Lifestyles, Residential Location, Adoption of Emerging Technologies of Social Networks, Car Ownership and Mobility Choices of Millennials

November 2015

Giovanni Circella  
Lewis Fulton  
Aria Berliner  
Farzad Alemi  
Patricia L. Mokhtarian  
Susan L. Handy
Lifestyles, Residential Location, Adoption of Emerging Technologies and Social Networks, Car Ownership and Mobility Choices of Millennials

Giovanni Circella*, Lew Fulton, Aria Berliner, Farzad Alemi, Patricia Mokhtarian, Susan Handy

Institute of Transportation Studies
University of California, Davis

*gcircella@ucdavis.edu
Mobility of Millennials in California

Interest in better understanding the relationships among residential location, lifestyles, adoption of technology, the use of social networks, and mobility-related choices of young adults, and in particular:

- The relationships among millennials’ attitudes/lifestyles and actual behaviors (do they behave differently from other generations?)

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

- Impact of *classical* (economic and non-economic) variables vs. *specific factors affecting the choices of millennials* (e.g. personal attitudes, adoption of technology, peers’ influence, 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” (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 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

<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</td>
<td>Fewer children</td>
</tr>
<tr>
<td></td>
<td>Driver’s education</td>
<td>(Über)</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 improved</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>infrastructure for</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>walking/biking</td>
</tr>
</tbody>
</table>

*(Polzin et al., 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
Statewide study in California

Design of a detailed survey to collect information from millennials

Survey distributed through multiple channels, including an opinion panel to build a sample representative of California’s population

Sample includes Millennials and Generation X
Survey Content

Focus on:
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

<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 overstated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Living Arrangements

Who lives with you?
PLEASE SELECT ALL THAT APPLY:

- Partner/husband/wife
- Child(ren) or grandchild(ren)
- Parent(s) or grandparent(s)
- One or more siblings
- Some other relative(s)
- One or more roommates/housemates
- I live alone
- Other (please specify): _

Information is collected about residential location and living arrangements...
Social Networks and Adoption of Technology

On average, *how often* do you use each of the following?

<table>
<thead>
<tr>
<th></th>
<th>I have never heard of it</th>
<th>I have heard of it but never use it</th>
<th>I use it <strong>less than once a month</strong></th>
<th>I use it at least <strong>once a month</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twitter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instagram</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Google+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LinkedIn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reddit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- I have never heard of it
- I have heard of it but never use it
- I use it **less than once a month**
  - ...at least **once a month**
  - ...at least **once a week**
  - ...**every day**
  - ...**multiple times per day**
Impact of Emerging Technologies

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

We are interested in your familiarity with and usage of the following transportation programs. Please check the single most appropriate answer for each program below:

<table>
<thead>
<tr>
<th>Program</th>
<th>I have never heard of it</th>
<th>I have heard of it but I’ve never used it</th>
<th>I use it when traveling away from home</th>
<th>I use it in my hometown/city</th>
<th>I use it in my hometown/city AND when traveling away from home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carsharing (e.g. Zipcar, City CarShare)</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>Peer-to-peer carsharing (e.g. Relay Rides, FlightCar)</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>Ridesharing (e.g. Uber, Lyft)</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>Bikesharing (e.g. Bay Area bike share)</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
</tbody>
</table>
## Major life events

### In the last three years…

<table>
<thead>
<tr>
<th>Event</th>
<th>Yes, this happened in the last three years</th>
<th>NO, this has not happened during the last three years</th>
</tr>
</thead>
<tbody>
<tr>
<td>I moved to the city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I moved to the suburbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I moved to another city, state, or country</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I bought a home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I sold my home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I started to study, or moved to a new school/university (e.g. undergraduate/graduate program)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I completed my studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I started a new job/I changed my job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I lost my job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I left/retired from my previous job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entered into a serious romantic relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I got married</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I got separated/divorced/widowed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I had/adopted (a) child(ren)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I moved out of my family’s (e.g. parents’) or friends’ place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I moved in with some family members (e.g. parents, siblings) or friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I moved in with my partner/significant other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some members of my household moved out (e.g. “children left the nest”, a relative passed away, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some members of my household moved in with me (e.g. children or other relatives moved in with me, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Travel Behavior ($t_0$)
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Time $t_0$
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Travel Behavior \( (t_0) \)
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Constraints and Limitations
- Personal Limitations
- Access/Availability of modes

Time \( t_0 \)
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Residential Location
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Constraints and Limitations
- Personal Limitations
- Access/Availability of modes

Travel Behavior \( (t_0) \)

Time \( t_0 \)
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Residential Location
+ LU Characteristics*

Travel Behavior ($t_0$)
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Constraints and Limitations
- Personal Limitations
- Access/Availability of modes

Time $t_0$

*Measured with external data (e.g. US EPA Smart Location data), after geocoding of residence $(X, Y)$
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Residential Location
+ LU Characteristics*

Travel Behavior $(t_0-\Delta t)$
- Major life events
- Previous res. loc.

