

Attitudes, Behaviors, and Choices toward Autonomous Vehicles

Sara Khoeini, Denise Capasso da Silva, and Ram Pendyala
Arizona State University



TOMNET Transportation Center
Teaching Old Models New Tricks

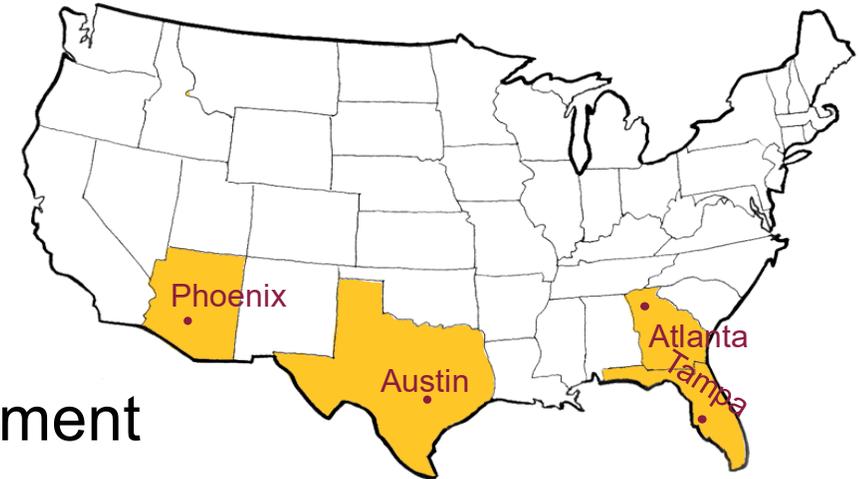
Vehicle-Highway Automation Committee, ACP30
Transportation Research Board
January 14th, 2021



Survey Team



TOMNET Transformative Transportation Technologies (T4) Survey



- Phoenix, Atlanta, Austin, and Tampa metro areas
- Summer and Fall 2019 (pre-pandemic)
- Random address-based sample with online instrument
- Inclusion of rich **attitudinal data**, robust **stated preference** questions, and extensive coverage of perceptions and choices of **Mobility-on-Demand and Autonomous Vehicles**

