# The Mobility of the "Uber" Generation:
# Individual Attitudes, Lifestyles, Residential Location and Adoption of Shared Mobility of Millennials in California

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# Objective

*To explore:*

*The Role of Individual Lifestyles, Preferences, Stage in Life, Residential Location and Adoption of Technology on Millennials' Mobility Choices and Aspirations towards the Purchase and Use of Private Vehicles*

# 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)
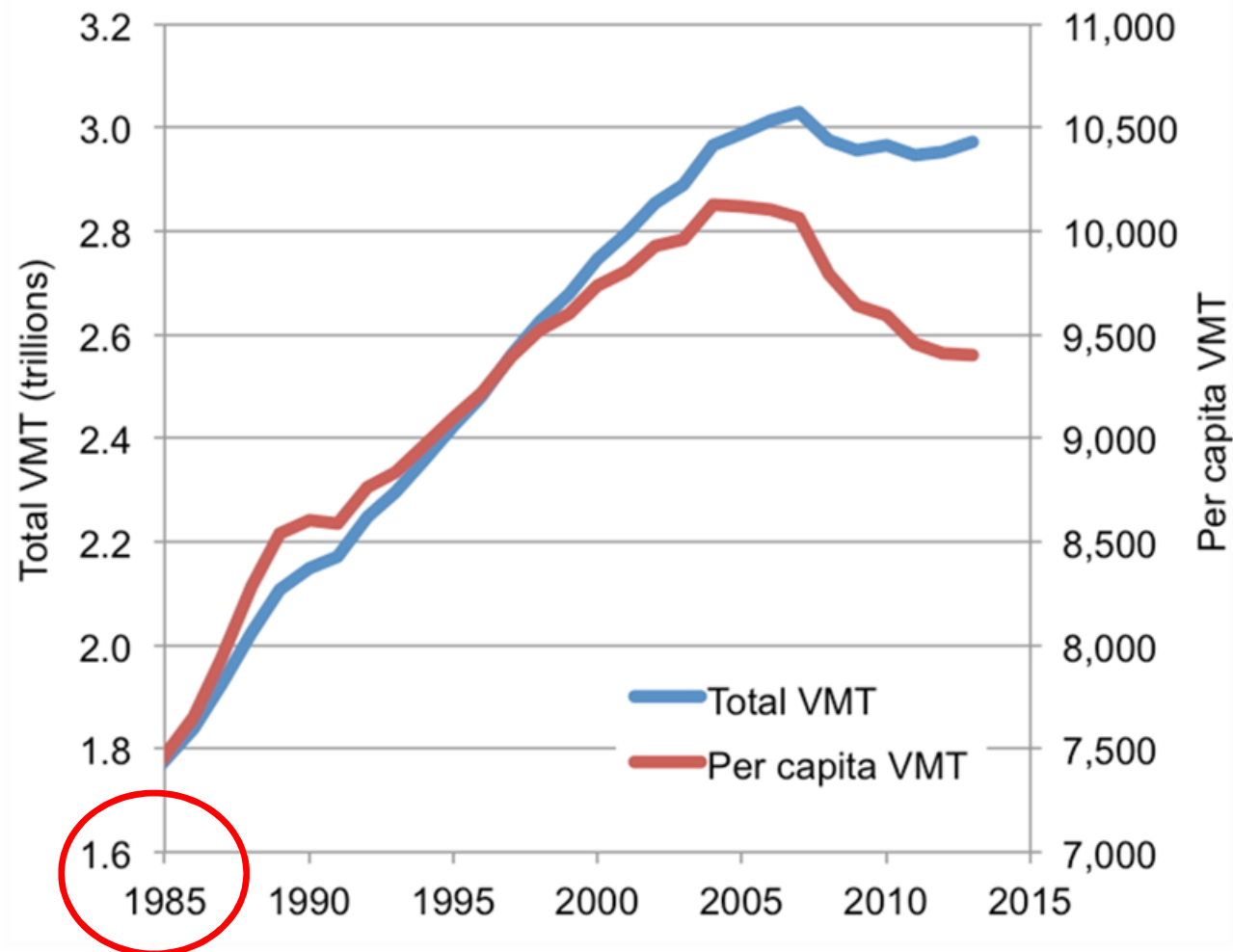


(2)

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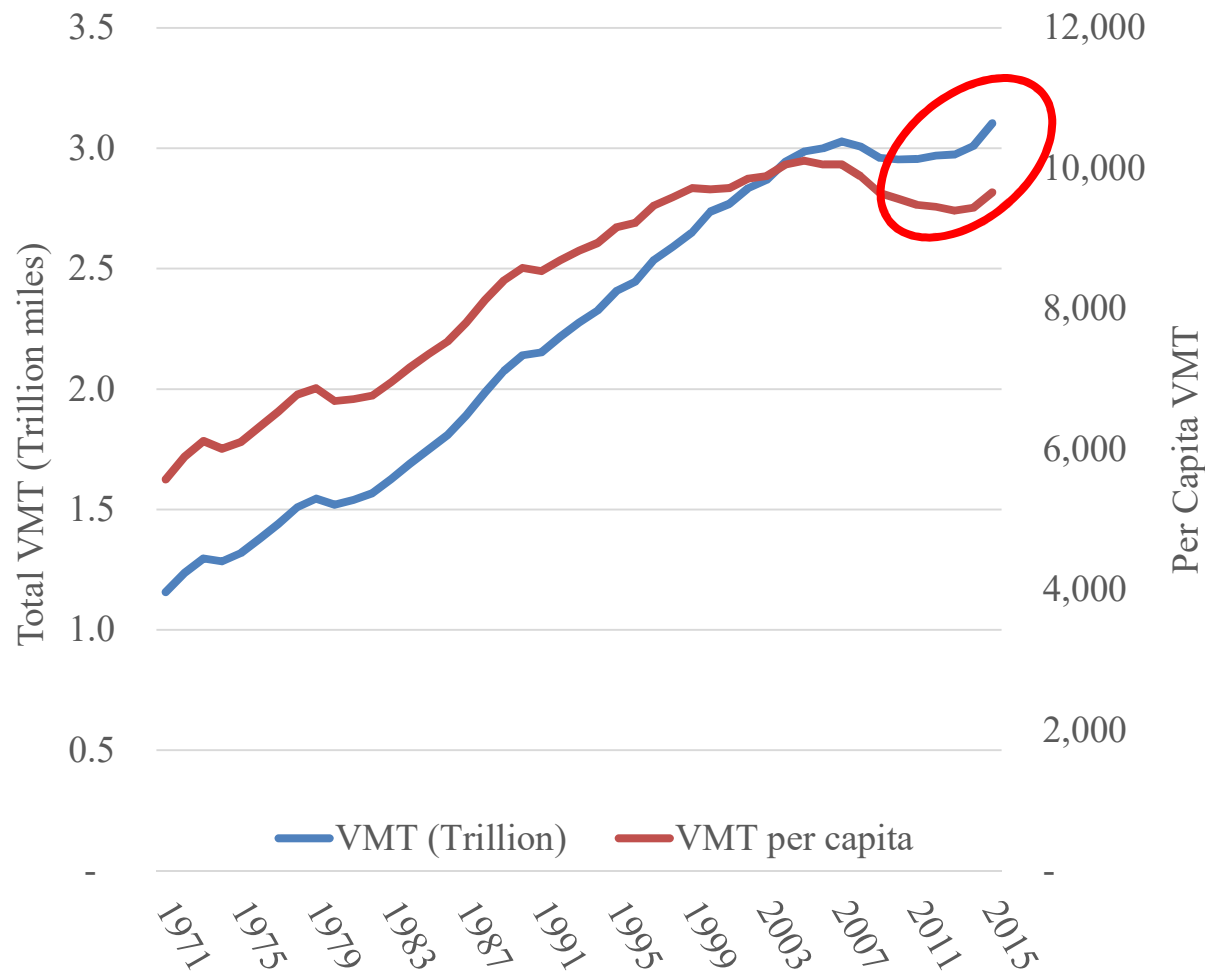*(2) Martinmark, Golden gate bridge, 2014, stockfreeimages.com*

