The COVID-19 Pandemic: What Does It Mean for Mobility? What the Temporary vs. Longer-term Impacts?

SCAG Modeling Task Force Meeting
September 23, 2020

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Big disruption caused by the COVID-19 pandemic with...

...need for social distancing

...impacts on employment and travel

...adoption of ICT-based remote working and e-shopping
Lime Just Became the Biggest Micromobility Company in the World

Uber is ceding operational control of its micromobility arm, Jump, to Lime — and giving it a commanding control of the entire market.

By Kea Wilson | May 11, 2020 | 10 COMMENTS

2018 California mobility panel survey:
~3,400 respondents from California

2019 “8 US cities” 3R survey:
~3,300 respondents from Boston, Kansas City, Los Angeles, Sacramento, Salt Lake City, San Francisco, Seattle, Washington DC

- Combination of quantitative (online surveys) + qualitative (in-depth phone interviews) research
- Initial plan to resample respondents from 2018-2019 surveys
- Longitudinal study to investigate the impacts of the pandemic
- Focus on temporary vs. the longer-term impacts of the pandemic
- Recruitment of additional participants in same regions and in new regions in this data collection:
  - USA: Atlanta, Chicago, Denver, Detroit, Tampa, New York and San Diego
  - Canada: Toronto and Vancouver
- Combination with analysis of passively-collected (e.g. cell phone) travel data
## Data Sources

### UC Davis COVID-19 Mobility Study

#### Previous 2018-2019 Data*
- Household organization
- Telecommuting patterns
- E-shopping behaviors
- Travel patterns
- Vehicle ownership
- Emerging delivery services
- Personal attitudes and preferences
- Shared mobility adoption
- Propensity towards AVs

*Previous data available only for longitudinal component of the sample

#### 2020 COVID-19 Data
- Impacts of the COVID-19 on lifestyles
- Employment and activities
- Household organization and child care
- E-shopping behaviors
- Emerging delivery services
- Current travel patterns
- Vehicle ownership
- Shared mobility adoption
- Personal attitudes and preferences

#### 2020 Qualitative Phone Interviews
- In-depth stories about how COVID-19 has reshaped travel behavior, offering unique insights for future hypotheses about COVID-19 effects on mobility, which can be tested in future studies.

#### Post-COVID-19 Data
- To be collected in Fall 2020 and/or Spring 2021
- Interest in evolution of changes over time
- Integration with passively-collected (i.e. cell phone) data
- Cooperation with other researchers in the US and Europe for comparative analyses
Data Sources—COVID 19 Mobility Study

**Dataset L (Longitudinal, N=1,339)**
- **Sampling Method**: Recall of participants from:
  - 2018 California Mobility Study
  - 2019 “8 Cities” (Boston, Kansas City, Los Angeles, Sacramento, Salt Lake City, San Francisco, Seattle and Washington DC) Study
- **Recruitment Method**: Direct e-mail
- **Valid Emails for Recontact**: 3,466
- **Response Rate**: 38.6%
- **Incentives**: $10 Amazon gift card to each survey respondent
- **Survey administration**: May to July 2020

**Dataset O (Op. Panel, N=8,834)**
- **Sampling Method**: Convenience sample through online opinion panel
- **Study Regions: 17 in the US and 2 in Canada**:
  - **United States**: Los Angeles, Sacramento, San Diego, San Francisco, Seattle, Chicago, Denver, Detroit, Kansas City, Salt Lake City, Atlanta, Boston, New York, Tampa and Washington D.C.
  - **Canada**: Toronto and Vancouver
- **Recruitment Method**: E-mail from online opinion panel
- **Sociodemographic Targets**: Age, gender, race and ethnicity, employment and HH income
- **Incentives**: Airline miles/points from opinion panel
- **Survey administration**: May to July 2020