	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



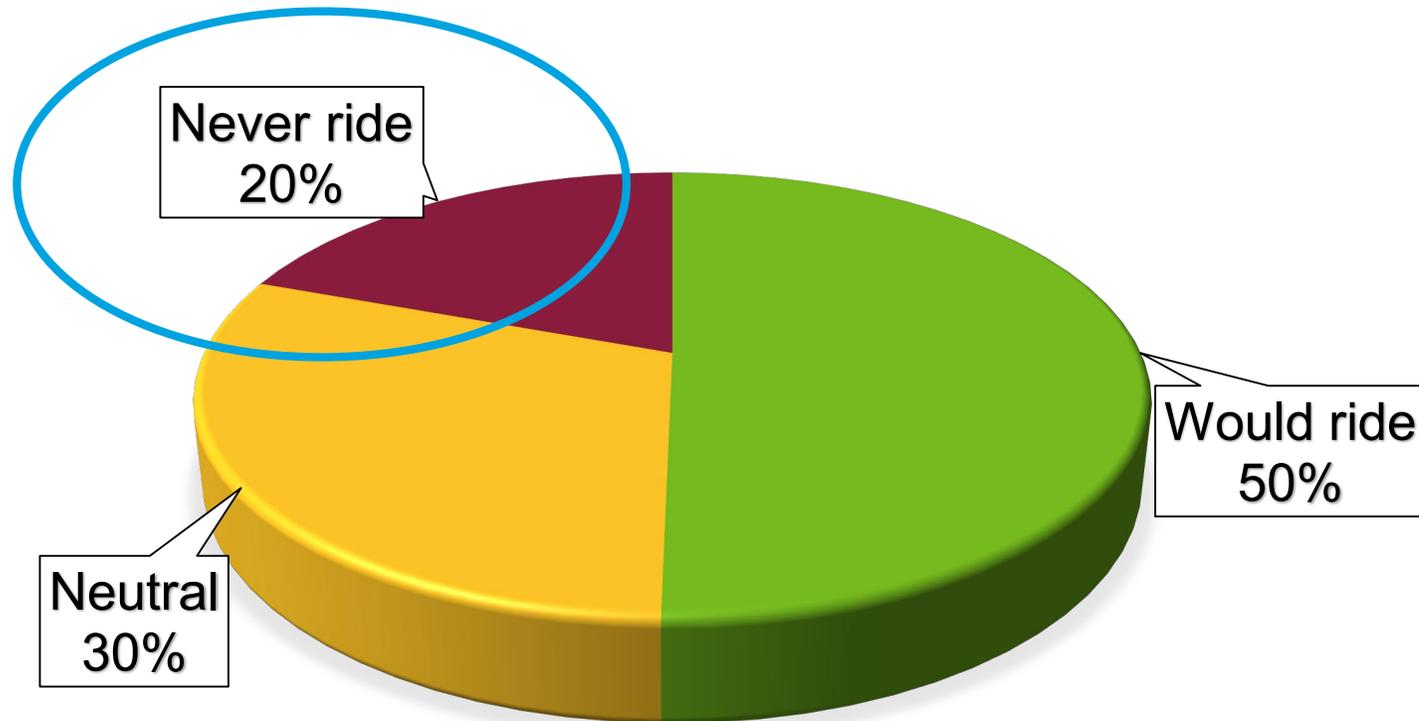
Background
Information



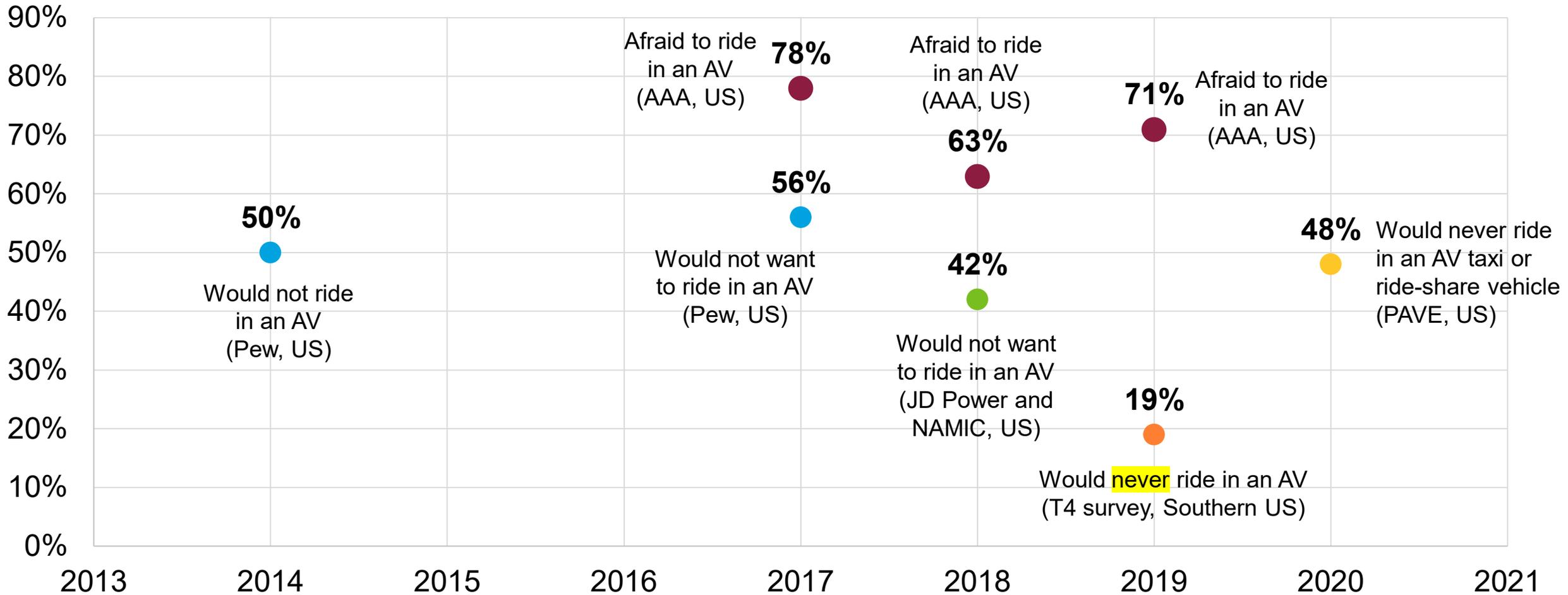
Question 1

Respondents Willingness to Ride and Buy AVs

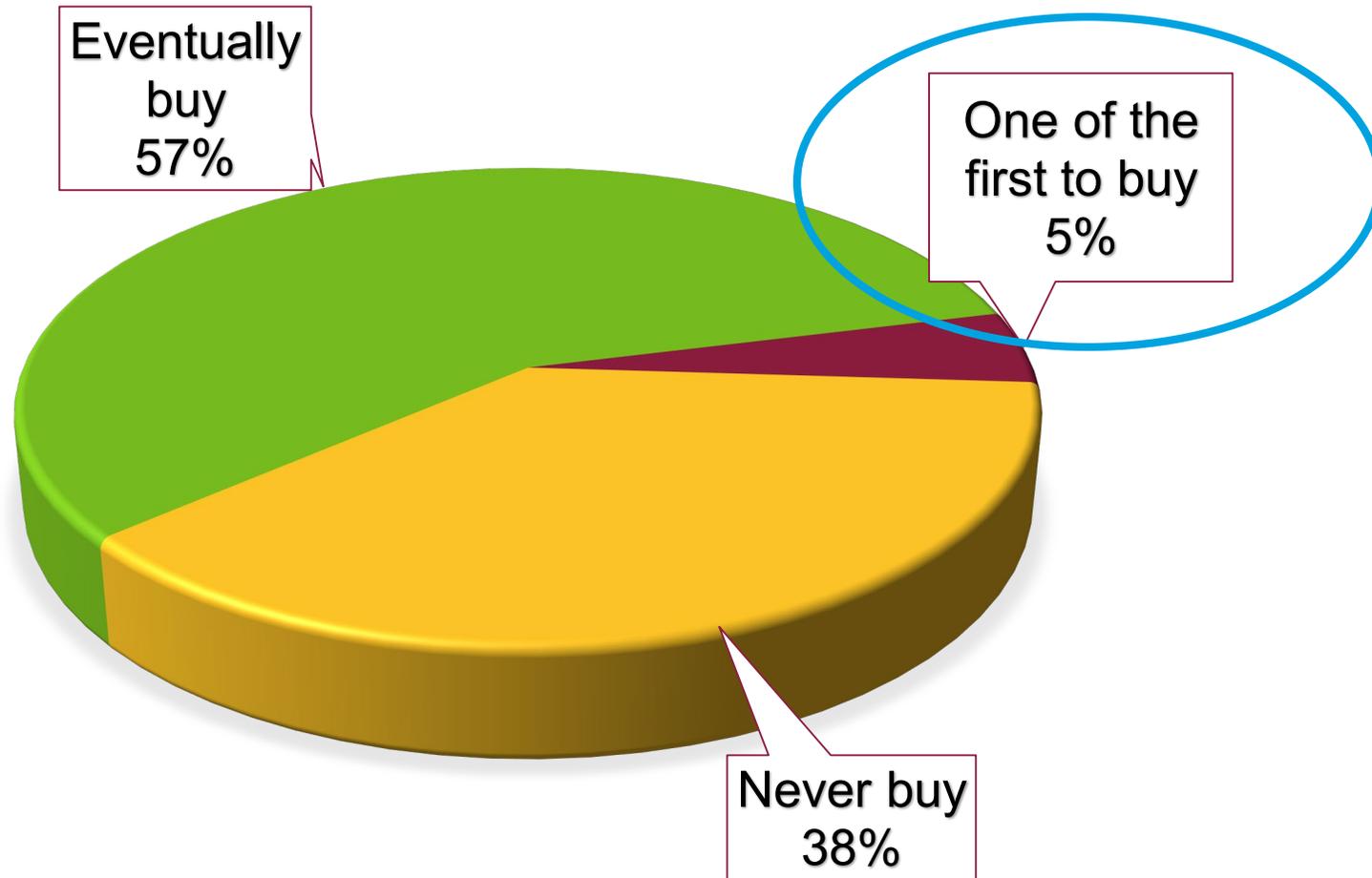
Riding in an AV (N=3,356)



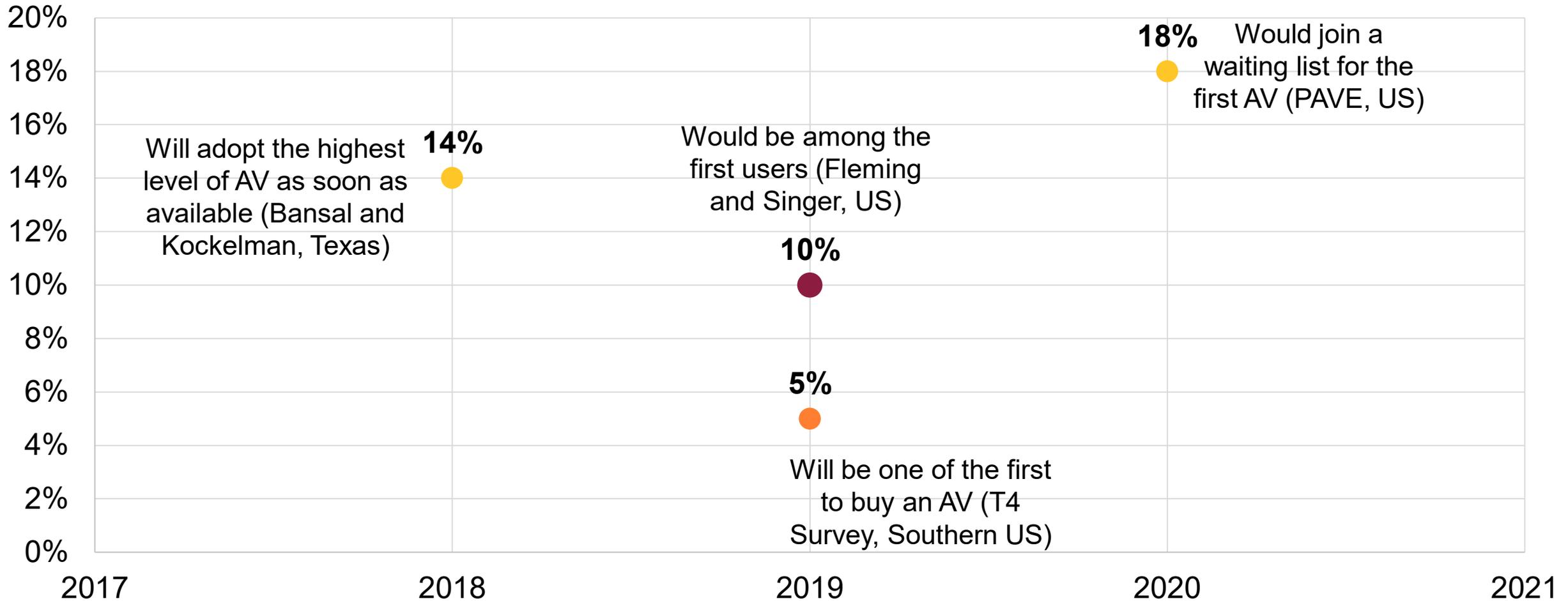
Riding in an AV: Comparisons



Buying an AV (N=3,356)