# Recent Trends in Passenger Travel



*Source: Federal Highway Administration (FHWA)*

# Recent Trends in Passenger Travel



Source: created by the author using FHWA data
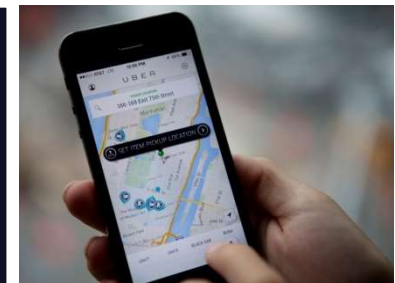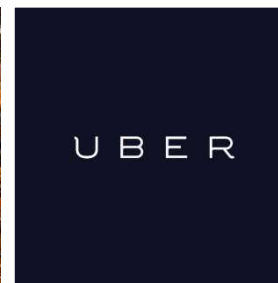
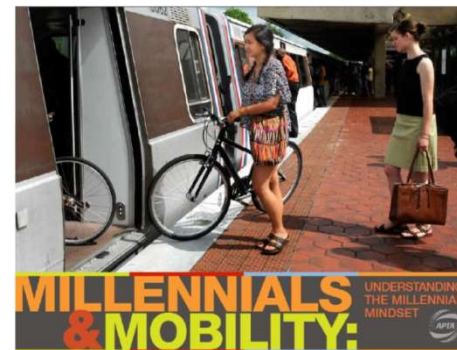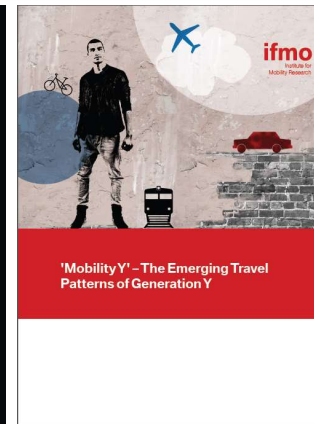5

# "Millennials" (or "Generation Y")

- Rapidly changing trends in:
  - Household size
  - Educational attainment
  - Economic influence / consumption

- Very *active segment* of the population

- Increasing economic power (and *still climbing the income ladder*)

- *"Diverse, Expressive and Optimistic"*
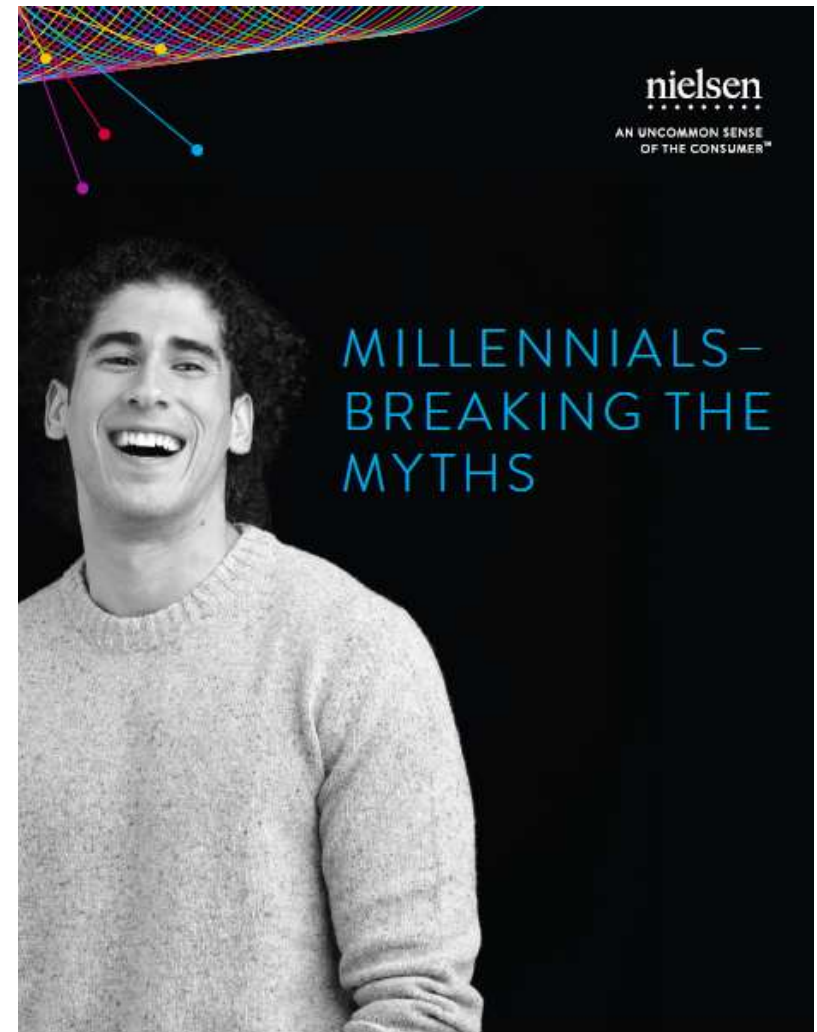
# "Millennials" (or "Generation Y")



- Millennials are often described as heavy adopters of *technology* and *social media*

- Less dependent on cars, and adaptable to the *sharing economy*

- *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

| Economic | Auto Costs | Technology | Demographic Change |
|---|---|---|---|
| • Recession<br>• Unemployment | • Gasoline<br>• Auto insurance<br>• Driver's education<br>• Auto repairs<br>• Other fees | • Communication technology<br>• Transportation technology (Über) | • Delayed marriage<br>• Fewer children<br>• Boomerang |
| **Residential Location**<br><br>• More likely to move to and live in cities | **Cultural**<br><br>• Environmentalists<br>• Less materialistic | **Regulatory Changes**<br><br>• Graduated Driver's Licensing<br>• Texting while driving laws | **Alternative Modes**<br><br>• Better transit<br>• Improved infrastructure for walking/biking |

*(Source: Blumenberg, 2014)*

# 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 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)

- Quota sampling by geographic region and neighborhood type

- Focus on personal attitudes, lifestyles, living arrangements, and adoption of technology, among other factors controlled in the study



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# California Millennial Study

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- 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. *Emerging Transp. 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*

# Individual Attitudes and Preferences

## 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**

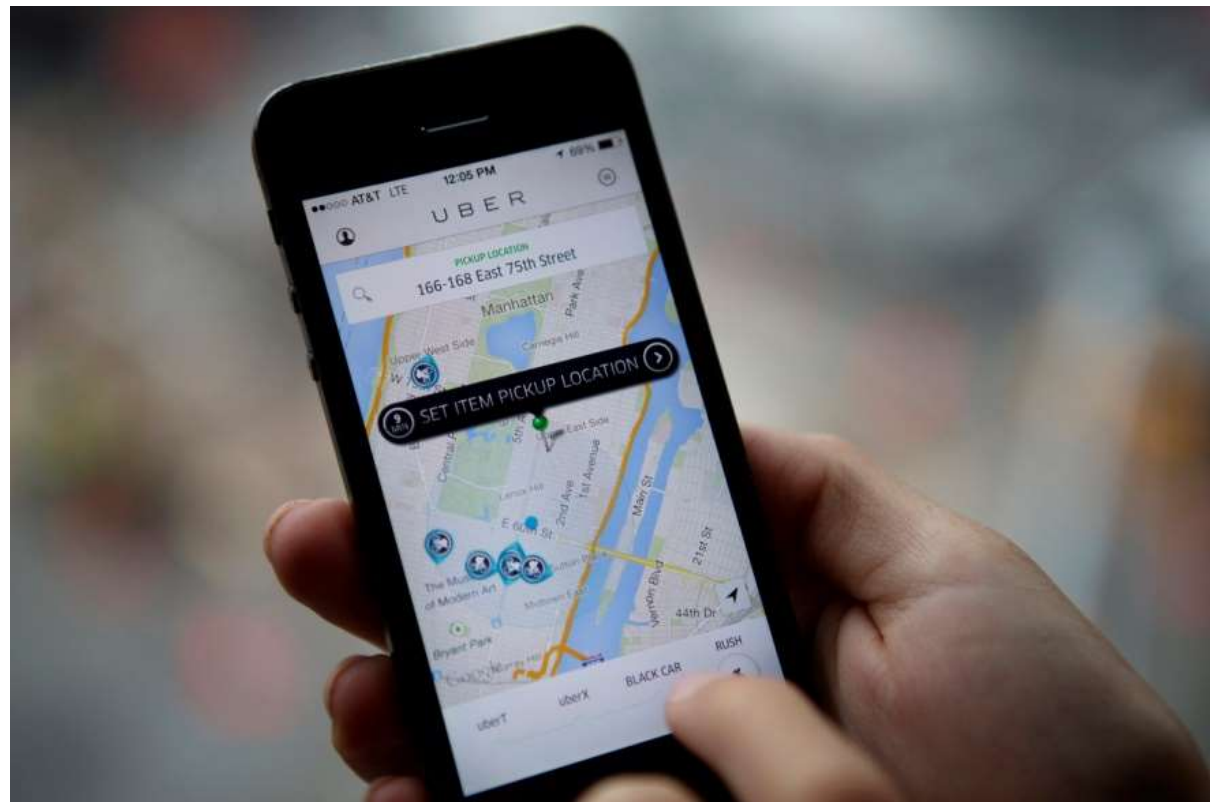|  | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I prefer to live close to transit, even if it means I'll have a smaller home and live in a more crowded area. | ○ | ○ | ○ | ○ | ○ |
| Getting regular exercise is very important to me. | ○ | ○ | ○ | ○ | ○ |
| I like sticking to a routine. | ○ | ○ | ○ | ○ | ○ |
| I prefer to live in a spacious home, even if it is farther from public transportation and most destinations. | ○ | ○ | ○ | ○ | ○ |
| Individuals should generally put the needs of the group ahead of their own. | ○ | ○ | ○ | ○ | ○ |
| Doing two or more activities at the same time is the most efficient way to use my time. | ○ | ○ | ○ | ○ | ○ |
| 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. | ○ | ○ | ○ | ○ | ○ |
| The importance of exercise is overrated | ○ | ○ | ○ | ○ | ○ |