**Dataset C (Convenience, N=1,266)**
- **Sampling Method**: Convenience sample
- **Study Regions**: Open to all respondents with survey link
- **Recruitment Method**: Various channels, including
  - Professional listservs, online social media
  - Facebook and Instagram ads in the US and Canada
- **Incentives**: Participation in random drawing to win one of 200 $10 gift cards or one of 10 $100 gift cards from Amazon
- **Survey Administration**: May to July 2020
Survey Content

All survey versions include nine main sections:

1. Attitudes and preferences on transportation, residential location, environmental topics, etc.
2. Impacts of COVID-19 pandemic on lifestyle, including use of technology
3. Employment status, work and study activities
4. Household organization and child care
5. Online and in-person shopping patterns (for groceries, food delivery services, visits to restaurants, etc.)
6. Current travel choices (by trip purposes and modes)
7. Use of emerging transportation services
8. Household vehicle ownership and eventual plans for vehicle purchase
9. Household and individual sociodemographics

The online survey was available in both desktop and mobile version, even if the use of a computer or tablet was encouraged.
Sociodemographics of the respondents

**Dataset L (Longitudinal, N=1,339)**

- **Age**
  - 18-24: 3.4%
  - 25-34: 13.3%
  - 35-44: 17.3%
  - 45-54: 19.8%
  - 55-64: 16.6%
  - 65+: 29.6%

- **Race**
  - Asian or Pacific Islander: 9.4%
  - Black/African American: 4.3%
  - Native American: 1.3%
  - White/Caucasian: 78.0%
  - Other: 2.8%
  - Multiracial American: 4.2%

**Dataset O (Op. Panel, N=8,834)**

- **Age**
  - 18-24: 18.4%
  - 25-34: 18.4%
  - 35-44: 16.8%
  - 45-54: 23.0%
  - 55-64: 22.3%
  - 65+: 10.0%

- **Race**
  - Asian or Pacific Islander: 11.5%
  - Black/African American: 11.8%
  - Native American: 1.4%
  - White/Caucasian: 66.5%
  - Other: 5.3%
  - Multiracial American: 3.5%

**Dataset C (Convenience, N=1,266)**

- **Age**
  - 18-24: 15.3%
  - 25-34: 9.3%
  - 35-44: 9.3%
  - 45-54: 23.3%
  - 55-64: 15.7%
  - 65+: 17.9%

- **Race**
  - Asian or Pacific Islander: 18.4%
  - Black/African American: 4.6%
  - Native American: 1.9%
  - White/Caucasian: 69.4%
  - Other: 4.2%
  - Multiracial American: 4.8%

Note: *A separate question asked for the Hispanic ethnicity (not shown here)
### Dataset L (Longitudinal, N=1,339)

#### Education Level

- Some grade/high school: 0.6%
- Completed high school or GED: 6.3%
- Some college/technical school: 29.9%
- Bachelor’s degree(s): 35.5%
- Graduate degree(s) (e.g. MS, PhD, MBA): 21.0%
- Professional degree(s) (e.g. JD, MD, DDS): 6.7%

### Dataset O (Op. Panel, N=8,834)

#### Household Income

- Less than $25,000: 13.1%
- $25,000 to $49,999: 15.9%
- $50,000 to $74,999: 17.1%
- $75,000 to $99,999: 13.3%
- $100,000 to $149,999: 19.2%
- $150,000 or more: 17.0%
- Did not answer: 4.3%

#### Education Level

- Some grade/high school: 3.9%
- Completed high school or GED: 16.9%
- Some college/technical school: 30.2%
- Bachelor’s degree(s): 29.5%
- Graduate degree(s) (e.g. MS, PhD, MBA): 14.4%
- Professional degree(s) (e.g. JD, MD, DDS): 5.1%

### Dataset C (Convenience, N=1,266)

#### Household Income

- Less than $25,000: 13.2%
- $25,000 to $49,999: 19.0%
- $50,000 to $74,999: 16.7%
- $75,000 to $99,999: 14.0%
- $100,000 to $149,999: 21.3%
- $150,000 or more: 15.8%
- Did not answer: 0.0%

