

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

# ***Autonomous Vehicles: Familiarity, Awareness, and Perceptions***

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# Autonomous Vehicle Definition

An **Autonomous Vehicle (AV)** is a vehicle that drives itself **without human supervision** or control. It **picks up and drops off** passengers including those who do not drive (e.g., children, elderly), goes and **parks itself**, and **picks up and delivers laundry, groceries, or food orders** on its own. When AVs become available, ridehailing companies (e.g., Uber and Lyft) will use them to **provide rides without a human driver** in the vehicle. When answering the questions in this section, please assume a future in which **autonomous vehicles (AVs) are widely adopted, but human-driven vehicles are still present.**



## SAE J3016™ LEVELS OF DRIVING AUTOMATION

	SAE LEVEL 0	SAE LEVEL 1	SAE LEVEL 2	SAE LEVEL 3	SAE LEVEL 4	SAE LEVEL 5
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged – even if you are seated in “the driver’s seat”		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	
	These are driver support features			These are automated driving features		
What do these features do?	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met	This feature can drive the vehicle under all conditions	
Example Features	<ul style="list-style-type: none"> <li>• automatic emergency braking</li> <li>• blind spot warning</li> <li>• lane departure warning</li> </ul>	<ul style="list-style-type: none"> <li>• lane centering OR adaptive cruise control</li> </ul>	<ul style="list-style-type: none"> <li>• lane centering AND adaptive cruise control at the same time</li> </ul>	<ul style="list-style-type: none"> <li>• traffic jam chauffeur</li> </ul>	<ul style="list-style-type: none"> <li>• local driverless taxi</li> <li>• pedals/steering wheel may or may not be installed</li> </ul>	<ul style="list-style-type: none"> <li>• same as level 4, but feature can drive everywhere in all conditions</li> </ul>

Source: Society of Automation Engineers

# Previous Studies

## Benefits

- Increased safety
- Enhanced mobility
- Increased roadway capacity
- No need to drive or park the car
- Multitasking
- Carsharing

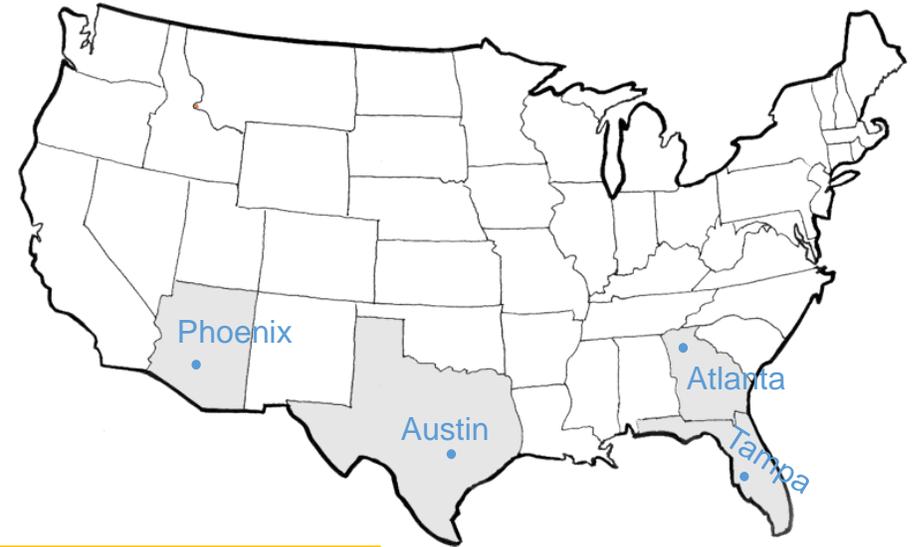


## Concerns

- Increase in VMT
- Increase in congestion
- Reduced vehicle occupancy
- Liability
- Data security
- Safety

# 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
<b>Sample Size</b>	1,027	944	1,127	260	<b>3,358</b>
<b>%</b>	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

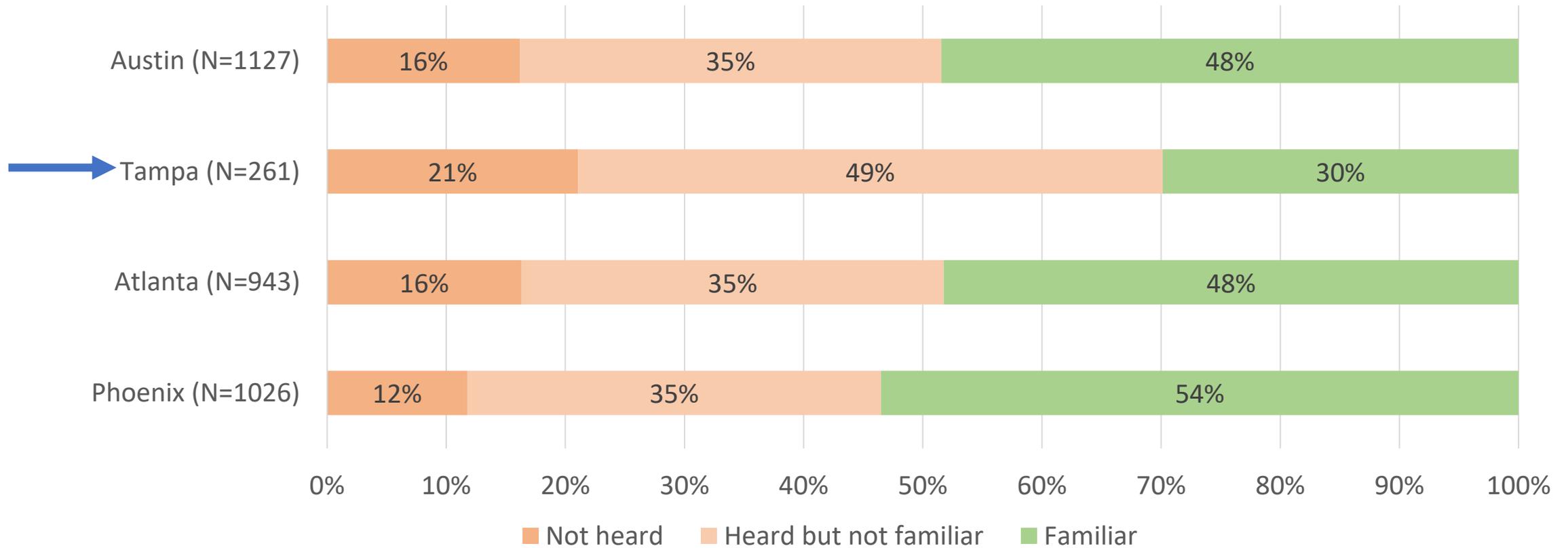
**Familiarity**  
**Perceptions**  
**Willingness to ride**  
**Policies**