# 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

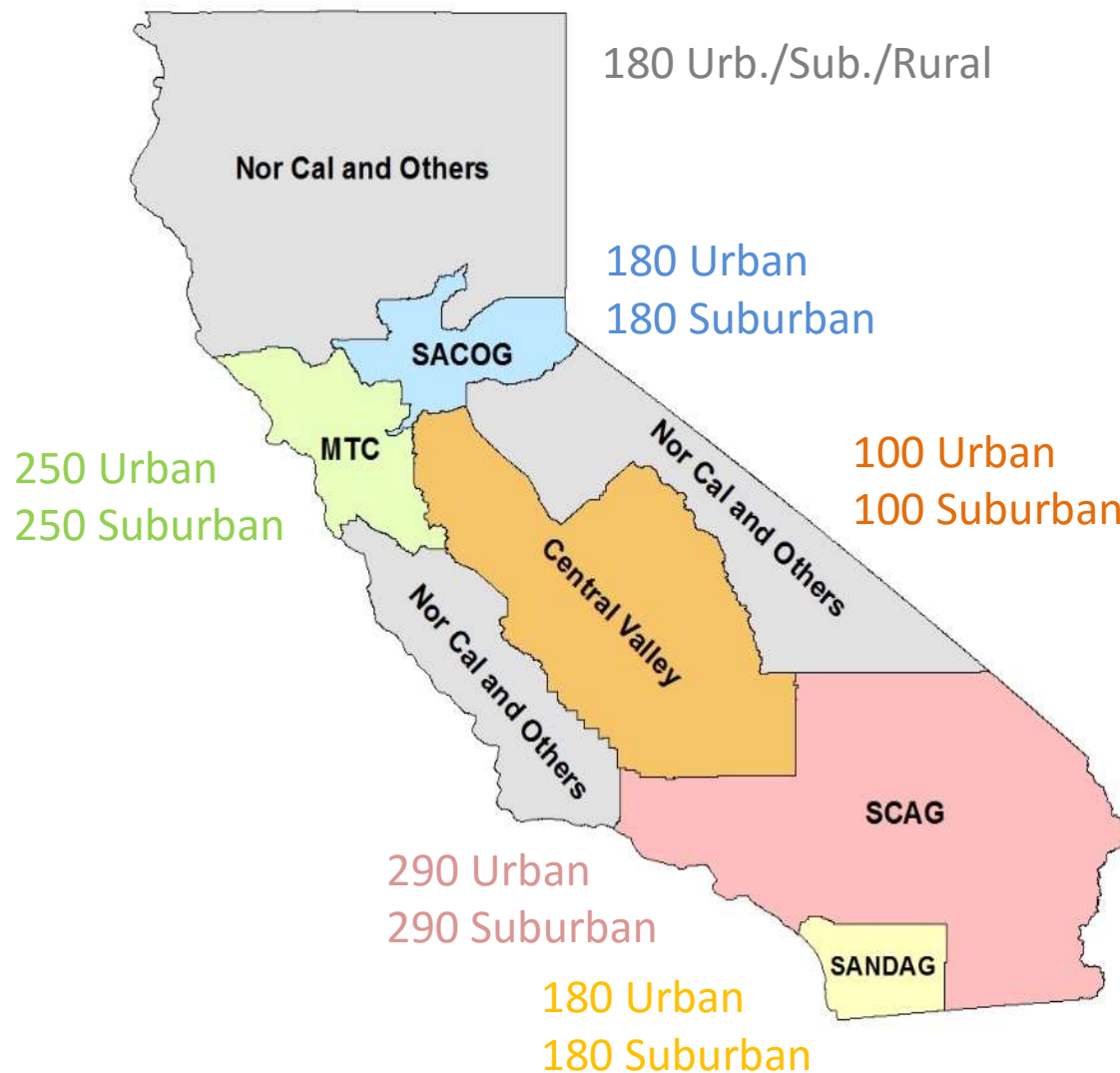- Extend range of public transportation

# Car Ownership vs. Shared Mobility

# California Millennial Dataset



180 Urb./Sub./Rural

Nor Cal and Others

180 Urban
180 Suburban

SACOG

250 Urban
250 Suburban

MTC

100 Urban
100 Suburban

Nor Cal and Others

Central Valley

Nor Cal and Others

290 Urban
290 Suburban

SCAG

180 Urban
180 Suburban

SANDAG

*+270 Rural (All California)*

Control for demographic targets:
- *Age*
- *Gender*
- *Income*
- *Race and Ethnicity*
- *Presence of Children (Y/N)*

*Data collection in Fall 2015*

*Target of:*
*1400 Millennials*
*1000 "Gen Xers"*

*N = 2400 Total sample size*

Legend

NHtype3
- Rural (green)
- Suburb (yellow)
- Urban (red)

All cases were geocoded based on residential location

Weighting/raking (IPF) approach to represent California's population by:
1. Region by NH Type by Age (W)
2. Employment by Student Status
3. Gender
4. Presence of Children
5. Household Income

# Classification Based on Land Use

Build on previous experience from other research projects (based on factor and cluster analysis) in California

Average characteristics of 2010 census tracts by neighborhood type

Population density (1000's)
Pct transit
Pct walk/bike
Pct single family homes
Pct homes <10 years old
Pct homes >60 years old
Median home value
Road density (miles per sq mile)
Regional job access
Local job access
Activity mix
# Restaurants in 10 min walk
Number of 2010 census tracts for which data are available



Neighborhood Types
- Central City
- Urban
- Suburb
- Rural-In-Urban
- Rural
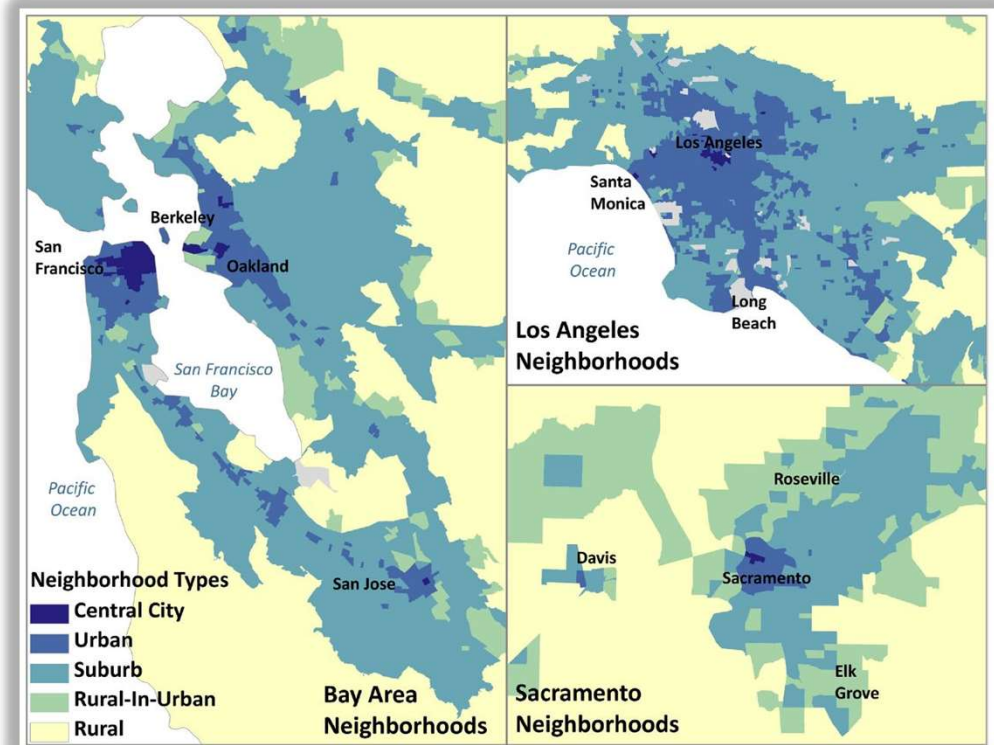
*Source:* Salon, D. (2015). Heterogeneity in the relationship between the built environment and driving: Focus on neighborhood type and travel purpose.*Research in Transportation Economics*, *52*, 34-45.

