

**TOMNET and D-STOP USDOT Tier 1 University Transportation Centers present
The ABCs (Attitudes – Behaviors – Choices) of Future Mobility**

Comparison of Alternative Survey Recruitment/Deployment Methods

Giovanni Circella, Yongsung Lee and Patricia L. Mokhtarian

School of Civil and Environmental Engineering

Georgia Institute of Technology

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TOMNET D-STOP Transformative Technologies in Transportation Survey (T4 Survey)

- Phoenix, Atlanta, Austin, and Tampa metro areas
- Summer and Fall 2019
- Random address-based sample with online instrument
- Comprehensive attitudinal survey on MaaS and AV
- Weighted to better represent Census distributions



	Phoenix, AZ	Atlanta, GA	Austin, TX	Tampa, FL	Total
Sample Size	1,027	944	1,127	260	3,358
%	30.6%	28.1%	33.6%	7.8%	100%

Survey Instrument



Attitudes and
Preferences



Vehicles You
Have and
Where You
Live



Current
Travel
Patterns



Mobility on
Demand and
Shared
Mobility
Services



Autonomous
Vehicles



Background
Information

Methods of Recruitment for T4 Survey



- **Phoenix**

- 10,000 invitations to randomly-selected mailing addresses (*mail recruitment*)
- 50,000 invitations to randomly-selected e-mail addresses (*e-mail recruitment*)
- Incentives: \$10 Amazon gift card to first 250 respondents + drawing for 100 \$10 Amazon gift cards



- **Atlanta**

- 30,000 invitations to randomly-selected mailing addresses (*mail recruitment*)
- 30,000 invitations to randomly-selected e-mail addresses (*e-mail recruitment*)
- Incentives: drawing of 10 \$100 Amazon gift cards and 200 \$10 Amazon gift cards



- **Tampa**

- 50,000 invitations to randomly-selected e-mail addresses (*e-mail recruitment*)
- Incentives: \$10 Amazon gift card per respondent (raised to \$20 gift card after first reminder)



- **Austin**

- 50,000 invitations to randomly-selected e-mail addresses (*e-mail recruitment*)
- Facebook ads with 42,168 unique user contacts (*social media recruitment*)
- Incentives: \$10 Amazon gift card to first 150 respondents + drawing for 100 \$10 Amazon gift cards

- The online-only survey was administered using the Qualtrics platform in all regions

- Where applicable, e-mail and mail addresses were purchased from InfoGroup

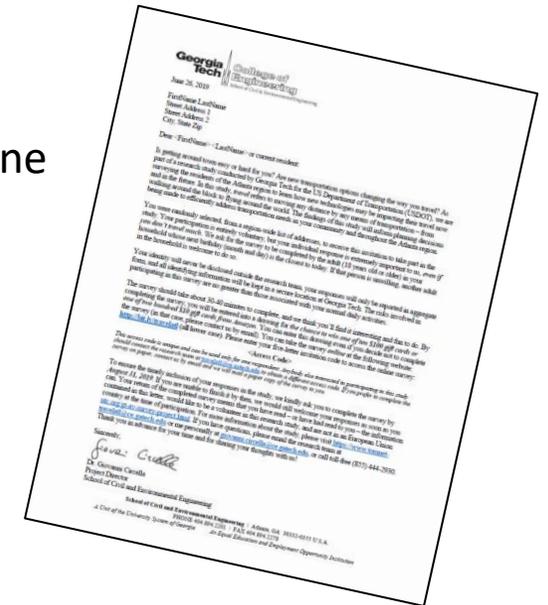
Survey Administration (Atlanta Subsample)

- Mail recruitment:

- Letter sent out in official university envelope with invitation to complete the survey online
- Recruitment letters finalized and mailed out on June 27, 2019
- First survey respondent took the survey on July 5, 2019
- Time elapsed from mailing out of the survey to first respondent: ~8 days
- One reminder (postcard) sent out in mid August 2019

- E-mail recruitment:

- First recruitment emails sent on week of July 25, 2019
- 2,500 invitations sent per day, five days per week
- First survey respondent took the survey on same day
- Three rounds of reminder emails sent out with the schedule below:



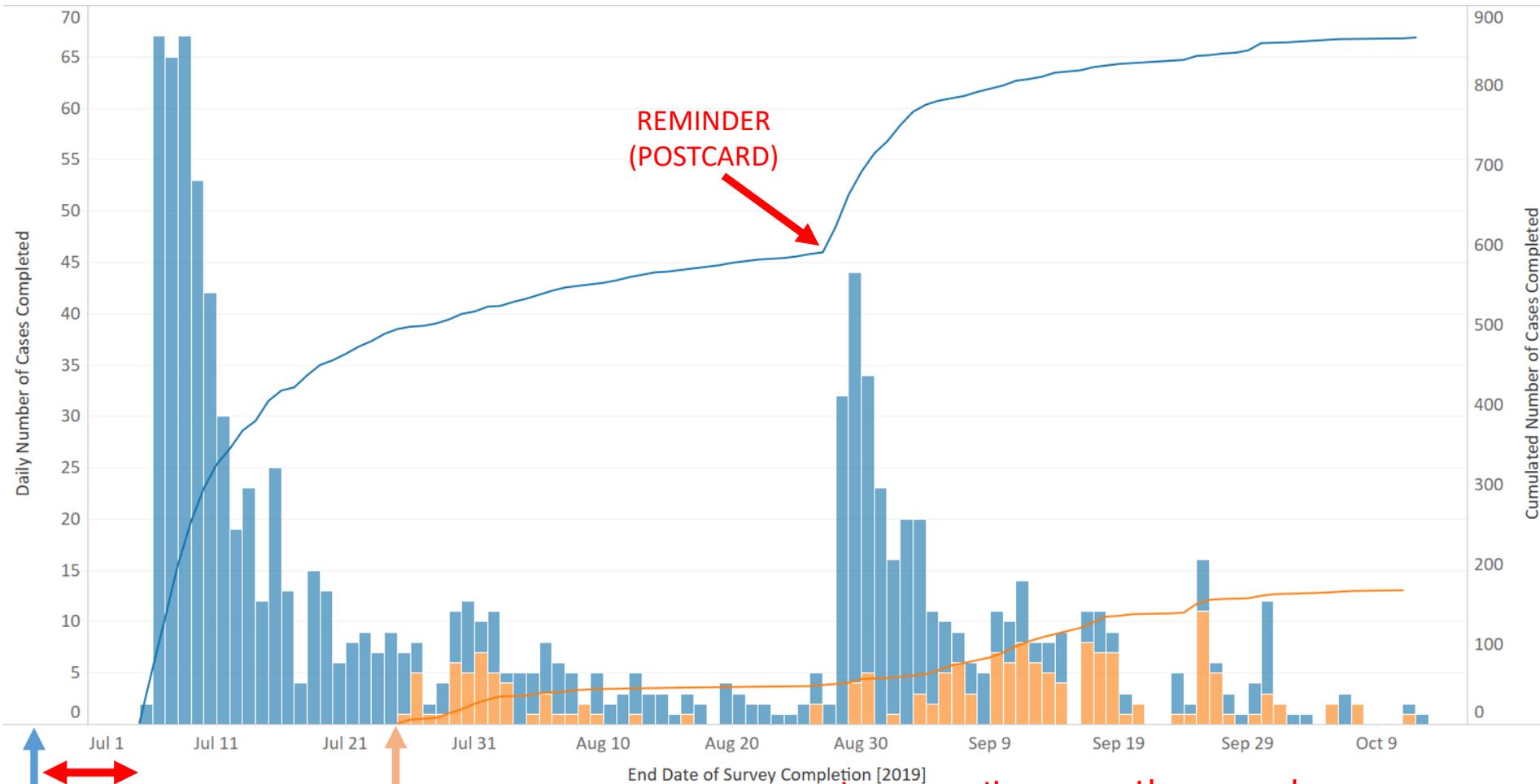
Time period	Action	Time interval from the previous sent-out
August 29 – September 9, 2019	1 st reminder	About a month
September 10 – September 18, 2019	2 nd reminder	2 weeks
September 20 – September 30, 2019	3 rd reminder	1.5 weeks (i.e., 10 days)

Sampling Method (Atlanta Subsample)

- Target sample size of 1,000 or more respondents
- Ideally, interest in representative sample of the population of Atlanta
- 60,000 survey invitations sent to randomly-selected households
- Mail and e-mail addresses sampled with a constant sampling rate from 15 counties in the metro area

County	Total households (ACS 2018)	% living in the Atlanta UA	Mail recruitment		Email recruitment	
			Initial target (1.62%)	Invitations sent out	Initial target (1.62%)	Invitations sent out
Fulton	400,016	98.9 %	6,458	6,508	6,458	6,448
Gwinnett	288,724	99.5 %	4,679	4,744	4,679	4,675
DeKalb	277,757	99.7 %	4,543	4,606	4,543	4,539
Cobb	277,222	99.8 %	4,561	4,604	4,561	4,557
Clayton	92,845	99.1 %	1,512	1,577	1,512	1,511
Cherokee	85,825	82.0 %	1,348	1,408	1,348	1,345
Henry	73,826	86.1 %	1,191	1,255	1,191	1,191
Forsyth	73,675	87.9 %	1,115	1,181	1,115	1,114
Paulding	52,389	77.5 %	839	905	839	838
Coweta	51,308	65.1 %	829	895	829	828
Douglas	48,968	84.3 %	797	863	797	793
Fayette	39,753	82.2 %	653	719	653	651
Newton	36,626	68.8 %	588	654	588	586
Rockdale	30,521	85.1 %	502	568	502	502
Spalding	24,137	59.2 %	384	450	384	384
Total	1,853,592		30,000	30,937	30,000	29,962