Travel Behavior $(t_0)$
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Constraints and Limitations
- Personal Limitations
- Access/Availability of modes

Measured at time of survey

Time $t_0$

*Measured with external data (e.g. US EPA Smart Location data), after geocoding of residence (X, Y)
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Residential Location
+ LU Characteristics*

Travel Behavior (t₀-Δt)
- Major life events
- Previous res. loc.

Travel Behavior (t₀)
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Future Aspirations After Δt
- Desired mobility and lifestyles
- Expectations about life events
- Interest in buying a vehicle
- Future TB preferences

Constraints and Limitations
- Personal Limitations
- Access/Availability of modes

Measured at time of survey

*Measured with external data (e.g. US EPA Smart Location data), after geocoding of residence (X, Y)
Behavioral Framework

**Classical Factors**
- Economic Activity
- Income
- Land Use
- Sociodemographics

**Non-Classical Factors**
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemography
- Cultural Background
- Peers influence

**Travel Behavior**
- Major life events
- Previous res. loc.

**Future Aspirations After Δt**
- Desired mobility and lifestyles
- Expectations about life events
- Interest in buying a vehicle
- Future TB preferences

**Residential Location**
+ LU Characteristics*

**Constraints and Limitations**
- Personal Limitations
- Access/Availability of modes

*Measured with external data (e.g. US EPA Smart Location data), after geocoding of residence (X, Y)
Behavioral Framework

Classical Factors
- Economic Activity
- Income
- Land Use
- Sociodemographics

Non-Classical Factors
- Personal Attitudes
- Transportation Preferences
- Urban Lifestyles
- Preferences for Location
- Adoption of Technology
- Changes in Sociodemogr.
- Cultural Background
- Peers influence

Travel Behavior \((t_0-\Delta t)\)
- Major life events
- Previous res. loc.

Travel Behavior \((t_0)\)
- Measures of TB by mode
- Auto ownership and use
- Adoption of other modes

Residential Location
+ LU Characteristics*

Constraints and Limitations
- Personal Limitations
- Access/Availability of modes

Residential Location \(t_1\)

Classical Factors \((t_1)\)

Future Aspirations After \(\Delta t\)
- Desired mobility and lifestyles
- Expectations about life events
- Interest in buying a vehicle
- Future TB preferences

Non-Classical Factors \((t_1)\)

*Measured with external data (e.g. US EPA Smart Location data), after geocoding of residence \((X, Y)\)
California Millennial Dataset

Sample representative of California population for:
- Age
- Gender
- Income
- Race and Ethnicity
- Presence of Children (Y/N)

1400 Millennials
1000 “Gen Xers”

N = 2400 Total sample size
Research Question 1-b

How do *living arrangements* and *geographical location* impact mobility patterns (e.g. use of various transportation modes) of millennials?

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.

- How does location affect millennials’ mobility choices?
- 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?

*What is the impact of millennials’ level of education, income and geographic location?*
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.
Research Question 3

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

Cluster 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. members of older generation fit in this profile?
Research Question 4

Structural Equations Model that explores relationships among attitudes and preferences, residential location, travel behavior, and future aspirations for mobility, etc.
What are the transportation patterns of the heavy *users of online social media*?

Are young adults active both in the *online social media* and *in-person activities* (i.e. stereotype from the media), or is a substitution effect between internet activity and physical travel at work?

What is the role of peers’ influence?

Interest in studying the different profiles of users, based on geographic location, living arrangements, social activities, and mobility patterns.
Policy Implications, and Next Steps

• Importance of understanding how millennials make *key decisions* about residential location and mobility:
  – Motivations behind the observed trends
  – Relationships among personal attitudes/lifestyles, activity participation, adoption of technology and mobility choices
  – Expected duration of effects (*permanent* vs. *temporary* changes in mobility)

• Insights into the *potential response of millennials to policies*, e.g. economic incentives vs. promotion of environmental-friendly choices

• Plan to extend the study to other U.S. States (Georgia, Vermont, in next stage of the research), and to international comparisons
Acknowledgements

Pat Mokhtarian, Susan Handy, Kate Tiedeman, Eric Gudz, Dan Sperling, Ram Pendyala, Joan Walker, Elisabetta Cherchi, Cinzia Cirillo, Kari Watkins, Scott Le Vine, Aliaksandr Malokin, Yongsung Lee, Gouri Mishra, Calvin Thigpen, Aniss Bahreinian (CEC), Katie Benouar, Melissa Thompson, Dillon Miner and David Chursenoff (Caltrans), John Orr, Elisabeth Sanford and Guy Rousseau (ARC), Mike Alba (LinkedIn Corp.), Ken Laberteaux (Toyota), David Ory (MTC), Natalia Tinjaca Mora (Cam. Comercio Bogota).
Thank you for your attention!

For more information, please contact:

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

gcircella@ucdavis.edu