# Data Sources of Land Use Variables

| Data Source | Latest release | Smallest Geography | Variables Available | Sample Land use Measurements |
|---|---|---|---|---|
| **US Census ACS** (American Community Survey) | • 5 year estimate 2009-2013 | • Census Block Group | • Population and household count<br>• Housing unit count (SFH or MFH, year structure built, etc.)<br>• Commute mode share | • Population & household Density<br>• Housing density, % of SFH, % of housing units built in pre WWII<br>• % transit commuters |
| **US Census LEHD** (Longitudinal Employer household dynamic) | • 2013 | • Census Block | • Employment count by industry | • Land use mix & Job to housing ratio<br>• Job accessibility & Population-serving job (retail/service) accessibility |
| **US Census TIGER road shapefile** | • 2015 | | • Street network<br>• Block size (Area) | • Street and intersection density<br>• Average block size and length of boundary |
| **US EPA SLD** (Smart Location Database) | • 2013 (DB year: 2010-2013) | • Census Block Group | • A rich set of pre-calculated land use measures for density, diversity, design, transit, and destination accessibility | |
| **Google API** | | | • Transit routes and schedules by time of the day (GTFS) | • Accessibility by transit in peak/non-peak hours |

**Other land use data sources: MapQuest API, WalkScore API, Yellow Page API, Uber API...**

# Sample Characteristics (N=2422)
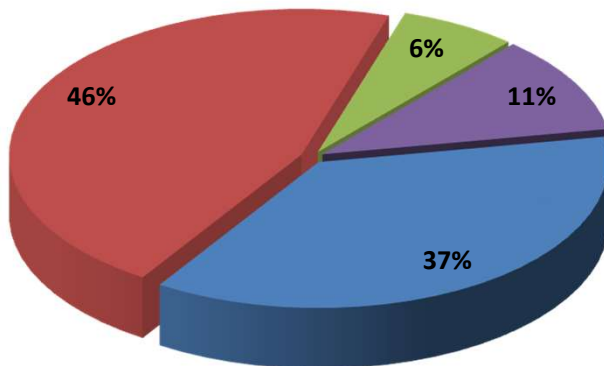
**Millennials**
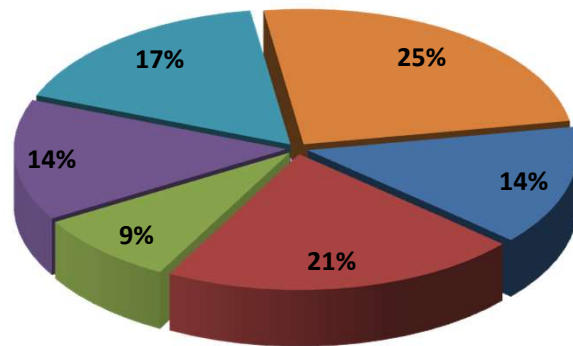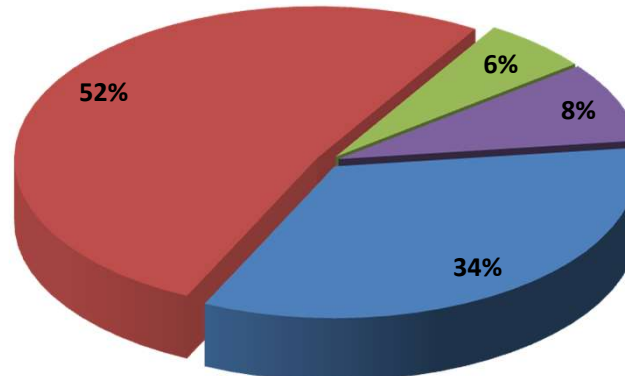


**Generation X**
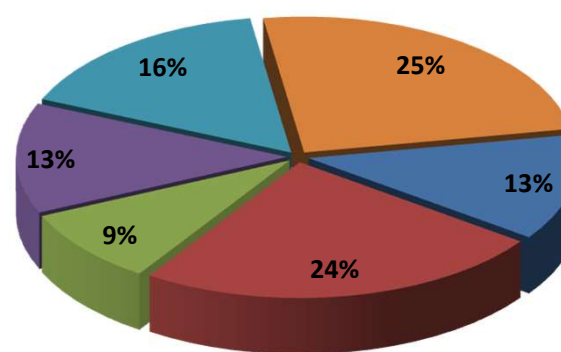


- Central Valley
- MTC
- NorCal and Others
- SACOG
- SANDAG
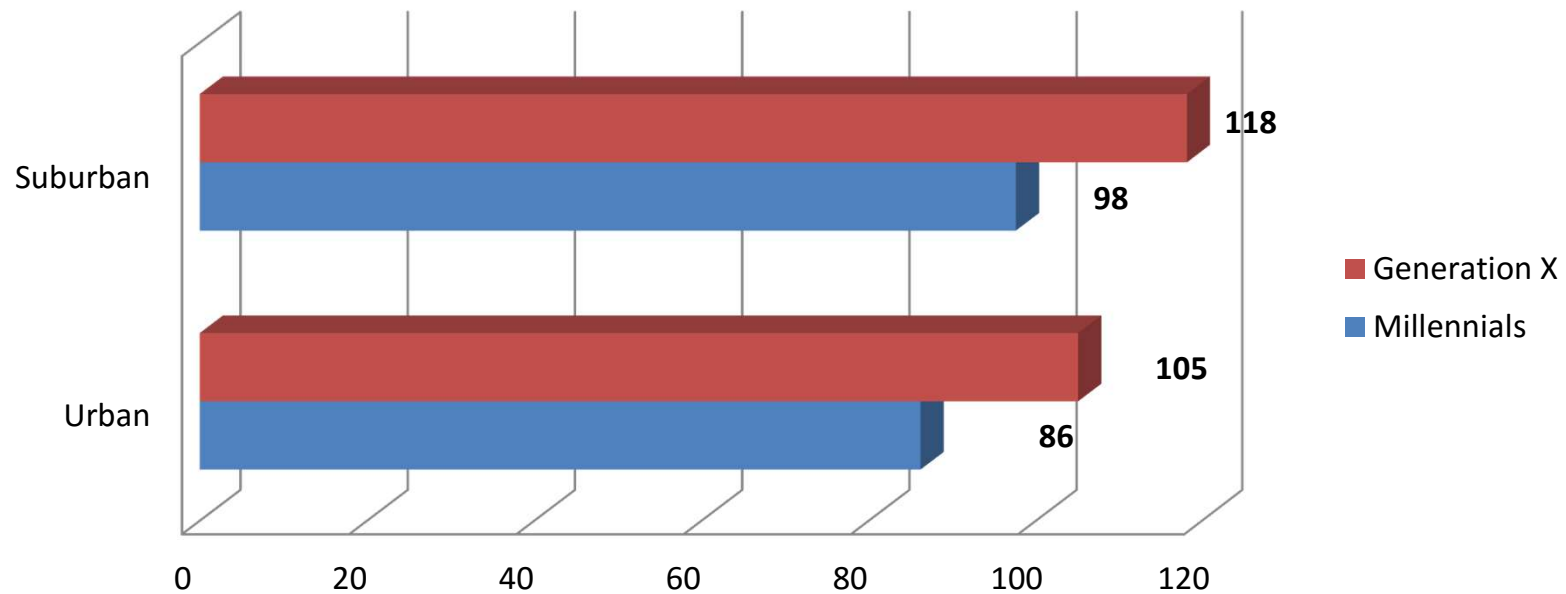- SCAG