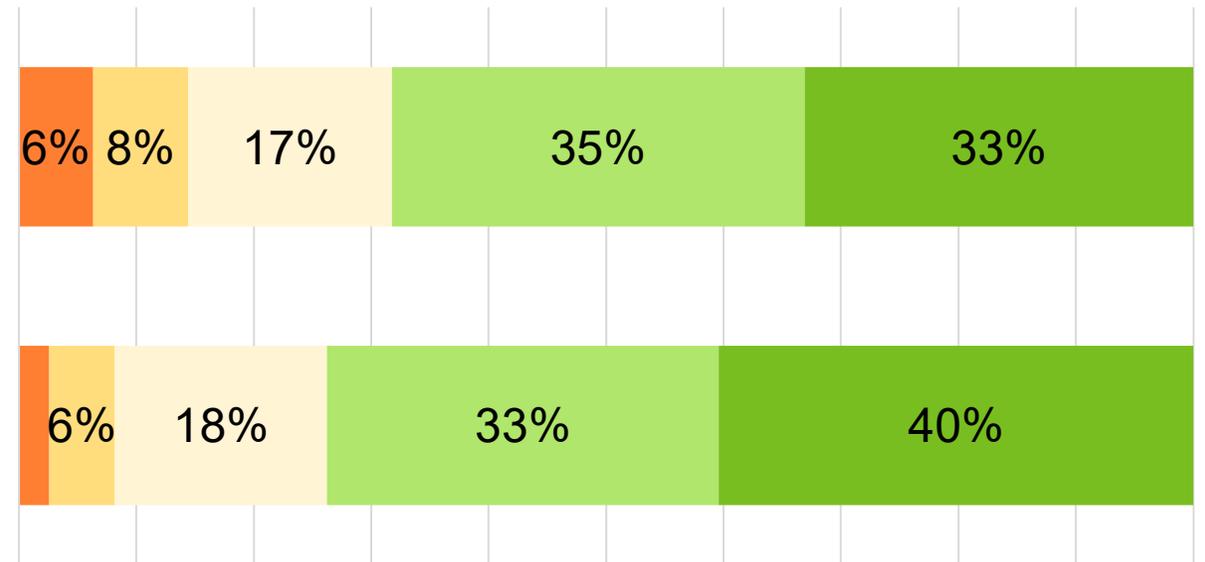
Buying an AV: First Adopters



AV: Safety Concerns

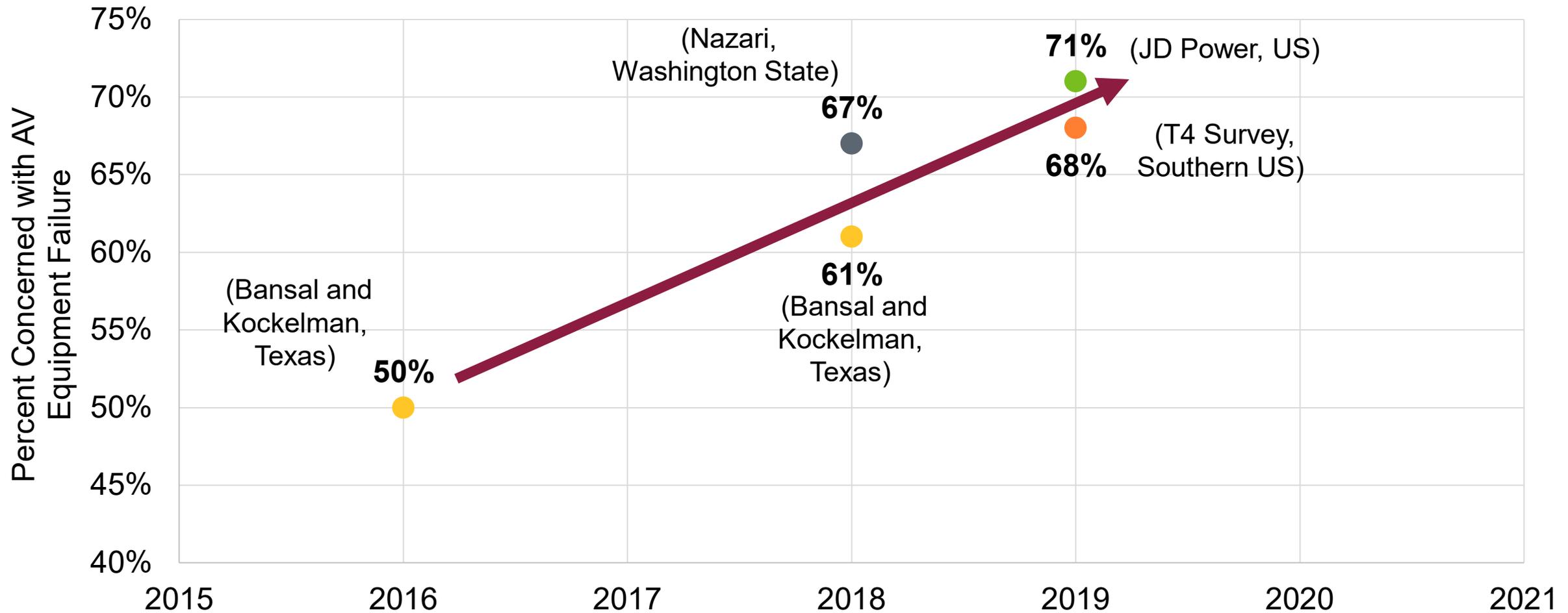
Strongly disagree Somewhat disagree Neutral Somewhat agree Strongly agree

I am concerned about the potential failure of AV sensors, equipment, technology, or programs. (N=3331)



I want the ability to take control of the AV at any time during the ride. (N=3331)

AV Technology: Concern of Equipment Failure





Picture source: YourMembership

Message 1

Public is still skeptical about AVs, especially **technology reliability**.

Lots more work to be done in public **education and awareness** domains to enhance **public trust** in AV technology.

Need more pilots!