#### Education Level

- Some grade/high school: 0.6%
- Completed high school or GED: 6.3%
- Some college/technical school: 29.9%
- Bachelor’s degree(s): 35.5%
- Graduate degree(s) (e.g. MS, PhD, MBA): 21.0%
- Professional degree(s) (e.g. JD, MD, DDS): 6.7%

### Notes:

1. For household income, US sub-sample only, N=7,863
2. For household income, US sub-sample only, N=1,091

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3 REVOLUTIONS
SHARED-AUTOMATED-ELECTRIC
Impacts of the COVID-19 Pandemic on Lifestyles and Individual Choices
Households have been changing as a result of the pandemic...

<table>
<thead>
<tr>
<th>Change in Household Composition</th>
<th>Dataset L (N = 1,177)</th>
<th>Dataset O (N = 8,834)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Someone moved in (or moved back in) and became a member of my household.</td>
<td>5.7%</td>
<td>2018-2019</td>
</tr>
<tr>
<td>Someone moved out and is no longer a member of my household.</td>
<td>3.0%</td>
<td>During COVID-19</td>
</tr>
<tr>
<td>I moved out of my previous place of residence, and I am staying with family/friends.</td>
<td>2.6%</td>
<td>2018-2019</td>
</tr>
<tr>
<td>I moved out of my previous place of residence, and I am living by myself.</td>
<td>1.0%</td>
<td>During COVID-19</td>
</tr>
<tr>
<td>Other changes in household composition</td>
<td>1.7%</td>
<td>2018-2019</td>
</tr>
</tbody>
</table>
### Changes in Technological Devices and Services in Response to the COVID-19 Pandemic

<table>
<thead>
<tr>
<th>Description</th>
<th>Urban part of a city/region</th>
<th>Suburban part of a city/region</th>
<th>Small town/Rural Area</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I purchased a new laptop and/or desktop computer</td>
<td>7.6%</td>
<td>9.4%</td>
<td>9.8%</td>
<td>13.0%</td>
</tr>
<tr>
<td>I purchased a new smartphone</td>
<td>7.5%</td>
<td>8.7%</td>
<td>9.7%</td>
<td>13.0%</td>
</tr>
<tr>
<td>I purchased a new tablet and/or similar device</td>
<td>3.3%</td>
<td>4.4%</td>
<td>4.7%</td>
<td>4.7%</td>
</tr>
<tr>
<td>I purchased other devices to set up or improve my &quot;home office&quot; (e.g. printer, external monitors)</td>
<td>6.1%</td>
<td>6.4%</td>
<td>7.1%</td>
<td>6.4%</td>
</tr>
<tr>
<td>I purchased or upgraded my home internet service/router/Wi-Fi subscription</td>
<td>6.1%</td>
<td>7.2%</td>
<td>8.5%</td>
<td>10.1%</td>
</tr>
<tr>
<td>I purchased or upgraded my cell phone plan and/or smartphone data plan</td>
<td>3.4%</td>
<td>2.8%</td>
<td>4.6%</td>
<td>3.4%</td>
</tr>
<tr>
<td>I made other changes (please specify):</td>
<td>1.7%</td>
<td>1.6%</td>
<td>2.8%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

**Note:** Urban part of a city/region: Suburban part of a city/region: Small town/Rural Area: Total

Dataset O (N = 8,834)
Impact of COVID-19 Pandemic on Household Financial Situation

- Paying bills is a major struggle and worry (15.6%)
- Paying bills is tough and on my mind, but I get by (29.3%)
- My monthly bills are affordable and I don’t worry too much about paying them (27.0%)
- I am not worried about my monthly bills (22.9%)
- Prefer not to answer (5.2%)

Dataset O (N = 8,834)
Financial Impact of COVID-19 Pandemic, by Household Income Category