**Millennials**



**Generation X**



- Urban
- Suburban
- Rural
- Small town

# Vehicle Miles Traveled

**Average Weekly VMT by Neighborhood Type**



*N=2422, unweighted sample*

# 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)"**
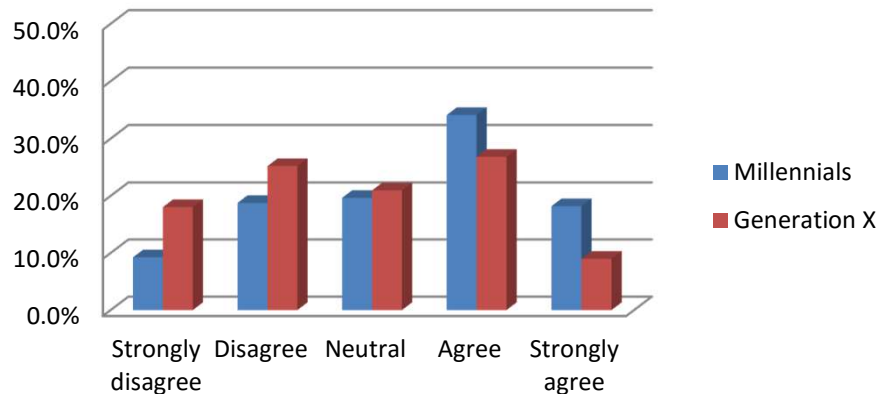


**"I prefer to live close to transit even if it means I'll have a smaller home and live in a more crowded area"**



**"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"**
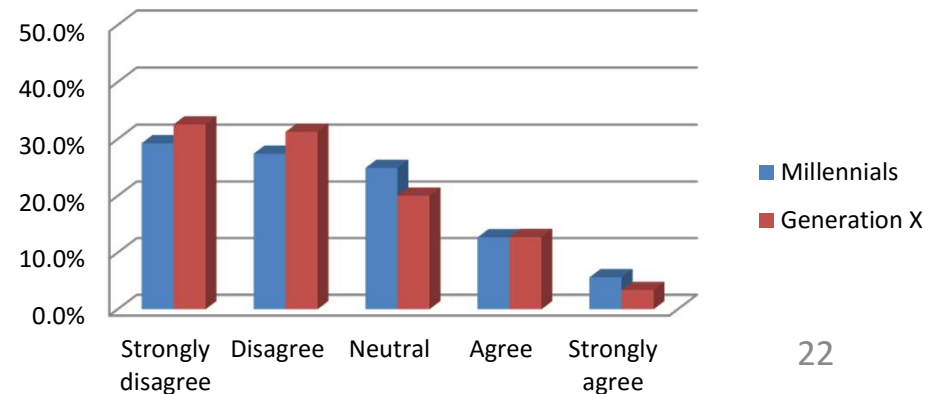
# Tech-Savvy, Smartphone-Oriented



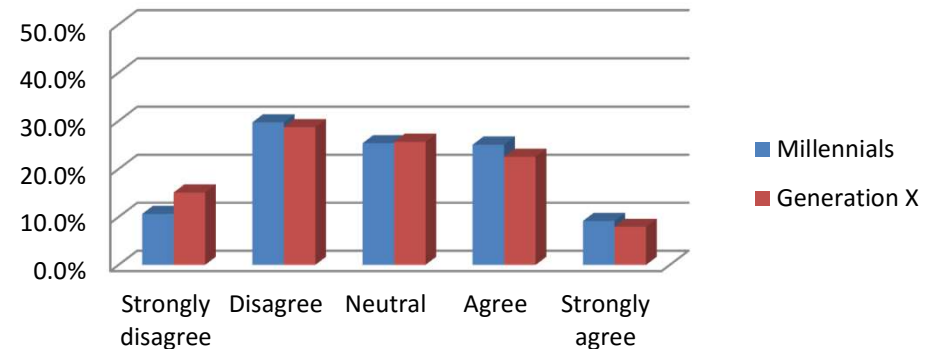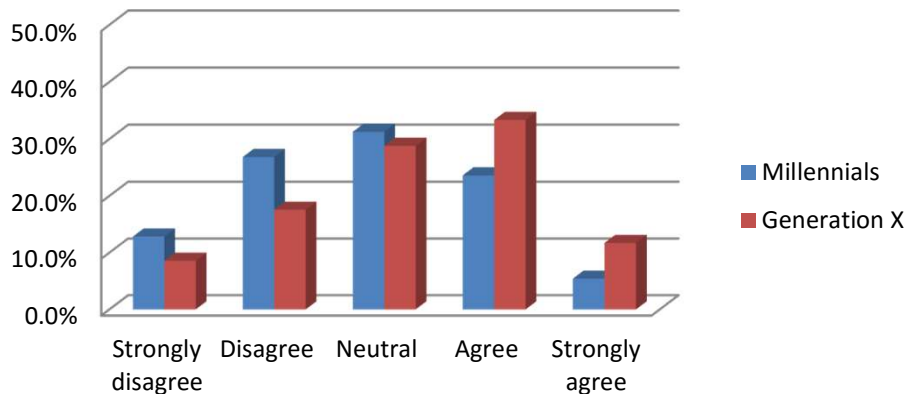*"I avoid doing things that I know my friends would not approve"*
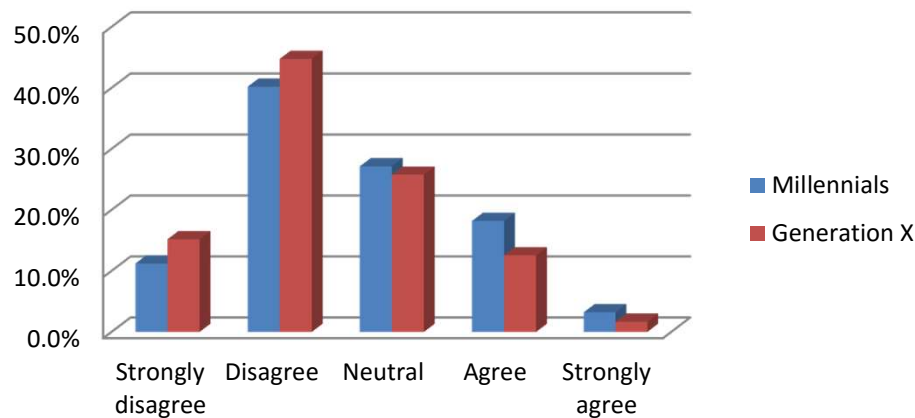
*"Use smartphone to decide which means of transportation, or combinations of multiple means, to use for a trip "*
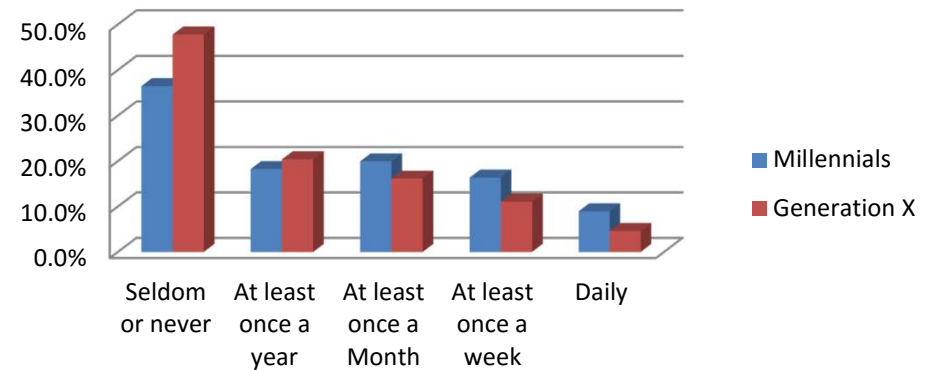
*"Having Wi-Fi and/or 3G/4G connectivity everywhere I go is essential to me"*
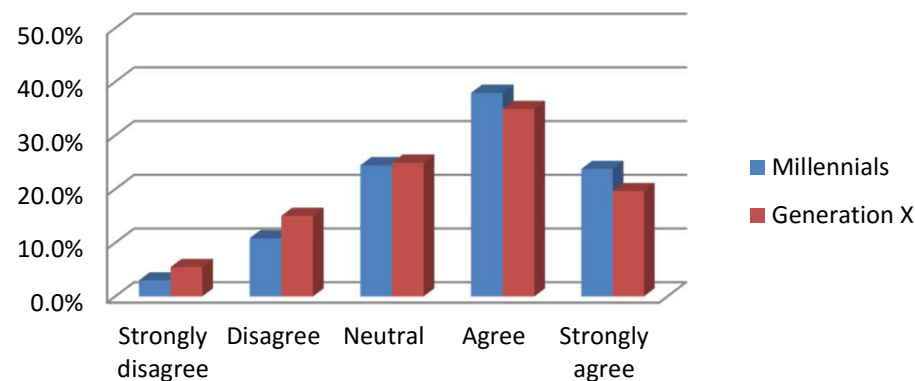
*"Use smartphone to identify possible destinations (e.g. restaurant, caf&eacute, etc.) "*

