences explained by a combination of individual/HH characteristics, land use features, technology adoption and personal attitudes.
- More heterogeneity observed among millennials. Land use features explain smaller portion of millennials’ VMT.
- Higher adoption of shared mobility services among millennials.
- Use of Uber associated with significantly fewer miles driven.
- Millennials more often adopt multimodal travel behavior, but...
  - Independent millennials (who already established their households) choose more accessible residential locations (more conducive to use of other modes).
  - Dependent millennials (who still live with their parents) often live in less accessible locations. Still, they often adopt multimodal travel.
- Gen Xers often live in more accessible locations than dependent millennials. However, they are more car-dependent.

Results available in 2017 TRB papers.
How many millennials match the stereotype of the *urbanites* common in the media?

*Latent class analysis* to analyze different profiles of people (urbanites vs. others, etc.)

Stereotype common in the media:
- Live in urban areas
- Have dynamic lifestyles
- Heavy users of social media
- Own zero (or few) cars
- Use public transportation
- Adopt new technologies

How many *millennials vs. Gen Xers* fit this profile?
Research Question 2

- Incorporate latent behavioral constructs into modeling travel behavior and the use of shared mobility services
- *Latent class choice model* to analyze differences in travel behavior and in the adoption of shared mobility services among different groups, e.g.:
Research Question 3

How does the adoption of *shared mobility* affect other components of *travel behavior* and *vehicle ownership*?

Jointly model the adoption of shared mobility and the use of other travel modes (or vehicle ownership, propensity to modify VO, etc.), controlling for the impacts of attitudes, adoption of technology, household, individual and built environment characteristics.

Potential modeling approaches: *bivariate ordered Probit*, *recursive Probit*, or *latent-class structural equation models*. 
Millennials and Cars
What about Vehicle Ownership?

Independent Millennials
- 0: 6.4%
- 1: 41.8%
- 2: 41.6%
- 3+: 10.2%

Dependent Millennials
- 0: 2.2%
- 1: 23.1%
- 2: 33.6%
- 3+: 41.1%

Gen Xers
- 0: 5.9%
- 1: 34.0%
- 2: 43.6%
- 3+: 16.6%

# Vehicles per driver
- Millennials: 
  - Urban: .79
  - Non-Urban: .92
- Gen X: 
  - Urban: .87
  - Non-Urban: .96

Percentage of time car is available for use
- Millennials: 85.0%
- Gen X: 91.4%
Propensity to Modify Vehicle Ownership

- Millennials often report that they want to increase their vehicle ownership.
- This more often happens among millennials who live in zero-vehicle households.

<table>
<thead>
<tr>
<th>Propensity to Change VO</th>
<th>Number of Vehicles</th>
<th>Expectation to have a child, and number of children in the household</th>
<th>Propensity to change VO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Millennials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Modeling the Propensity to Modify Vehicle Ownership

- Multinomial Logit Model
- Three alternatives: Reduce VO, Maintain VO (base), Increase VO
- Combination of propensity to buy and/or to sell/get rid of a vehicle
- Unequal choice sets
- Factor analysis on attitudinal variables
- Exclude dependent millennials (their VO level presumably mediated with the family of origin)
- Sample size N = 1,275

\[
\mathcal{L}(\beta) = -783.67 \\
\mathcal{L}(0) = -1386.54 \\
\rho^2 = 0.43 \\
\rho^2 (MS base) = 0.09 \\
\text{Adjusted } \rho^2 = 0.42 \\
\text{Adjusted } \rho^2 (MS base) = 0.08
\]
Modeling the Propensity to Modify Vehicle Ownership (2)