Timeline of Data Collection (Atlanta Subsample)



**TOTAL RESPONDENTS:
N=1,021**

**TOTAL VALID CASES
(after cleaning):
N=944**

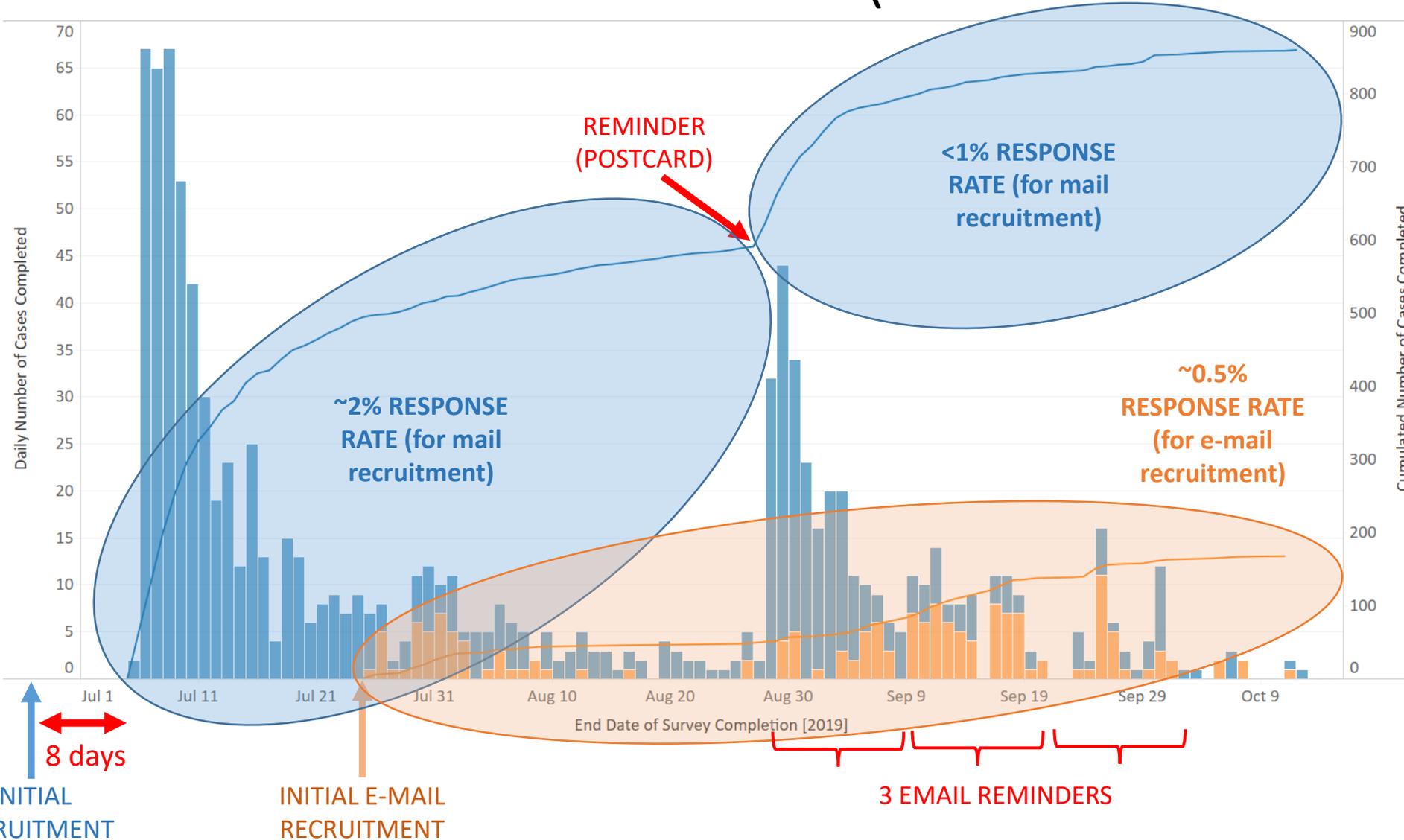
**OVERALL RESPONSE RATE:
1.55%**

INITIAL RECRUITMENT

INITIAL E-MAIL RECRUITMENT

3 EMAIL REMINDERS

Timeline of Data Collection (Atlanta Subsample)



**TOTAL RESPONDENTS:
N=1,021**

**TOTAL VALID CASES
(after cleaning):
N=944**

**OVERALL RESPONSE RATE:
1.55%**

Response Rate (by Recruitment Method)