23
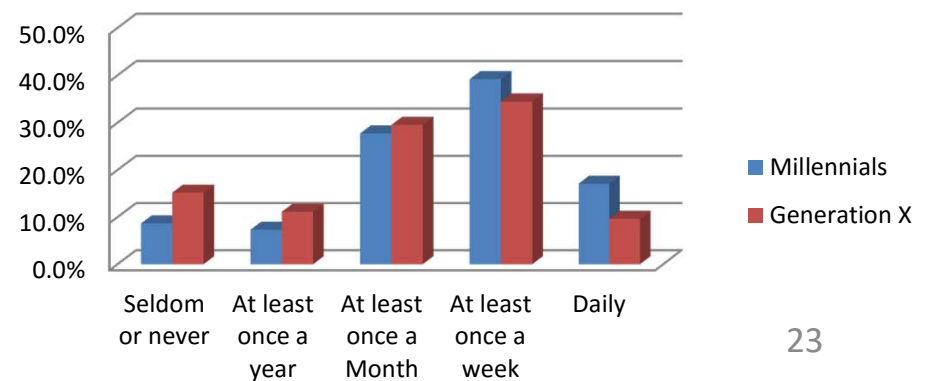
# Smartphone and ICT



Smartphone and ICT considered critical when out of home (all cases)
**BLUE: YES**
**RED: NO**
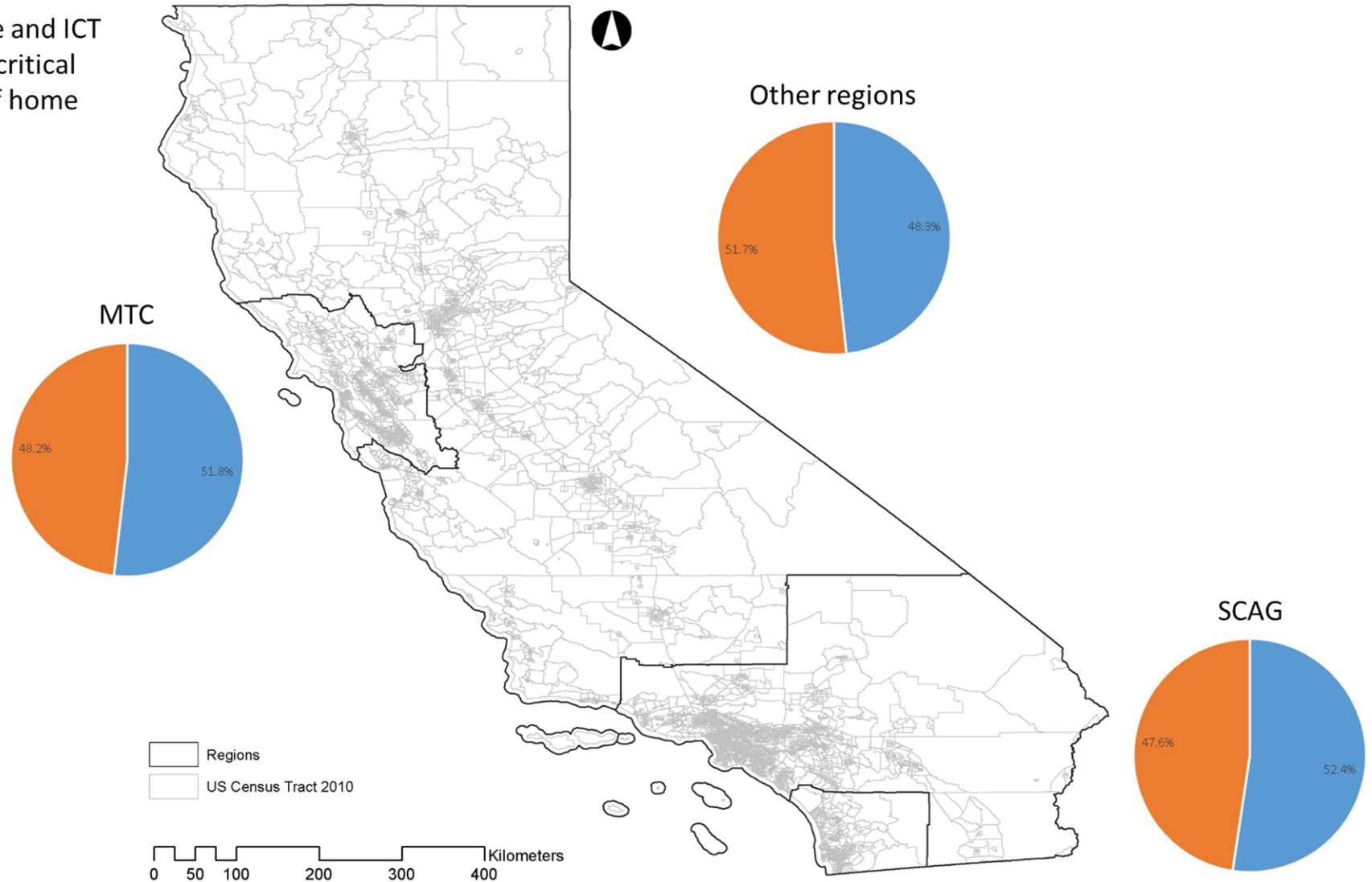
# Smartphone and ICT



Smartphone and ICT considered critical when out of home (Gen Y & Gen X)
BLUE: YES
RED: NO
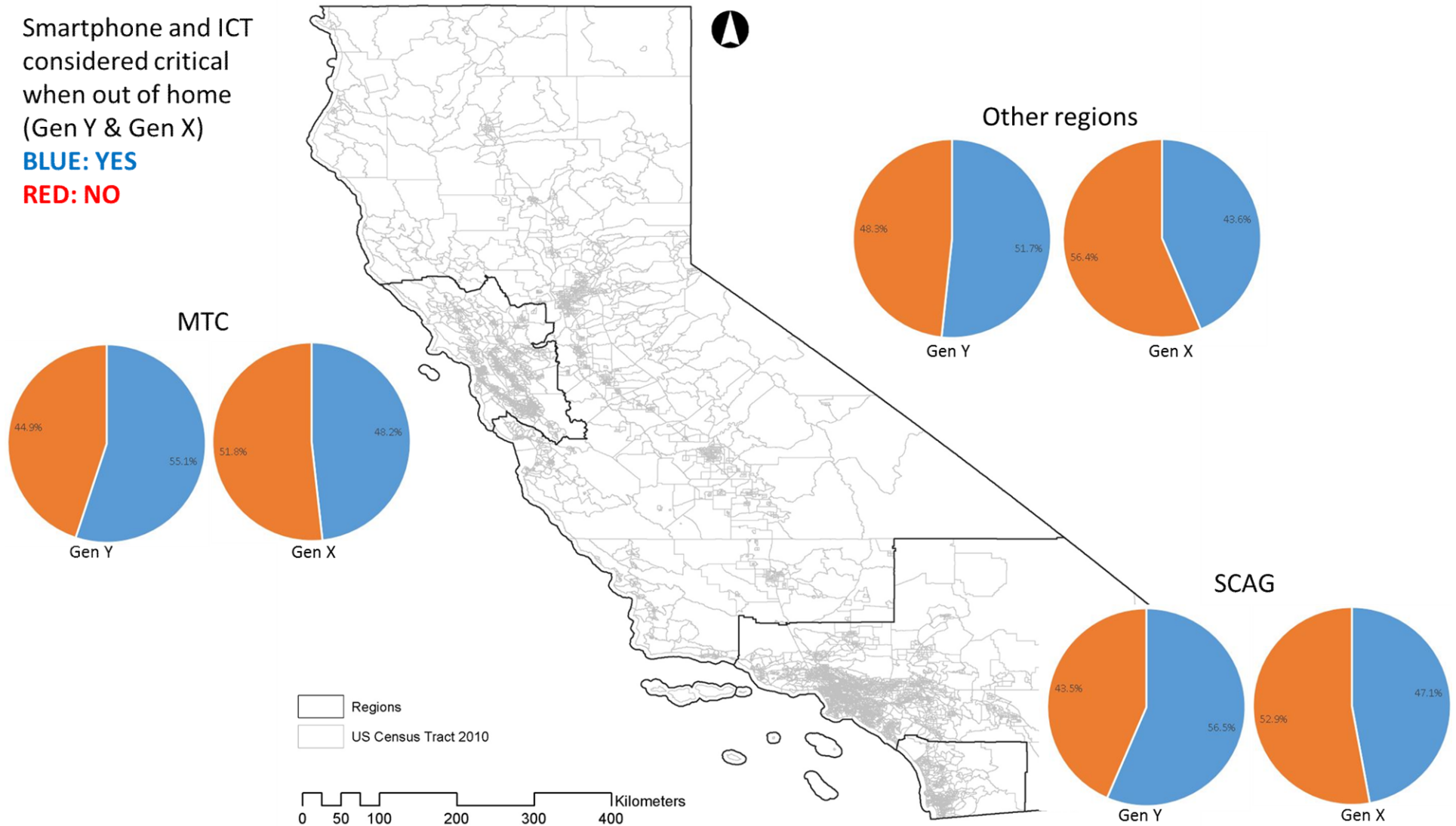
# Smartphone and ICT