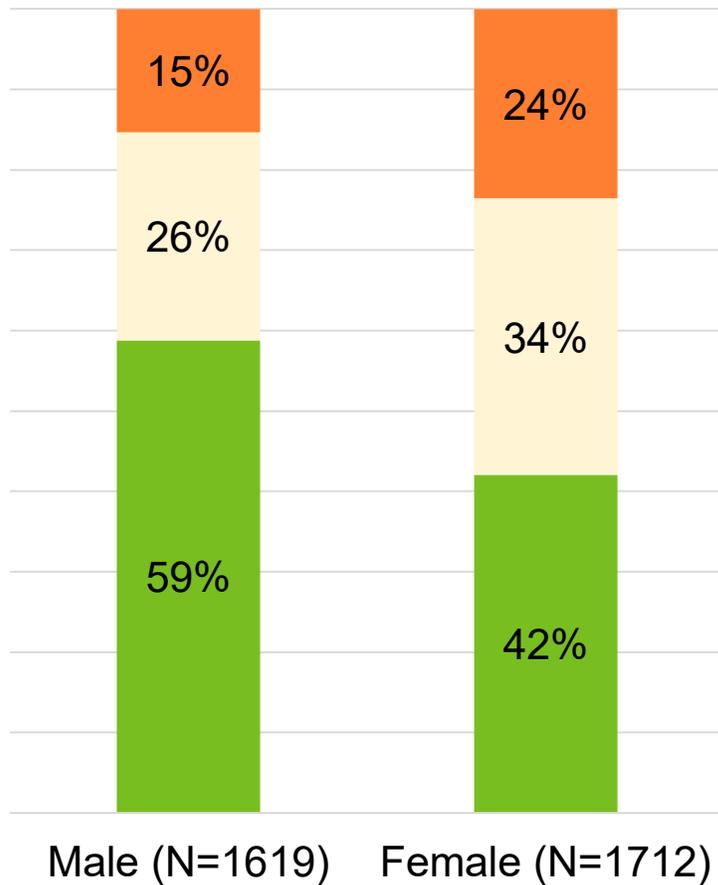


Question 2

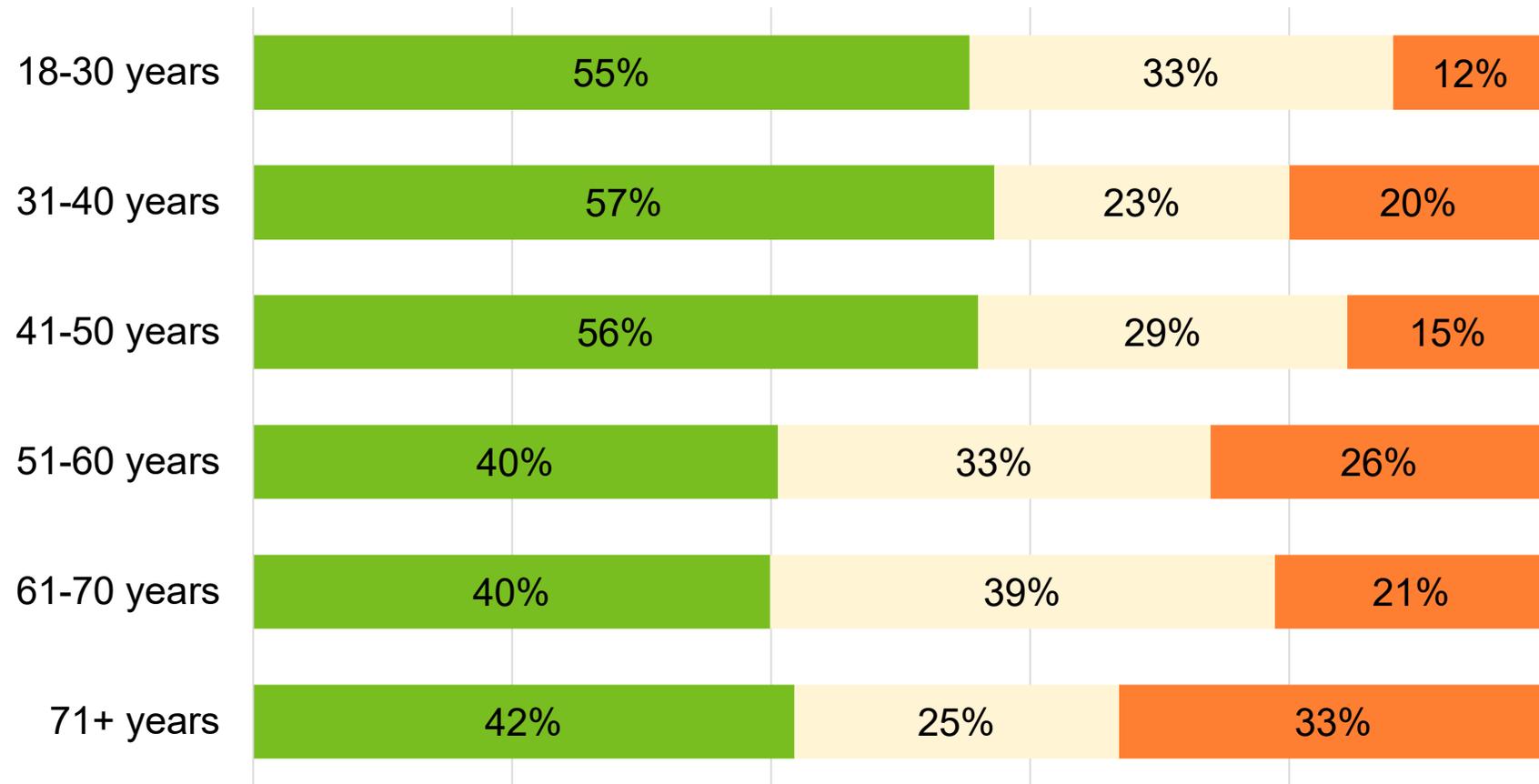
Importance of Attitudes in AV Adoption

Role of Age and Gender

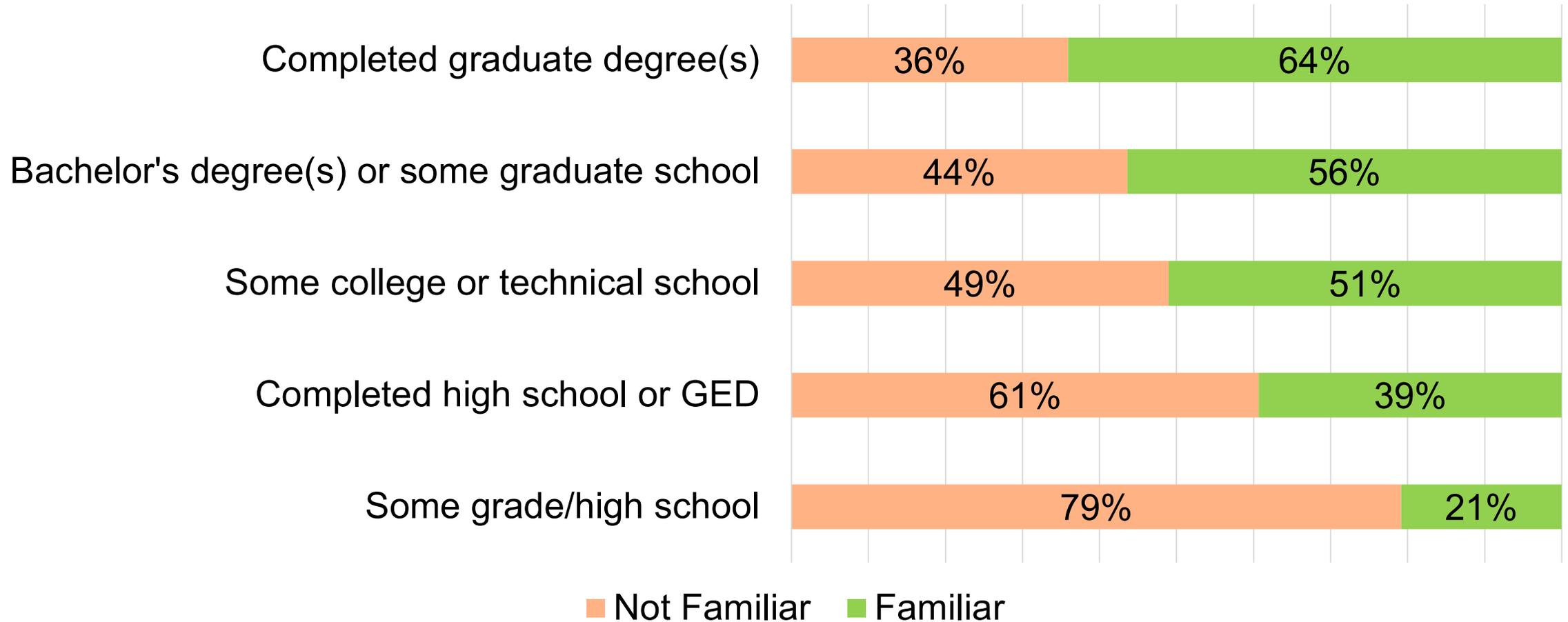
■ Never ride an AV
 ■ Neutral
 ■ Ride AV