	Phoenix, AZ		Atlanta, GA ³		Tampa, FL	Austin, TX	
	Mail	Email	Mail	Email	Email	Email	Facebook
Number of invitations/contacts	9,387	48,800	30,937	29,962	50,000	50,000	42,168 ¹
Number of valid cases ²	196	827	778	149	260	249	851
Response rate	2.09%	1.69%	2.51%	0.50%	0.52%	0.50%	2.02%
Total number of cases	1,023		927		260	1,100	

Notes:

¹ Number of unique contacts, for the social media (Facebook) ads

² 37 cases were recruited through other channels (not reported in the table)

³ 10 cases in Atlanta requested a printed copy of the survey (not reported in the table)

Respondent Characteristics

- Who are the respondents recruited through each channel?

	Mail (N=974)	Email (N=1,485)	Facebook (N=851)
Age (mean)	51.6	57.0	23.6
Household size (mean)	2.50	2.51	2.85
Driver's license (DV)	95.6%	97.1%	83.5%
# of drivers in the household	2.04	2.26	2.46
# of motorized vehicles in the household	2.18	2.29	2.12
Gender: Female	58.0%	51.4%	68.3%
Country where born: U.S. or U.S. Territory	90.2%	90.8%	81.1%
Educational attainment			
<i>Some grade/high school</i>	0.7%	0.7%	3.3%
<i>Completed high school or GED</i>	6.4%	5.9%	13.6%
<i>Some college or technical school</i>	20.0%	32.0%	37.4%
<i>Bachelor's degree(s) or some graduate school</i>	38.8%	38.4%	31.0%
<i>Completed graduate degree(s)</i>	34.1%	23.0%	13.3%
<i>Missing</i>	0.0%	0.0%	1.4%

Respondent Characteristics (2)

- Who are the respondents recruited through each channel?

	Mail (N=974)	Email (N=1,485)	Facebook (N=851)
Housing tenure			
<i>Rent</i>	17.1%	15.2%	57.1%
<i>Own</i>	78.5%	81.5%	29.0%
<i>Provided by somebody else (e.g., relative, employer)</i>	3.5%	2.5%	12.5%
<i>Other (please specify)</i>	0.5%	0.5%	0.6%
<i>missing</i>	0.3%	0.4%	0.8%
Building structure			
<i>Stand-alone home</i>	75.6%	81.8%	42.5%
<i>Attached home/townhome</i>	8.3%	5.1%	5.9%
<i>Condo/apartment</i>	14.1%	9.9%	46.9%
<i>Mobile home</i>	0.8%	2.2%	1.5%
<i>Other (please specify)</i>	1.2%	0.9%	2.5%
<i>missing</i>	0.0%	0.1%	0.7%

Respondent Characteristics (3)

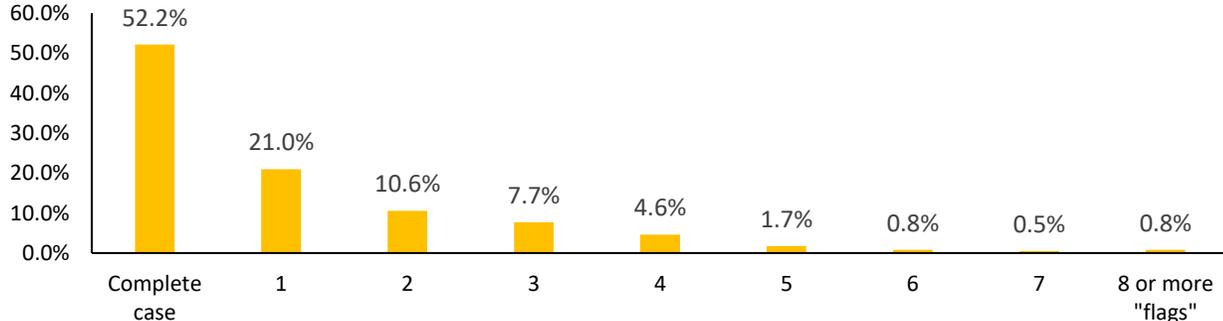
- Who are the respondents recruited through each channel?