### Multinomial Logit Model Estimation Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reduce VO</th>
<th>Maintain Current VO</th>
<th>Increase VO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young millennial (18-24) with less than one vehicle per household driver</td>
<td>base</td>
<td>1.222***</td>
<td>(0.379)</td>
</tr>
<tr>
<td>Older millennial (25-34) in zero vehicle household</td>
<td>base</td>
<td>3.602***</td>
<td>(0.778)</td>
</tr>
<tr>
<td>Older millennial (25-34) with less than one vehicle per household driver</td>
<td>base</td>
<td>1.368***</td>
<td>(0.219)</td>
</tr>
<tr>
<td>Gen Xer (35-50) in zero vehicle household</td>
<td>base</td>
<td>1.969***</td>
<td>(0.520)</td>
</tr>
<tr>
<td>Gen Xer (35-50) with less than one vehicle per household driver</td>
<td>base</td>
<td>0.640***</td>
<td>(0.213)</td>
</tr>
<tr>
<td>Have more than one car per driver and plan to move to more urban area</td>
<td>base</td>
<td>0.439*</td>
<td>(0.229)</td>
</tr>
<tr>
<td>Gender: female</td>
<td>base</td>
<td>-0.282*</td>
<td>(0.151)</td>
</tr>
<tr>
<td>Young Gen Xer (35-44) with kid(s)</td>
<td>base</td>
<td>0.752***</td>
<td>(0.182)</td>
</tr>
</tbody>
</table>

***, **, * = significant at 1%, 5%, 10%.
### Modeling the Propensity to Modify Vehicle Ownership (2)

#### Multinomial Logit Model Estimation Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reduce VO</th>
<th>Maintain Current VO</th>
<th>Increase VO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young millennial (18-24) with less than one vehicle per household driver</td>
<td>base <strong>1.222</strong>* (0.379)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
<tr>
<td>Older millennial (25-34) in zero vehicle household</td>
<td>base <strong>3.602</strong>* (0.778)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
<tr>
<td>Older millennial (25-34) with less than one vehicle per household driver</td>
<td>base <strong>1.368</strong>* (0.219)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
<tr>
<td>Gen Xer (35-50) in zero vehicle household</td>
<td>base <strong>1.969</strong>* (0.520)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
<tr>
<td>Gen Xer (35-50) with less than one vehicle per household driver</td>
<td>base <strong>0.640</strong>* (0.219)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
<tr>
<td>Have more than one car per driver and plan to move to more urban area</td>
<td>base 0.439* (0.229)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
<tr>
<td>Gender: female</td>
<td>base <strong>-0.282</strong>* (0.151)</td>
<td><strong>-</strong></td>
<td><strong>-</strong></td>
</tr>
<tr>
<td>Young Gen Xer (35-44) with kid(s)</td>
<td>base <strong>0.752</strong>* (0.182)</td>
<td><strong>+++</strong></td>
<td><strong>+++</strong></td>
</tr>
</tbody>
</table>

***, **, * = significant at 1%, 5%, 10%.
### Modeling the Propensity to Modify Vehicle Ownership (3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reduce VO</th>
<th>Maintain Current VO</th>
<th>Increase VO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would like to use car less</td>
<td></td>
<td>base</td>
<td>-0.450**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.201)</td>
</tr>
<tr>
<td>Not satisfied with current travel</td>
<td></td>
<td>base</td>
<td>0.890*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.469)</td>
</tr>
<tr>
<td>Like biking</td>
<td>0.326*</td>
<td>base</td>
<td>0.234***</td>
</tr>
<tr>
<td></td>
<td>(0.174)</td>
<td></td>
<td>(0.076)</td>
</tr>
<tr>
<td>Materialism</td>
<td></td>
<td>base</td>
<td></td>
</tr>
<tr>
<td>Variety seeking (Young millennial, 18-24)</td>
<td>1.007***</td>
<td>base</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.388)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variety seeking (Older millennial, 25-34)</td>
<td></td>
<td>base</td>
<td>0.327**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.129)</td>
</tr>
<tr>
<td>Variety seeking (Older Gen Xer, 45-50)</td>
<td>0.737**</td>
<td>base</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.302)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Must own car (Older millennial, 25-34)</td>
<td></td>
<td>base</td>
<td>0.290**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.127)</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.817***</td>
<td>base</td>
<td>-1.566***</td>
</tr>
<tr>
<td></td>
<td>(0.429)</td>
<td></td>
<td>(0.140)</td>
</tr>
</tbody>
</table>
## Modeling the Propensity to Modify Vehicle Ownership (3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reduce VO</th>
<th>Maintain Current VO</th>
<th>Increase VO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would like to use car less</td>
<td>base</td>
<td>-0.450** (0.201)</td>
<td></td>
</tr>
<tr>
<td>Not satisfied with current travel</td>
<td>base</td>
<td>0.890* (0.469)</td>
<td></td>
</tr>
<tr>
<td>Like biking</td>
<td>base</td>
<td>0.326* (0.174)</td>
<td></td>
</tr>
<tr>
<td>Materialism</td>
<td>base</td>
<td>0.234*** (0.076)</td>
<td></td>
</tr>
<tr>
<td>Variety seeking (Young millennial, 18-24)</td>
<td>base</td>
<td>1.007*** (0.073)</td>
<td></td>
</tr>
<tr>
<td>Variety seeking (Older millennial, 25-34)</td>
<td>base</td>
<td>0.327** (0.129)</td>
<td>++</td>
</tr>
<tr>
<td>Variety seeking (Older Gen Xer, 45-50)</td>
<td>base</td>
<td>0.737** (0.302)</td>
<td>++</td>
</tr>
<tr>
<td>Must own car (Older millennial, 25-34)</td>
<td>base</td>
<td>0.290** (0.147)</td>
<td>++</td>
</tr>
<tr>
<td>Constant</td>
<td>base</td>
<td>-3.817*** (0.429)</td>
<td>-1.566*** (0.740)</td>
</tr>
</tbody>
</table>
Summary and closing thoughts