■ Ride AV
 ■ Neutral
 ■ Never ride an AV

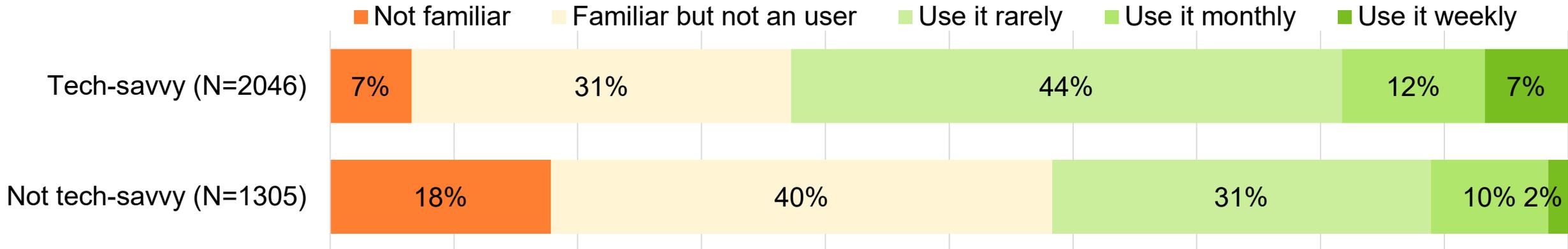


Role of Education

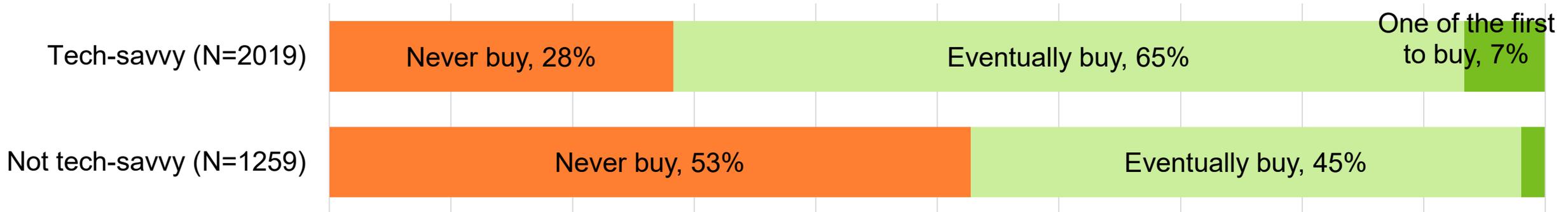


Role of Attitudes: Tech-Savviness

Use of Private Ridehailing

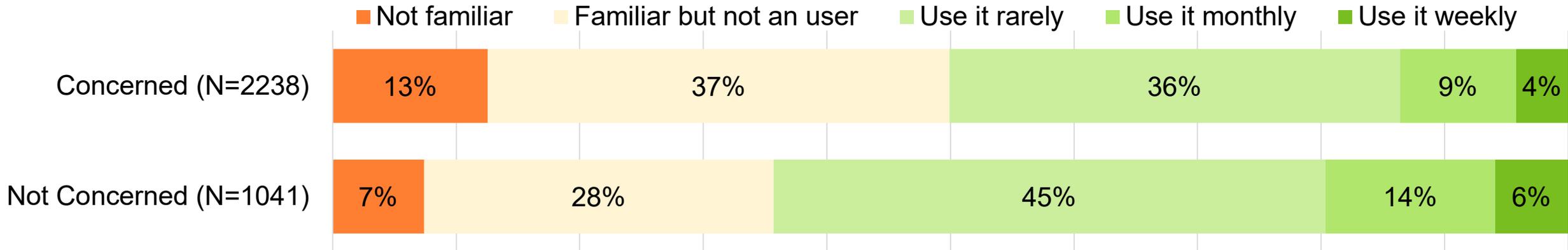


Willingness to Buy AV

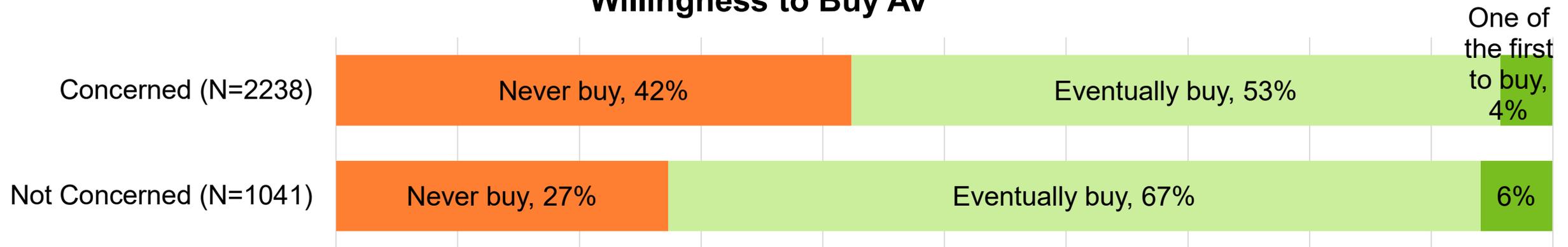


Role of Attitudes: Concern about Privacy

Use of Private Ridehailing



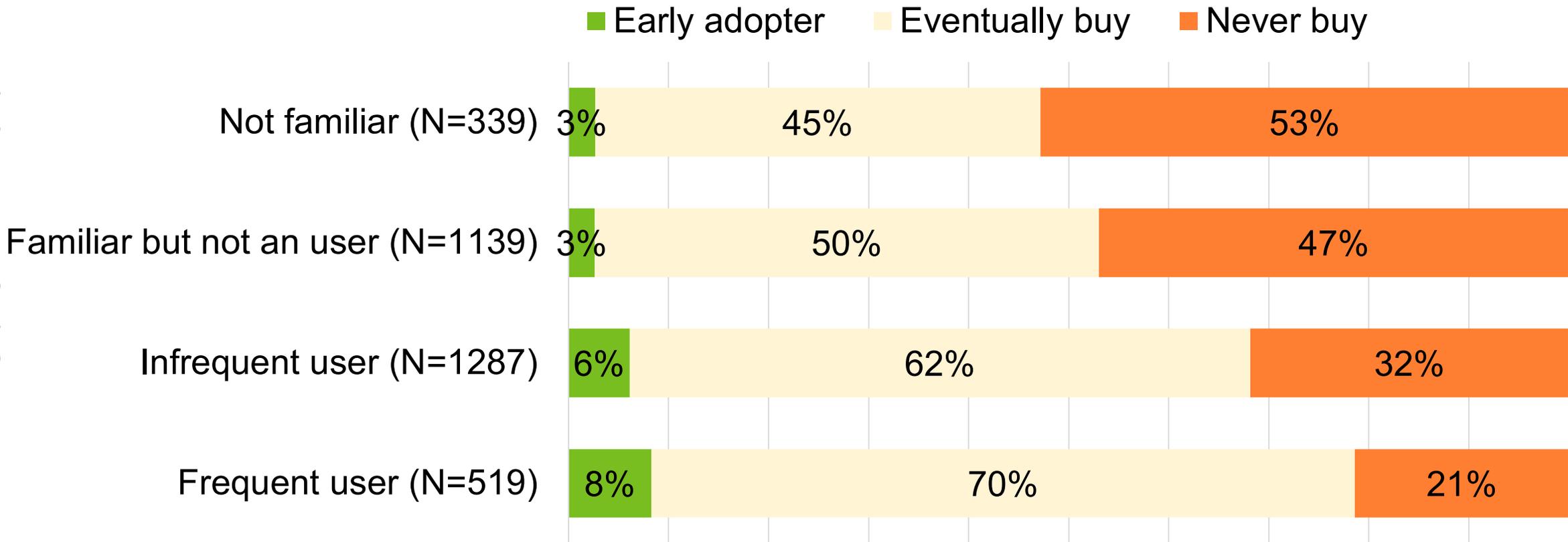
Willingness to Buy AV



AV Adoption and Ridehailing Use

Willingness to Buy Autonomous Vehicles

Familiarity and Use of Private Ridehailing (e.g., Uber, Lyft)