	Mail (N=974)	Email (N=1,485)	Facebook (N=851)
Population density (residential census tract)			
<i>Least dense (bottom quartile)</i>	29.1%	25.3%	18.9%
<i>Less dense (25-50th percentile)</i>	30.4%	24.8%	17.5%
<i>Denser (50-75th percentile)</i>	26.7%	25.6%	22.5%
<i>Densest (top quartile)</i>	13.9%	24.4%	41.1%
Access to a car in the household			
<i>No car/driver</i>	1.7%	1.4%	7.4%
<i>Fewer than one car/driver</i>	9.0%	12.3%	24.0%
<i>One car/driver</i>	67.4%	63.0%	60.1%
<i>More than one car/driver</i>	21.9%	23.3%	8.6%

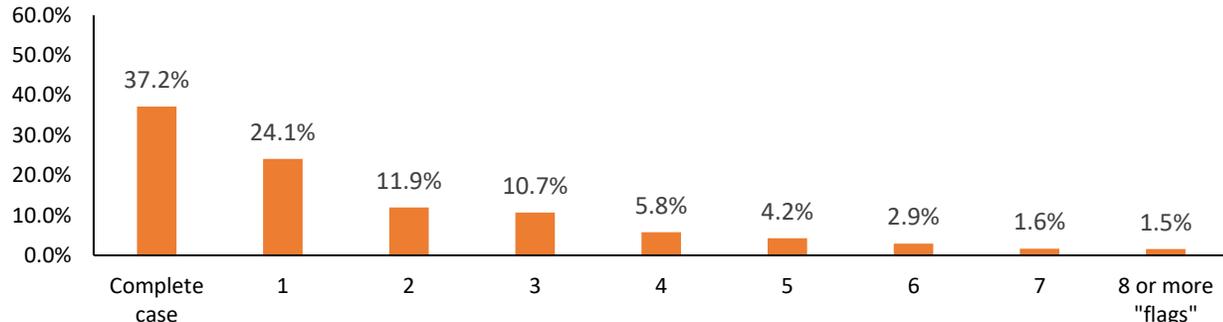
Data Quality

- Number of “flags” for potential incomplete or inconsistent information in the data

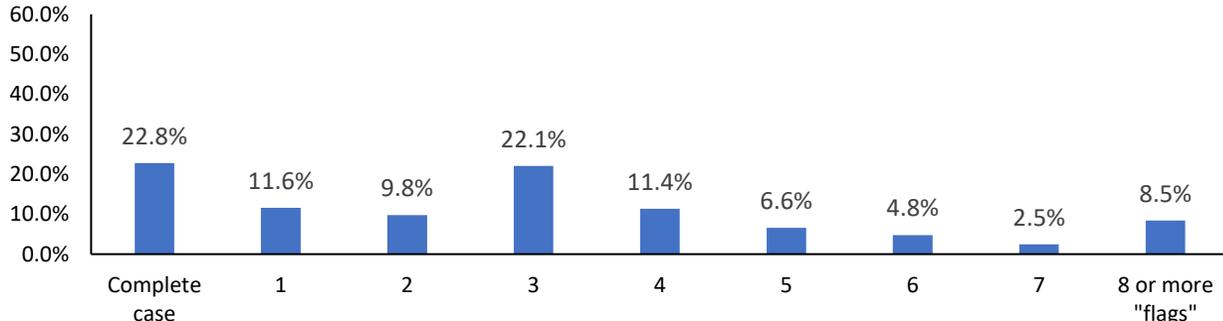
Mail
(N=972)



Email
(N=1,484)