Smartphone and ICT considered critical when out of home (Gen Y & Gen X)
**BLUE: YES**
**RED: NO**

# Most Recent Commute - Mode Choice



**Millennials**

- Public Transit 9.3%
- Uber/Lyft (on-demand ride services) 0.6%
- Bike or e-bike 2.9%
- Walk or Skateboard 6.0%
- Other 2.0%
- Work-/School-provided shuttle 1.0%
- Motorcycle or motor-scooter 0.4%
- Carpool 9.2%
- Drive alone 68.8%

**Generation X**

- Public Transit 8.4%
- Uber/Lyft (on-demand ride services) 0.4%
- Bike or e-bike 1.5%
- Walk or Skateboard 4.7%
- Other 2.8%
- Work-/School-provided shuttle 0.1%
- Motorcycle or motor-scooter 0.4%
- Carpool 7.2%
- Drive alone 74.5%
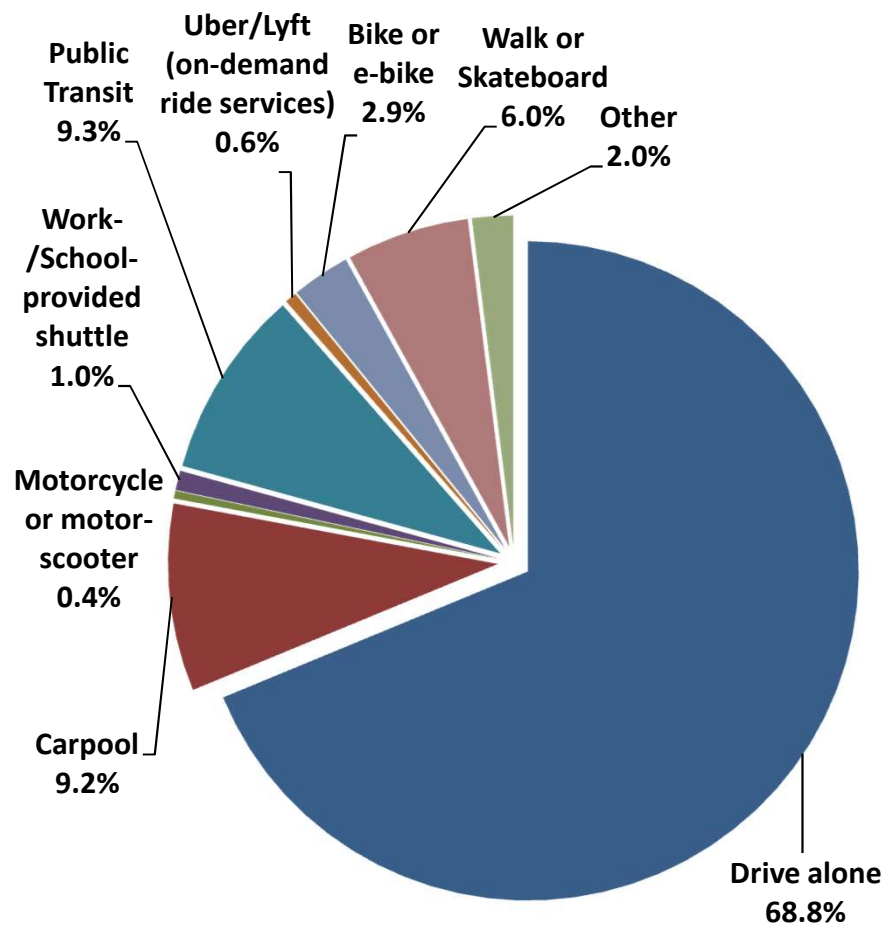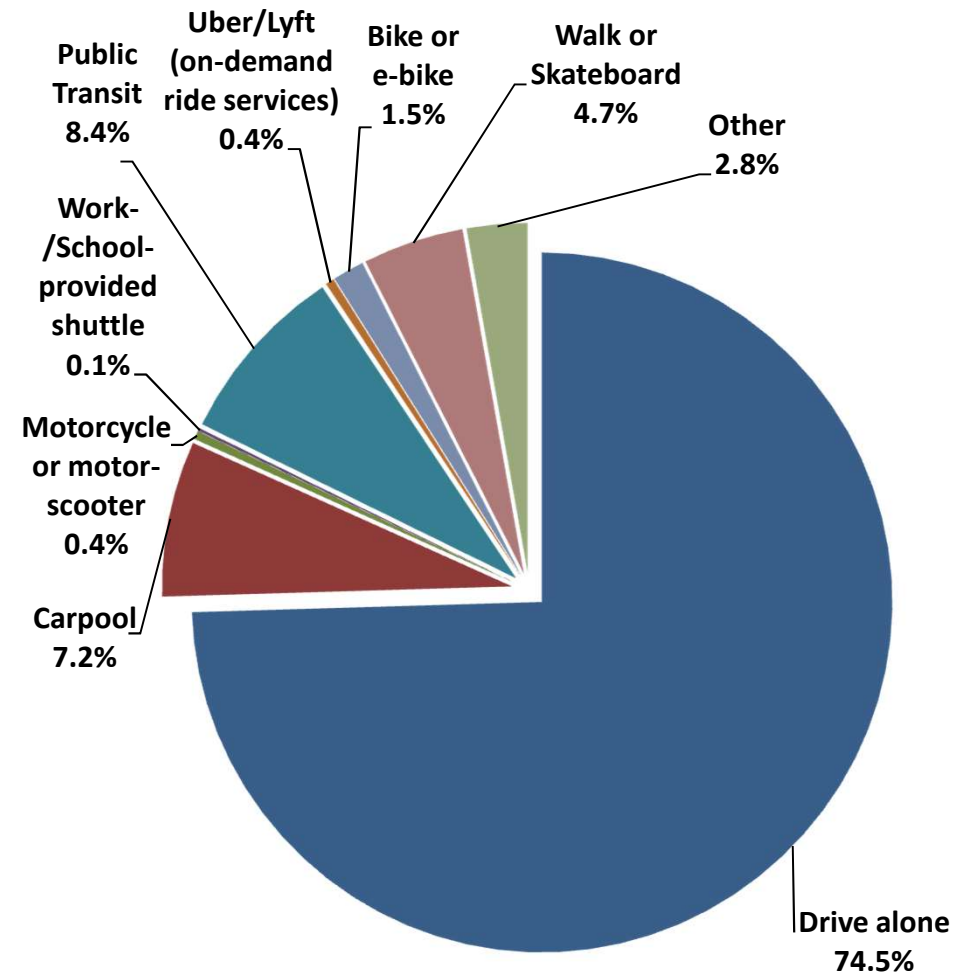
*N=1797, unweighted sample*

# Multitasking while Traveling

**Millennials**



100% | 80% | 60% | 40% | 20% | 0%

| | Central Valley | MTC | NorCal and Others | SACOG | SANDAG | SCAG |
|---|---|---|---|---|---|---|
| Multi-tasked | 55.5% | 73.8% | 63.5% | 65.1% | 66.9% | 63.4% |
| Did not do anything | 44.5% | 26.2% | 36.5% | 34.9% | 33.1% | 36.6% |

■ **Multi-tasked while commuting** ■ **Did not do anything while commuting**

**Generation X**



100% | 80% | 60% | 40% | 20% | 0%

| | Central Valley | MTC | NorCal and Others | SACOG | SANDAG | SCAG |
|---|---|---|---|---|---|---|
| Multi-tasked | 50.6% | 58.4% | 46.6% | 55.1% | 55.5% | 50.0% |
| Did not do anything | 49.4% | 41.6% | 53.4% | 44.9% | 44.5% | 50.0% |

■ **Multi-tasked while commuting** ■ **Did not do anything while commuting** *N=1797, unweighted sample*

# Shared Mobility Services

| Type of Services | | Ownership and Operational Models |
|---|---|---|
| Carsharing | CAR2GO · zipcar · TURO | • Fleet-based or peer-to-peer<br>• Round trip or one way |
| Bikesharing | BAY AREA BikeShare · Spinlister The global bike share · citi bike | • Fleet-based or peer-to-peer<br>• Dock-based or GPS-based |
| Dynamic Ridesharing | scoop | • Private-public partnership<br>• Carpooling, vanpooling, and dynamic ridesharing |
| On-demand Ride Services | Uber · lyft | • Private (may be subsidized by public in future)<br>• Uber X and Lyft; Uber pool and LyftLine |