More financial struggle for lower-income classes

Less financial burden for higher-income classes

Dataset O (N = 8,834)
## Impacts of the pandemic on employment

### Household Income

<table>
<thead>
<tr>
<th></th>
<th>Less than $50,000</th>
<th>$50,000 to $99,999</th>
<th>$100,000 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample (n=8,834)</td>
<td>31.82%</td>
<td>31.12%</td>
<td>37.06%</td>
</tr>
<tr>
<td><em>I'm furloughed with pay from my previous job (n=136)</em></td>
<td>33.10%</td>
<td>41.90%</td>
<td>25.00%</td>
</tr>
<tr>
<td><em>I'm furloughed without pay from my previous job (n=425)</em></td>
<td><strong>37.20%</strong></td>
<td>30.60%</td>
<td>32.20%</td>
</tr>
<tr>
<td><em>I was let go from my job during the COVID-19 pandemic (n=340)</em></td>
<td>49.70%</td>
<td>28.20%</td>
<td>22.10%</td>
</tr>
<tr>
<td><em>My place of employment went out of business during the COVID-19 pandemic (n=115)</em></td>
<td>55.70%</td>
<td>28.70%</td>
<td>15.70%</td>
</tr>
</tbody>
</table>
Days travelled to work before vs. during the pandemic

In an average week before the COVID-19 pandemic (before March 2020), on how many days did you physically travel to work?

- 0 days: 9.6%
- 1 day: 1.9%
- 2 days: 4.0%
- 3 days: 7.0%
- 4 days: 9.4%
- 5 days or more: 68.0%

In an average week during the COVID-19 pandemic, on how many days have you been physically traveling to work?

- 0 days: 49.7%
- 1 day: 5.9%
- 2 days: 8.2%
- 3 days: 6.1%
- 4 days: 6.0%
- 5 days or more: 23.9%

Dataset O (N = 5,872 before and N = 5,117 during the pandemic, as 755 respondents who stopped working)

- Individuals in certain occupations and lower-income segments of the population often do not have access to telecommuting.
Commuting and Telecommuting

Number of Days Telecommuting in a Week

Dataset L (N = 586)

- 64% of employees telecommute 0 days in a week.
- 24% of employees telecommute 7 days in a week.

High adoption of teleworking
Commuting and Telecommuting

During the peak COVID-19 pandemic:
- 11.5% of High Income workers were not telecommuting.
- 32.9% of Middle Income workers were not telecommuting.
- 45.7% of Low Income workers were not telecommuting.

Dataset L (N = 586)
Lower transit ridership, more driving?

Changes during the COVID-19 pandemic in the use of buses

- Drive a car more frequently, 34.7%
- Drive a car less frequently, 42.1%
- Drive the same, 23.2%

Ride bus less frequently, 30.9%
Ride bus with same frequency, 58.9%
Ride bus more often, 10.2%

Changes during the COVID-19 pandemic in driving

- Drives a car more often, 29.4%
- Drives a car with same frequency, 20.6%
- Drives a car less often, 50.1%

Dataset L (N = 705)
### Changes in Attitudes towards Travel and Multimodality

The interest in adopting a *car-light* and multimodal lifestyle is found to be lower than what observed in the 2018 and 2019 data collections.

**Dataset O** *(N = 8,834)*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am willing to live without owning a car if I have good access to viable alternatives such as carsharing and ridehailing.</td>
<td>36.9%</td>
<td>17.0%</td>
<td>21.4%</td>
<td>15.8%</td>
<td>8.9%</td>
</tr>
<tr>
<td>I am fine with not owning a car, as long as I can use/rent one any time I need it.</td>
<td>40.8%</td>
<td>17.1%</td>
<td>20.4%</td>
<td>14.6%</td>
<td>7.1%</td>
</tr>
<tr>
<td>If there were a transit monthly pass that also included bikesharing/shared e-scooters I would use these services more.</td>
<td>35.1%</td>
<td>14.9%</td>
<td>27.3%</td>
<td>16.4%</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

The interest in adopting a *car-light* and multimodal lifestyle is found to be lower than what observed in the 2018 and 2019 data collections.
How respondents expect to travel by October 2020?