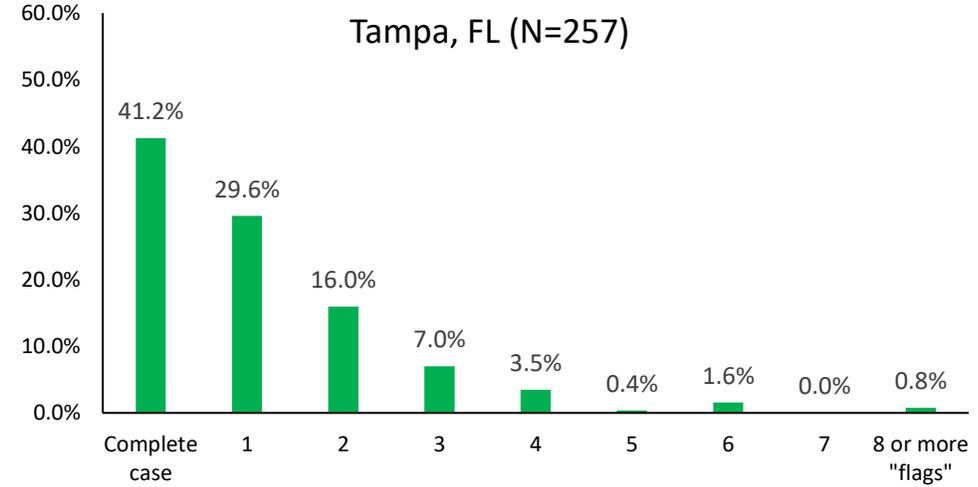
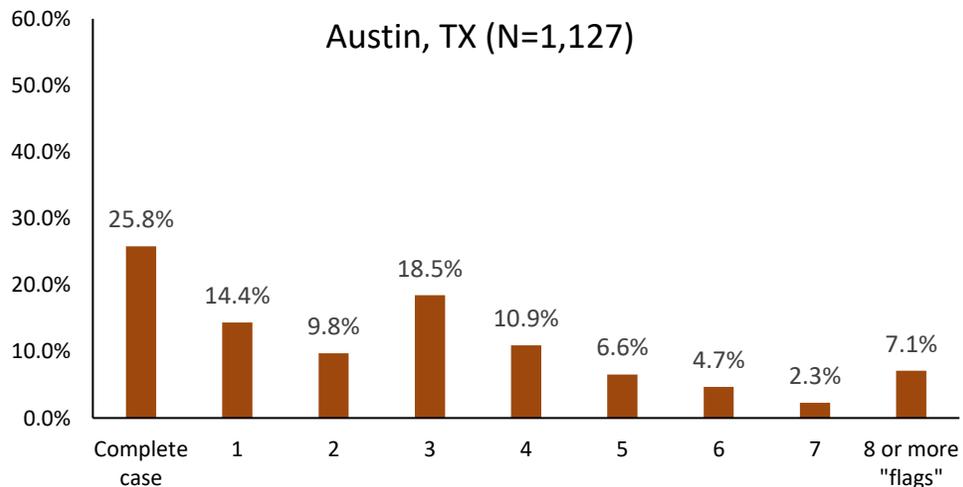
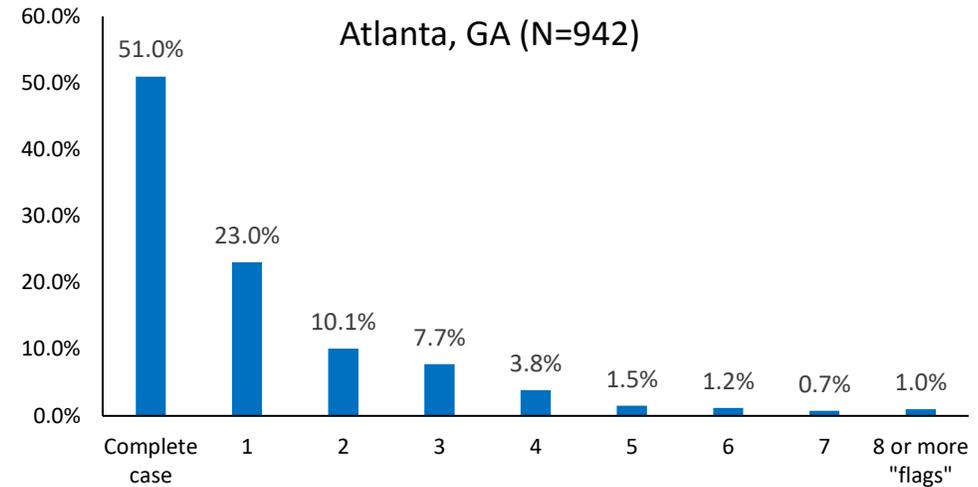
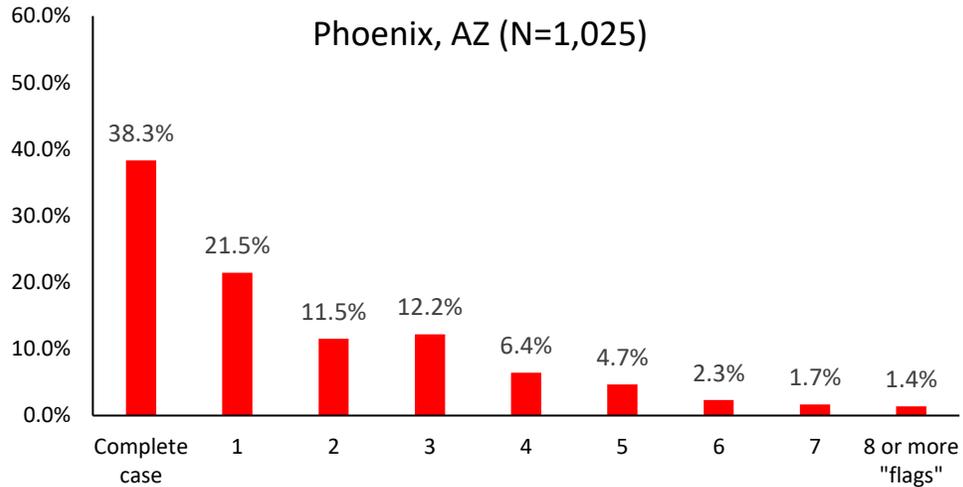


Facebook
(N=851)



Data Quality (2)

- Number of “flags” for potential incomplete or inconsistent information in the data