# Use of Car-Sharing



Legend

Region3
- Other CA
- SCAG
- SF MTC

Yes 17%
No 83%

Yes 5%
No 95%

Yes 10%
No 90%

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

## *Use of Uber/Lyft*



Yes 32%
No 68%

Yes 21%
No 79%

Yes 31%
No 69%

Legend
Region3
Other CA
SCAG
SF MTC

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

# A Uber-Friendly Generation?

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



Legend: Millennials, Generation X

Categories: 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/city AND when traveling away from home
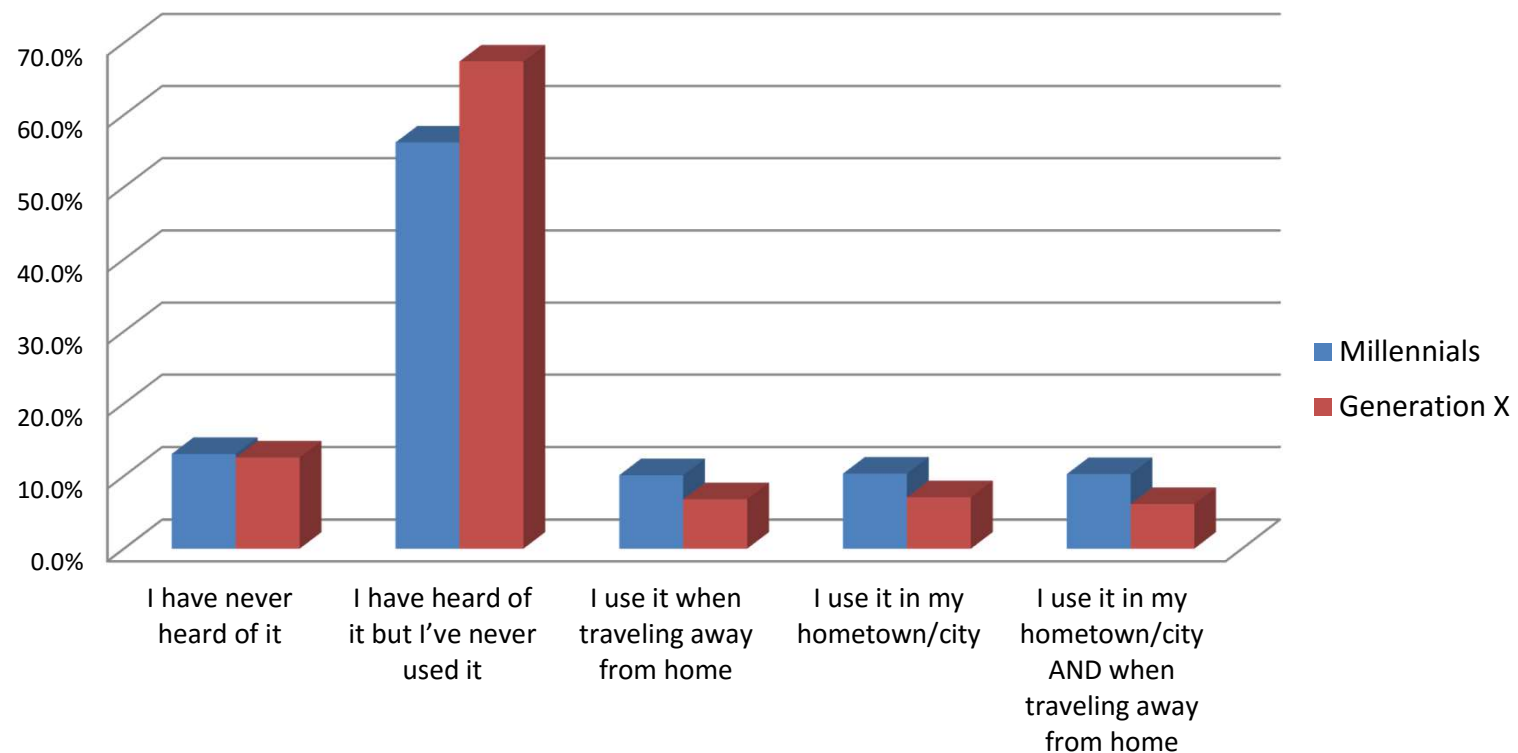
*N=2422, unweighted sample*

# Impact of Last Uber Trip on the Use of Other Means of Travel

**Millennials**

- It reduced the amount of driving I did
- It reduced my use of public transportation
- It increased the amount of walking/biking I did
- It increased my use of public transportation by providing a better way to access public transportation
- It increased my use of public transportation by providing a ride outside public transportation schedule
- It reduced the amount of walking/biking I did
- Other

**Generation X**

- It reduced the amount of driving I did
- It reduced my use of public transportation
- It increased the amount of walking/biking I did
- It increased my use of public transportation by providing a better way to access public transportation
- It increased my use of public transportation by providing a ride outside public transportation schedule
- It reduced the amount of walking/biking I did
- Other

Legend:
- Urban
- Suburban
- Rural
- Small Town

*N=1103, unweighted sample*

# Preliminary Findings, and Next Steps

- Consistent with expectations, millennials are found to:
  - Drive less
  - Use ICT devices more often
  - Multitask during their commute
  - Have different personal attitudes (e.g. about the environment, technology…)
  - Adopt share mobility services more often

- How do their behaviors relate to…
  - Stage in life
  - Personal attitudes, lifestyles and living arrangements
  - Adoption of technology and mobility choices

- Relevance for planning implications, for example:
  - Will these trends continue in future years, or are mainly part of *lifecycle* effects?
  - What is the role of emerging technologies/shared mobility services?
  - How are behavioral patterns affected by geographic location?

# Research Question 1

What are the relationships among travel behavior, personal preferences, adoption of technology and residential location of millennials?

Estimation of frequency models for the use of various means of travel, segmented respectively for millennials and Gen Xers.

- What are the main factors affecting the adoption of modes alternative to cars?
- What is the impact of the adoption of *on-demand ride services* (Uber/Lyft) on the use of other modes?
- What is the impact of living arrangements vs. personal preferences?

How do *level of education, income* and *geographic location* relate to millennials' choices?

# Research Question 2

Are the dominant trends of millennials' travel permanent or temporary (e.g. effect of a transition in life stages)?

Estimation of a VMT model, which controls for sociodemographics, personal attitudes, lifestyles, and geographic location.

- What is the impact of stage of life (e.g. being married, presence of children) on the travel behavior of millennials?
- What is the impact of personal attitudes and preferences?
- How does the place where somebody grew up affect travel behavior?
- What is the impact of major life events (new job, relocation to city, moving out of parents' place, moving in with partner, etc.)?

Not possible to fully analyze these issues using NHTS, or other currently available travel survey data.

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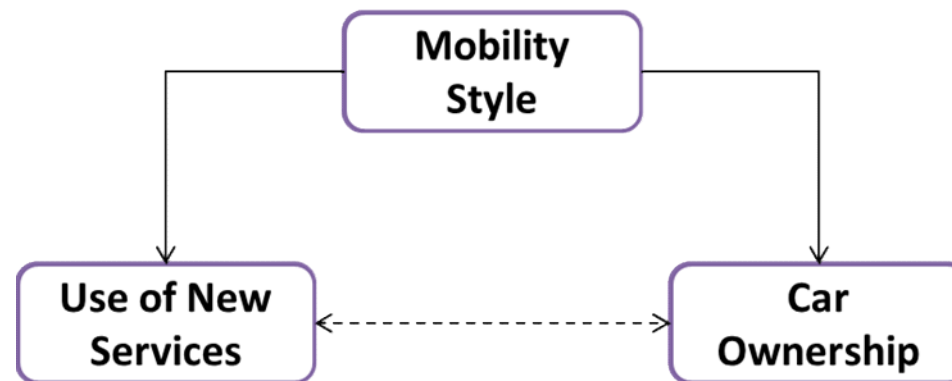


Jointly model the adoption of shared mobility and vehicle ownership (or self-reported desired level of vehicle ownership), while controlling for the impacts of attitudes, commute and non-commute patterns, adoption of technology and social media, residential self-selection, household, individual and built environment characteristics.

Estimation of *bivariate ordered Probit*, *recursive Probit*, or *latent-class structural equation models*.

# Research Question 4

How many millennials match the stereotype of *urbanite/socialite* common in the media?

Cluster or latent class analysis to analyze different profiles of people (socialite/urbanite vs. others)

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?

# Acknowledgements

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# Thank you for your attention!

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