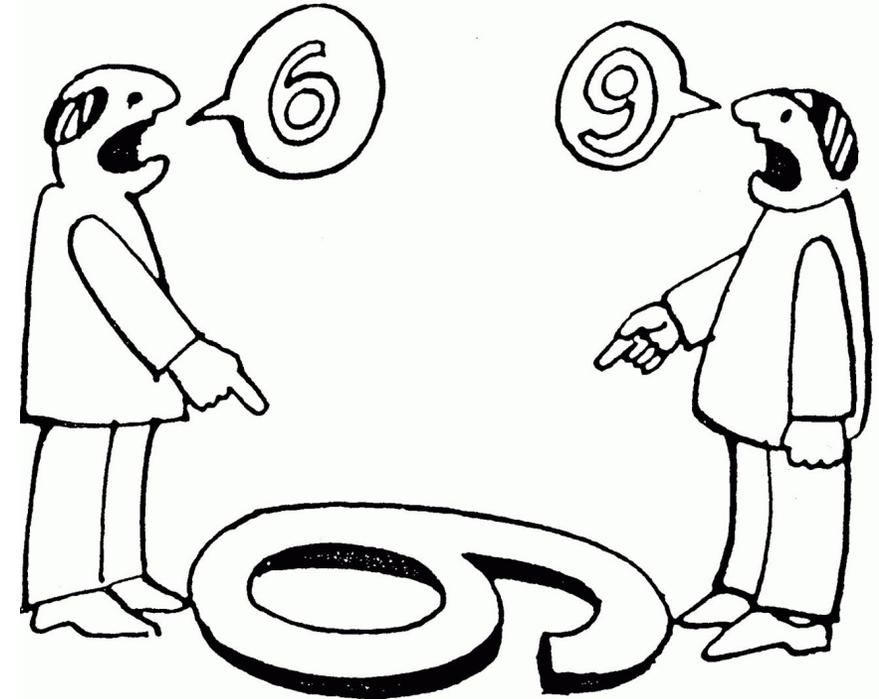
Message 2

Attitudes have a key role in shaping **adoption** pathways.

Insufficient attention has been paid to **attitudes** in **forecasting** models.

We must proactively work to influence and shape **attitudes** and **perceptions**.

Need more pilots!





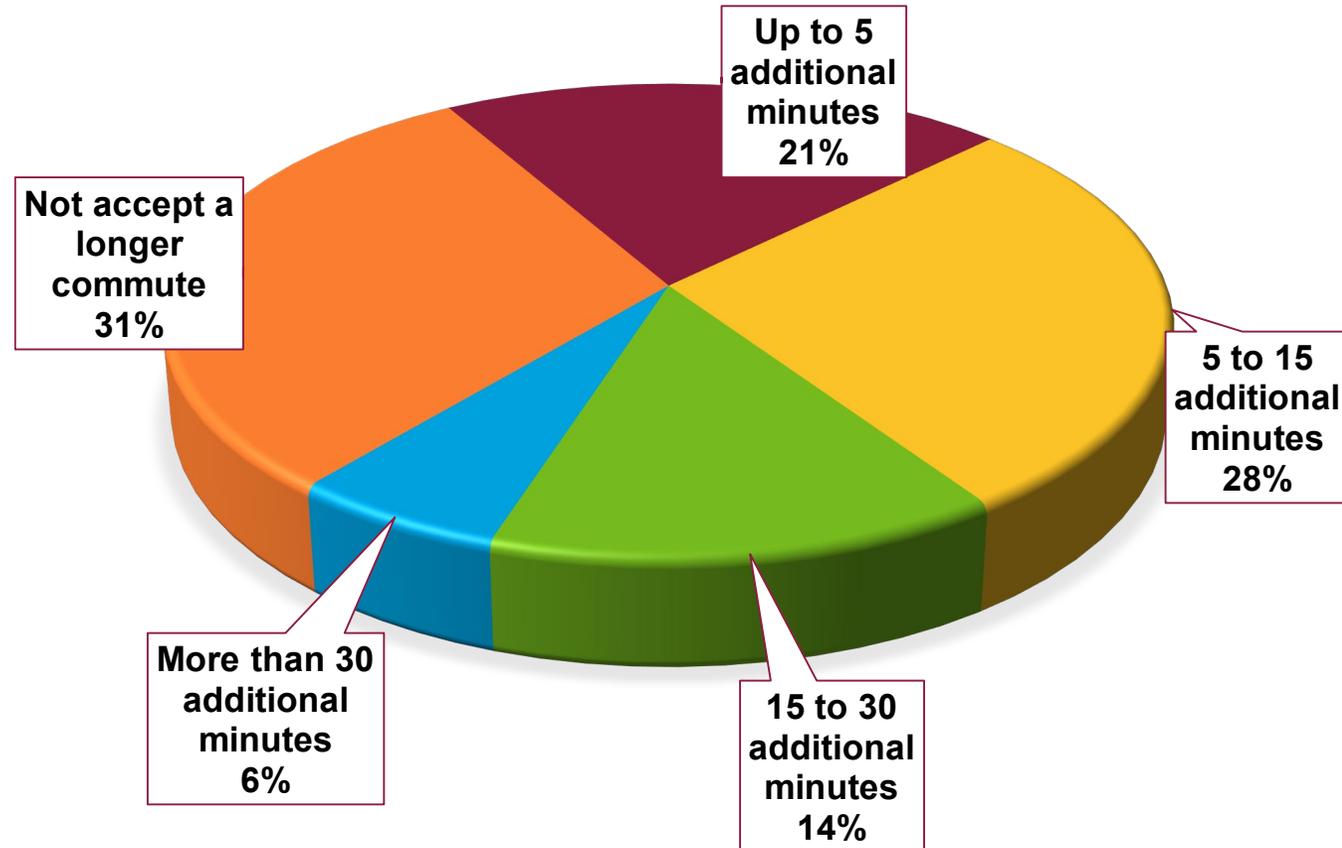
Question 3

To what extent will people travel more?

AV Future: Additional Commute Time (N=2,221)

How much longer would you be willing to commute in an AV, compared to your current commute?

Average: ~ 9 min



AV Future: Zero-occupant VMTs

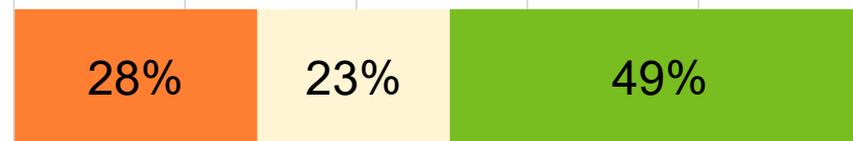
(N=3,356)

Disagree Neutral Agree

I would feel comfortable having an AV pick-up/drop-off children without adult supervision.



I would send an AV to pick-up groceries/laundry/food orders by itself.