Other Survey Recruitment/ Deployment Methods

2017 Georgia Survey

- Address-based stratified random sampling in Georgia
- Different sampling rates by region of the state
- Recruitment letters mailed to 30,000 households
- Additional recruitment with resampling of NHTS respondents in Georgia
- Paper booklet with prepaid envelope + online survey link
- Higher-response rate among elderly and rural populations
- Data collection spanned *185 days*
- Several months required to input data from paper surveys
- Incentive: \$2 bill to each respondent



More information available in: Kim, S. H., P. L. Mokhtarian, P. L. and G. Circella, G. (2020). How, and for Whom, Will Activity Patterns Be Modified by Self-driving Cars? Expectations from the State of Georgia. *Transportation Research Part F: Traffic Psychology and Behaviour*, 70, 68-80.

2017 Georgia Survey (2)

	Random-based sampling (mail recruitment)		NHTS resampling (mail recruitment)	
	Paper Questionnaire	Online Survey	Paper Questionnaire	Online Survey
Number of invitations	29,975		5,150	
Number of respondents	1,515	435	1,297	301
Response rate	5.05% ¹	1.45% ¹	25.18% ²	5.84% ²
Total number of cases	1,950		1,598	
Overall response rate	6.51%		31.03%	

Notes:

¹ For ease of exposition only: the overall response rate was 6.51%, when considering both respondents who took the survey online (435) and those who mailed back a paper questionnaire (1,515), as the two options were offered to the same participants

² For ease of exposition only: the overall response rate was 31.03%, when considering both respondents who took the survey online (301) and those who mailed back a paper questionnaire (1,297), as the two options were offered to the same participants

2018 California Survey

- Address-based stratified random sampling in California
- Different sampling rates by region of the state
- Recruitment letters mailed to 30,000 households
- Paper booklet with prepaid envelope + online survey link
- Additional recruitment with opinion panel with online survey for recontact of 2015 respondents and new recruitment
- Opinion panel allows for faster data collection and sample that mimics the sociodemographics of the population
- Several months required to input data from paper surveys
- Higher percentage of inconsistent and problematic cases in opinion panel
- Incentive: random drawing for Amazon Gift Card (*mail recruitment*) and direct incentive (*opinion panel*)



More information available at: <https://3rev.ucdavis.edu/california-panel>

2018 California Survey (2)

	Random-based sampling (mail recruitment)		Opinion Panel (New)	Opinion Panel (2015 recontacts)
	Paper Questionnaire	Online Survey	Online Survey	Online Survey
Number of invitations	30,000		n.a.	1,939
Number of respondents	1,620	372	1,833	246
Response rate	5.40% ¹	1.24% ¹	n.a.	12.69%
Total number of cases	1,992		2,079	
Overall response rate	6.64%		n.a.	

Notes:

¹ For ease of exposition only: the overall response rate was 6.64%, when considering both respondents who took the survey online (372) and those who mailed back a paper questionnaire (1,620), as the two options were offered to the same participants

2020 COVID-19 Travel Survey



- Version 1 administered through email recontact of previous respondents from 8 US regions
- Version 2 features recruitment of new respondents through online opinion panel in 15 US regions and 2 regions in Canada
- Version 3 administered with convenience sample recruited through email and social media
- Online survey only
- Incentive: \$10 Amazon Gift Card to all respondents (Version 1), direct incentive through opinion panel (Version 2), random drawing of gift cards (Version 3)

More information available at: <https://postcovid19mobility.ucdavis.edu/>

2020 COVID-19 Travel Survey (2)

	Recontact of 2018/9 respondents (email recruitment)	Opinion Panel	Convenience sample (email and social media)
	Online Survey	Online Survey	Online Survey
Number of invitations	3,482	n.a.	n.a.
Number of respondents	1,288 ¹	~6,000 ²	~1000 ²
Response rate	36.99%	n.a.	n.a.

Notes:

¹ To date, data collection in progress

² Estimate, data collection in progress

Costs of Data Collection

	Atlanta		Phoenix		Tampa	Austin	
	Mail	Email	Mail	Email	Email	Email	Facebook
Purchase of addresses	\$1,500	\$6,000	\$700	\$12,500	\$10,000	\$10,000	
Printing, mailing, advertising	\$9,750		\$8,921				\$619
Incentives	\$2,530	\$470	\$700	\$2,800	\$4,340	\$566	\$1934
Data entry							
Total costs	\$13,780	\$6,470	\$10,321	\$15,300	\$14,340	\$10,566	\$2,553
Valid cases	777	149	195	826	257	249	851
Cost per valid case	\$17.74	\$43.42	\$52.93	\$18.52	\$55.80	\$42.43	\$3.00

Costs of Data Collection (2)