• Most millennials - and Gen Xers - have **access to cars**.
• Lower vehicle ownership among independent millennials, **but**...
• Millennials show higher propensity to purchase vehicles as they age and transition in their stage of life.
• Preliminary model of propensity to change VO: the zero-vehicle/low-vehicle ownership status might be short-lived...
• Most individuals in zero- or low-vehicle owning households plan to increase VO in the near future (with the **exception of young millennials in zero-vehicle households**).
• Impact of **stage in life** (age and **presence of children**) on propensity to change vehicle ownership.
• Several impacts of attitudinal traits:
  – Individuals who are **not satisfied with current amount of travel** → more likely to increase VO
  – Those who **want to travel less by car** → **less** likely to increase VO
  – More **materialistic** people → higher propensity to **increase** VO
  – **Like biking** → higher propensity to **decrease** VO
  – **Older millennials** that highly value “owning a car” → more likely to **increase** VO
  – Different effects of **variety seeking** for the various age groups: **young millennial and Gen Xer variety seekers** want to reduce their VO, middle group (**old millennials**) more attracted by increasing VO

• Interest in modeling **joint/conditional choices** of current vehicle ownership and **propensity to modify VO** (among several analyses being carried out with this dataset).
What Affects Millennials’ Mobility?
PART I: Investigating the Environmental Concerns, Lifestyles, Mobility-Related Attitudes and Adoption of Technology of Young Adults in California

May 2016
A Research Report from the National Center for Sustainable Transportation

Dr. Giovanni Circella, University of California, Davis
Dr. Lew Fulton, University of California, Davis
Farzad Alemi, University of California, Davis
Rosaria M. Berliner, University of California, Davis
Kate Tiedeman, University of California, Davis
Prof. Patricia L. Mokhtarian, Georgia Institute of Technology
Prof. Susan Handy, University of California, Davis

Project Report Available at: ncst.ucdavis.edu
What Affects Millennials’ Mobility?
PART II: The Impact of Residential Location, Individual Preferences and Lifestyles on Young Adults’ Travel Behavior in California

January 2017

A Research Report from the National Center for Sustainable Transportation – FINAL DRAFT

Dr. Giovanni Cirillo, University of California, Davis
Farzad Alemi, University of California, Davis
Kate Tiedeman, University of California, Davis
Rosaria M. Berliner, University of California, Davis
Yongsung Lee, Georgia Institute of Technology
Dr. Lew Fulton, University of California, Davis
Prof. Patricia L. Mokhtarian, Georgia Institute of Technology
Prof. Susan Handy, University of California, Davis

Soon available at:
ncst.ucdavis.edu
Thank you for your attention!

For more information, please contact:

Dr. Giovanni CIRCELLA
Institute of Transportation Studies, University of California, Davis

gcircella@ucdavis.edu