AVs would save me time and money for parking by dropping me off and parking themselves.



Photo: Brian Tietz for Transdev

Photo: Ross D. Franklin, STF / Associated Press

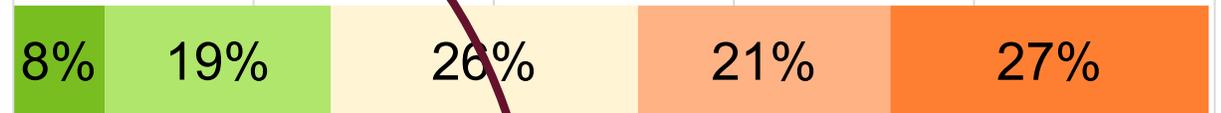


AV: Travel Impacts

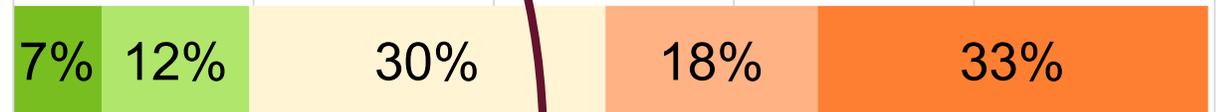
(N=3,358)

■ Very likely ■ Somewhat likely ■ Neutral ■ Somewhat unlikely ■ Very unlikely

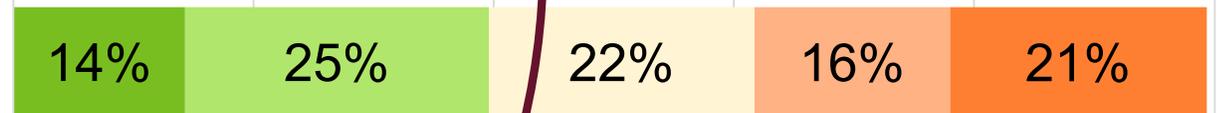
Making additional trips that are not made now



Moving to a better location or home



Making more long-distance road trips

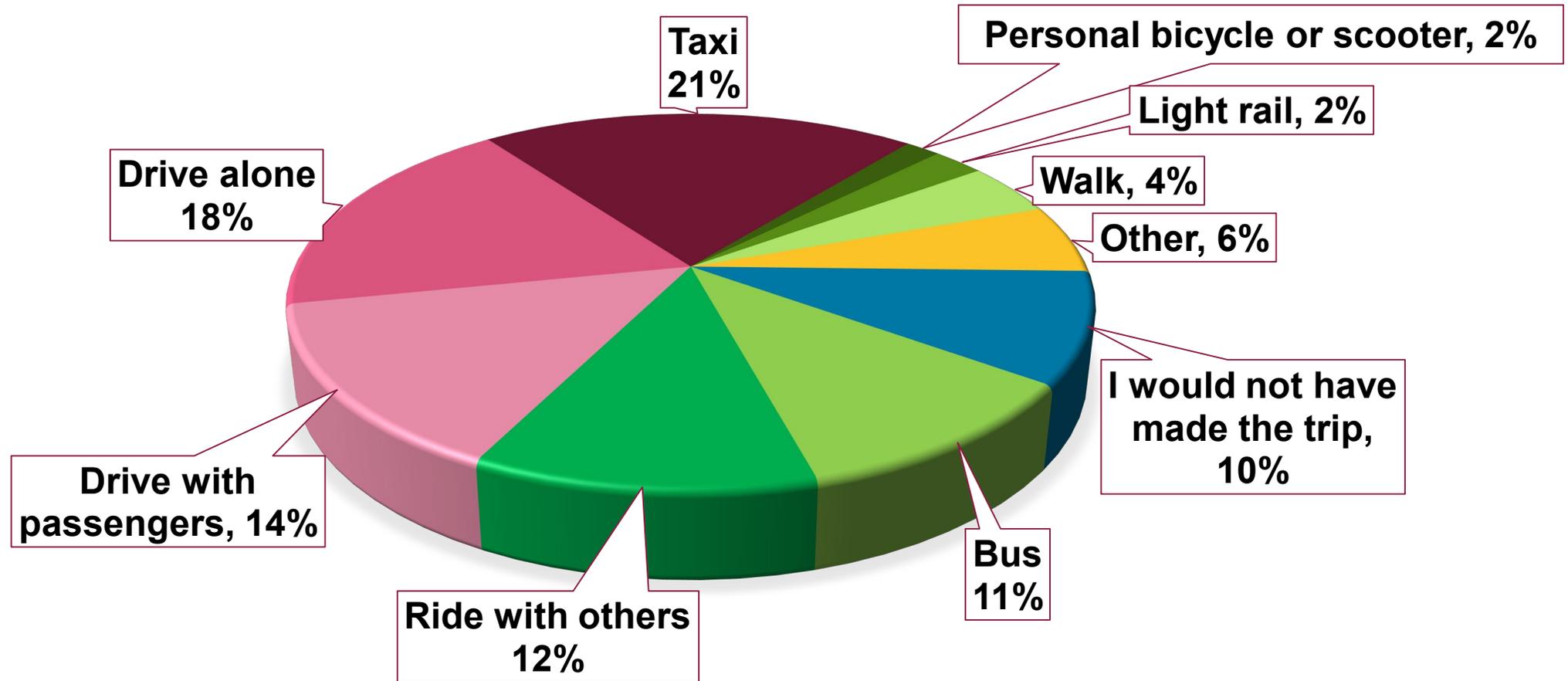


Traveling more in peak hours (due to multitasking)



Replacing Other Modes (N=1,219)

What alternative mode would you have used on your last ridehailing trip?





Message 3

AVs may **not** cause significant increase in **commute** VMT.

AVs can lead to **increase in VMT** due to **zero-occupant miles, extra discretionary travel, and more long-distance trips.**

AVs will likely **replace** some active modes, carpool, and transit trips.