	Atlanta		Phoenix		Tampa	Austin		Georgia 2017		California 2018		COVID19 2020	
	Mail	Email	Mail	Email	Email	Email	Facebook	Mail	NHTS recall	Mail	Opinion panel	Email recall	Opinion panel
Purchase of addresses	\$1,500	\$6,000	\$700	\$12,500	\$10,000	\$10,000		\$1,800		\$1,500			
Printing, mailing, advertising	\$9,750		\$8,921				\$619	\$27,202	\$22,292	\$72,315			
Incentives	\$2,530	\$470	\$700	\$2,800	\$4,340	\$566	\$1934	\$3,900	\$3,196	\$6,000	\$20,163	\$12,880	\$55,000
Data entry								\$6,938	\$5,940	\$9,075			
Total costs	\$13,780	\$6,470	\$10,321	\$15,300	\$14,340	\$10,566	\$2,553	\$39,841	\$31,428	\$88,890	\$20,163	\$12,880	\$46,000
Valid cases	777	149	195	826	257	249	851	1,950	1,598	1,992	1,833	1,288	~6,000
Cost per valid case	\$17.74	\$43.42	\$52.93	\$18.52	\$55.80	\$42.43	\$3.00	\$20.43	\$19.67	\$44.62	\$11.00	\$10.00	\$9.17*

Notes:

* Estimate, data collection in progress

Question

- If we had to do this again, what approach would we follow?

Some Lessons Learned

- Each sampling approach and recruitment method has *pros* and *cons*
- Respondents sampled through various channels differ by sociodemographics, and also attitudes and behaviors
- Weighting can help reduce deviation from non-representativeness, but cannot solve for non-sampling of certain groups (elderly, low-income, etc.)
- Cost-effectiveness of each method varies considerably by region and characteristics of data collection
- Considerations about response rate, quality of the collected data, representativeness of the sample should all be considered when evaluating the right approach for data collection
- Opinion panels are often seen as a valuable option for faster data collection but they rely on sampling from predefined lists of respondents, and not the general population
- Recontact of previous respondents is one of the most cost-effective approaches for data collection and allows for longitudinal datasets: always ask for permission to recontact for a follow-up survey!
- Attrition and response biases affect recontact of respondents: *self-selection* of those who remain in panel
- Importance of reminders and right communications to motivate respondents
- Incentives have a role in motivating participation and account for a limited portion of total costs

Acknowledgements

For T4 Survey:

- *Yun-Hsuan (Grace) Chen and all fantastic TOMNET team*

For 2017 Georgia Survey:

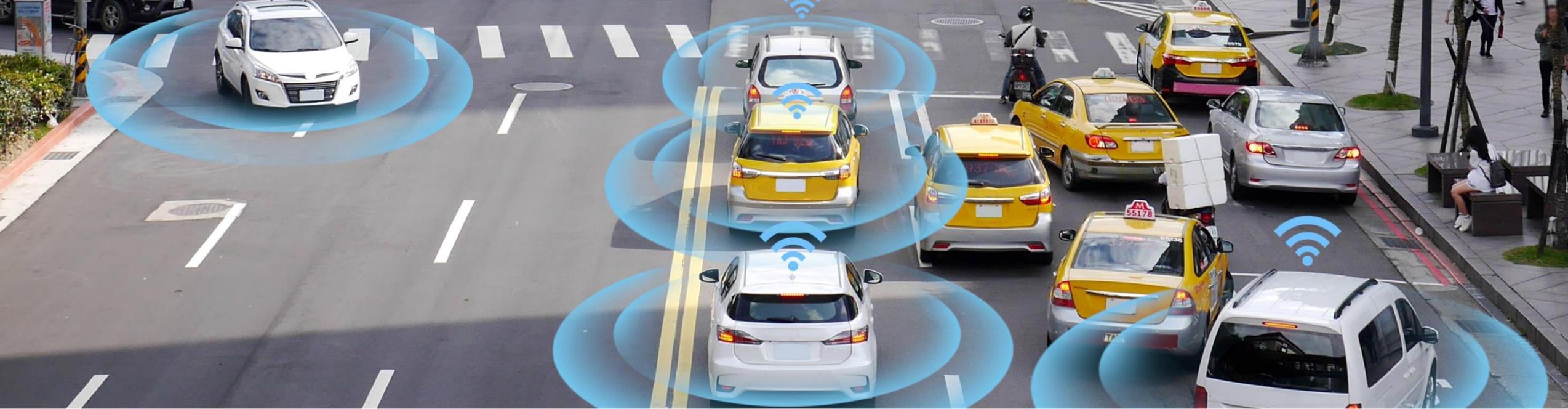
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Giovanni Circella, giovanni.circella@gatech.edu

Yongsung Lee, yongsung.lee@gatech.edu

Patricia L. Mokhtarian, patmokh@gatech.edu