1. I will travel more by car because it makes me feel safer from the transmission of pathogens (e.g. COVID-19 or other).
   - Strongly disagree: 6.4%
   - Somewhat disagree: 6.3%
   - Neither agree nor disagree: 27.8%
   - Somewhat agree: 30.8%
   - Strongly agree: 28.7%

2. I will use ridehailing services (e.g. UberX or Lyft) as often as I did before the pandemic.
   - Strongly disagree: 33.4%
   - Somewhat disagree: 17.2%
   - Neither agree nor disagree: 26.7%
   - Somewhat agree: 14.7%
   - Strongly agree: 8.0%

3. If I felt protected from car traffic, I would ride a bicycle more often.
   - Strongly disagree: 32.9%
   - Somewhat disagree: 14.0%
   - Neither agree nor disagree: 23.7%
   - Somewhat agree: 20.6%
   - Strongly agree: 8.8%

4. I will feel uncomfortable putting my hands on the handlebar of a shared e-bike, e-scooter or e-moped recently used by someone else.
   - Strongly disagree: 10.1%
   - Somewhat disagree: 10.3%
   - Neither agree nor disagree: 23.5%
   - Somewhat agree: 28.7%
   - Strongly agree: 27.4%

Dataset O (N = 8,834)
Is the pandemic is further increasing equity gaps?

- Lower-income individuals are more likely to have lost their job during the pandemic
- Lower-income households are much more likely to be financially struggling
- A larger proportion of lower-income workers are considered essential workers and need to continue to physically commute to work
- During the pandemic, lower-income workers are significantly more likely to commute to work and not telecommute than higher-income workers (difference was not significant in 2018-2019)

- The transition to e-shopping favors the younger and tech-savvy segments of the populations: senior citizens, less-educated individuals and minorities more likely to suffer the changes in retail organization
- Among those that travel long-distance for work/business purposes, those in higher-paying jobs are more likely to have reduced their travel, while lower-income workers are more likely to continue to travel
Will we go back to our previous life...?

• There are reasons to believe that after the large disruption, individuals will to a certain extent go back to their behaviors (and habits) from before the pandemic.

• However, the longer the disruption, the more likely longer-term impacts might derive (and modifications in lifestyles might persist). Besides, among other effects...
  
  – Increase in e-shopping will likely persist
  
  – Retail space will likely be modified forever (some stores are shutting down and will not reopen)
  
  – Economic activities will need time to recover.
Research and Policy Questions

• At least for some time, travelers will remain hesitant to use shared modes.
• Transportation supply might change in the meantime, due to funding issues, changes in investments, mergers and acquisitions.
• Space for policy making, in particular, to promote active modes and avoid resurgence of car travel.

• Equity impacts need consideration, due to the burden of disruption differently affecting the various segments of the population.
• It’s probably too early to evaluate whether there will be long-term increased demand for low-density housing (questions about “future” plans not very reliable, due to strong emotional reactions).
On-going Data Analyses

• Three papers submitted for presentation at 2021 TRB Conference:
  – “Longitudinal Analysis of COVID-19 Impacts on Mobility: An Early Snapshot of the Emerging Changes in Travel Behavior” (lead author: Grant Matson)
  – “Effect of the COVID-19 pandemic on visiting grocery stores: A before-and-during exploration” (lead author: Junia Compostella)

(Papers currently under review, available upon request from the authors)
Questions for the SCAG MTF Meeting Attendees

• What research questions would you like to see addressed as part of this project? How can this project best support your work in the agency?

• How would you like us to engage you (and other colleagues) in the next steps of this project?

• Do you have recommendations for our next round of data collection (both in terms of time of the data collection and content of the survey)?
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Other Research Partners:

[Logos of various organizations]

3 Revolutions Future Mobility Program Sponsors:

[Logos of various organizations]
For more info on the UC Davis COVID-19 Mobility Study, please visit: postcovid19mobility.ucdavis.edu