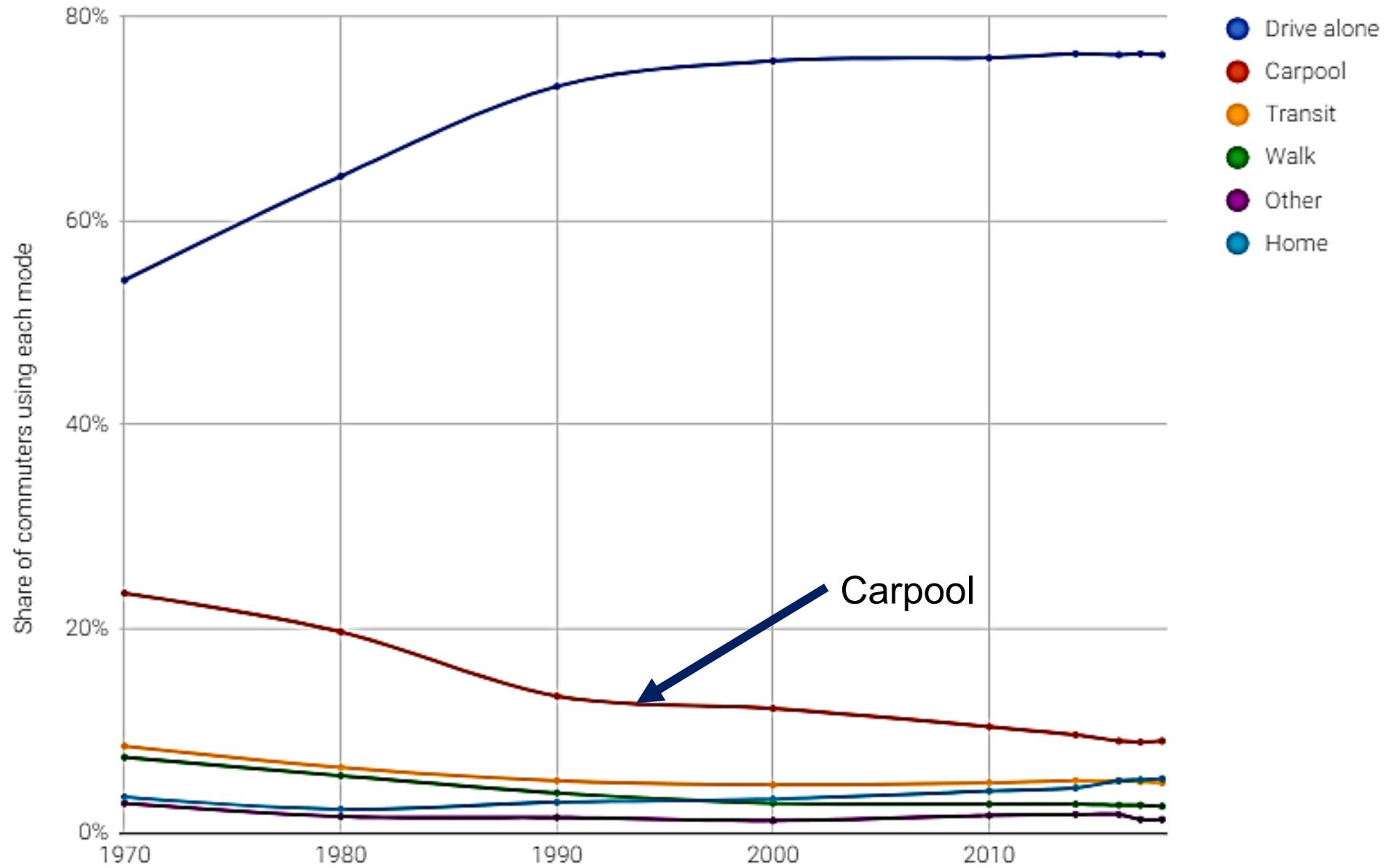


Question 4

To what extent will people share rides in an automated future?

Commute Mode Shares in the US

U.S. commuter mode share to work



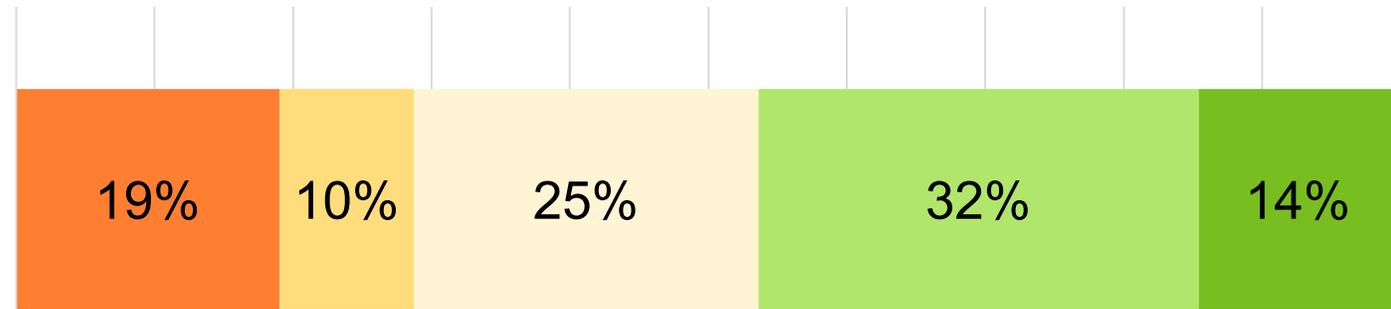
Ridehailing: Ride-Sharing

	Last trip using ridehailing in Atlanta and Austin		
	Private service or shared service alone	Shared ride with familiar people	Shared ride with unfamiliar people
Sample size	1093 (89%)	78 (6%)	59 (5%)
Age (Average)	41.4 years	32.3 years	32.9 years
Gender (%Female)	49%	68%	72%
Median income	\$50,000 to \$99,999	\$50,000 to \$99,999	\$25,000 to \$49,999
Trip duration (Average)	22.2 minutes	17.1 minutes	42.1 minutes

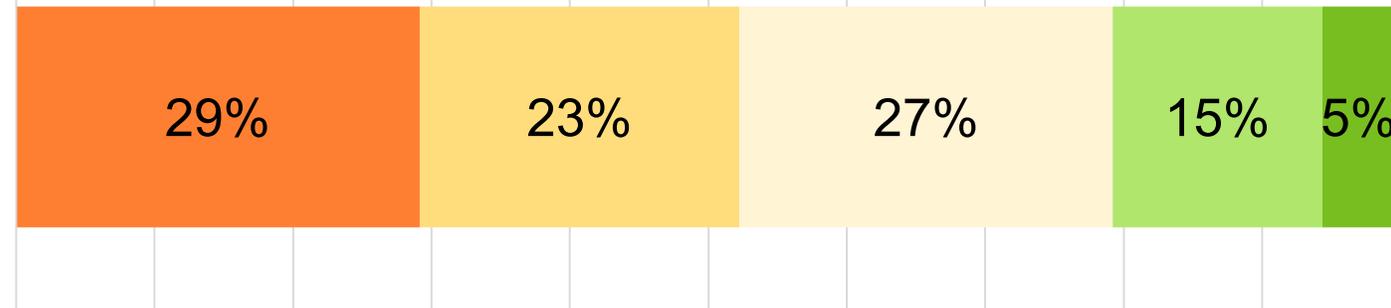
AV Future: Willingness to Share

Strongly disagree Somewhat disagree Neutral Somewhat agree Strongly agree

I will use AV ridehailing services alone or with coworkers, friends, or family. (N=3358)



I will use AV ridehailing services with other passengers I don't know. (N=3358)



Message 4

We cannot count on **AV-service** ridesharing to happen on any significant scale.

And **pricing** ownership and solo-driving/riding could be problematic and regressive.

Will a sustainable AV future prove elusive?



Picture source:
Cartoon Stock

POST-COVID Behaviors (N= 8723 across US)

www.covidfuture.org

Work-from-home

25% of workers expect to increase their WFH frequency

Personal Air Travel

13% expect to increase*

36% expect to decrease*

Business Air Travel

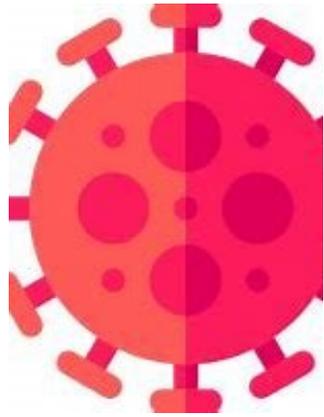
12% expect to increase**

40% expect to decrease**

Online Shopping

21% expect to increase online non-grocery shopping

16% expect to increase online groceries for delivery



Concluding Thoughts

T4 Survey paints a challenging picture:

- Low adoption/trust
- No (very low) true sharing
- More non-commute VMT

Complex interrelationship between **technology and pandemic impacts** not well understood

Need a stronger **dialogue** between the **automation and travel behavior communities**

Integrate **travel behavior data** to proactively design a **sustainable and efficient AV future**



Picture source: ThinkStock

Thank you!

Sara Khoeini, sara.khoeini@asu.edu

Full citation: Khoeini, S. , Capasso da Silva, D., & Pendyala, R.. ” Attitudes, Behaviors, and Choices toward Autonomous Vehicles”. Presented at Automation Committee Meeting, ACP30; Transportation Research Board; January 14, 2021.