# AV Familiarity

Which of the following statements best describes your familiarity with AVs?

	N	%	
I had never heard of AVs before taking this survey.	512	15.2%	Not Heard 15%
I have heard of AVs, but don't know much about them.	1217	36.2%	
I am somewhat familiar with AVs.	1165	34.7%	Heard but not Familiar 36%
I am very familiar with AVs.	416	12.4%	
I have actually taken a ride in an AV.	46	1.4%	
Total	3358	100%	Familiar 49%

# AV Familiarity across Jurisdictions

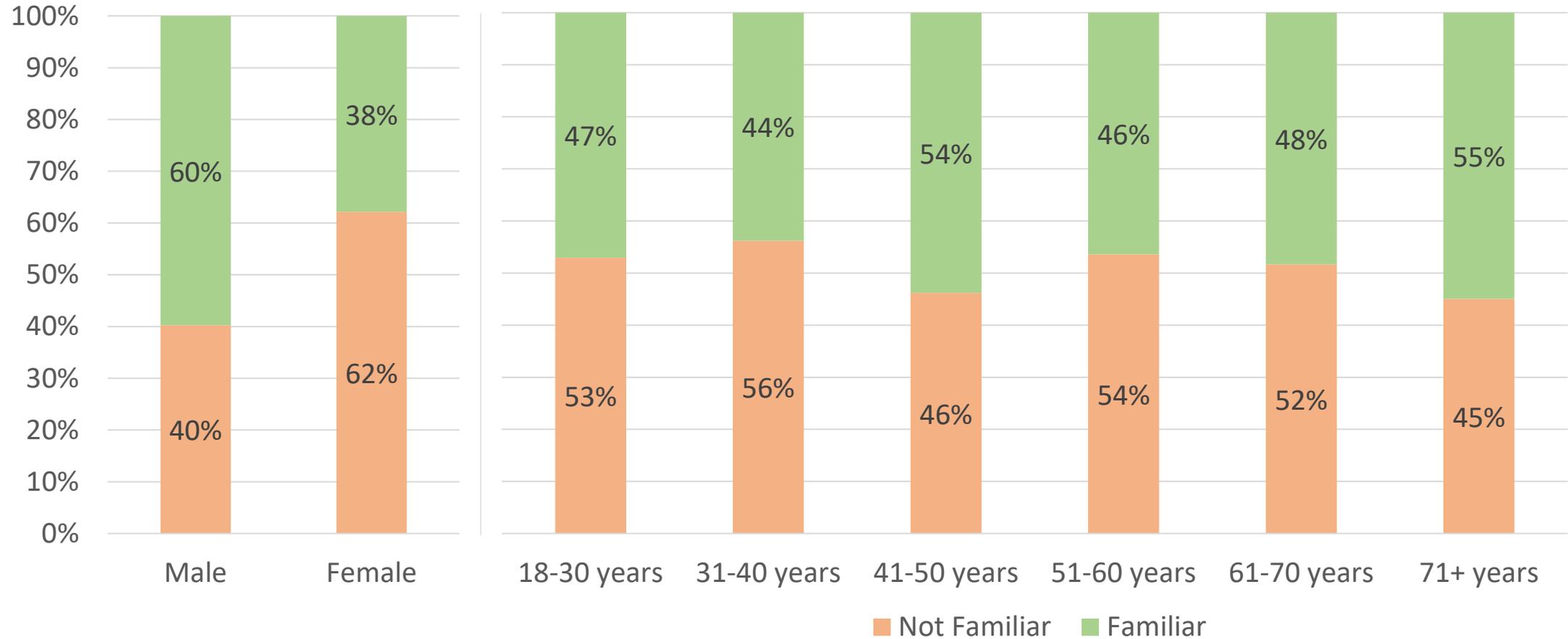


# AV Familiarity: Two Groups

	N	%	
I had never heard of AVs before taking this survey.	512	15.2%	} <b>Not So Familiar 51%</b>
I have heard of AVs, but don't know much about them.	1217	36.2%	
I am somewhat familiar with AVs.	1165	34.7%	} <b>Rather Familiar 49%</b>
I am very familiar with AVs.	416	12.4%	
I have actually taken a ride in an AV.	46	1.4%	
Total	3358	100%	

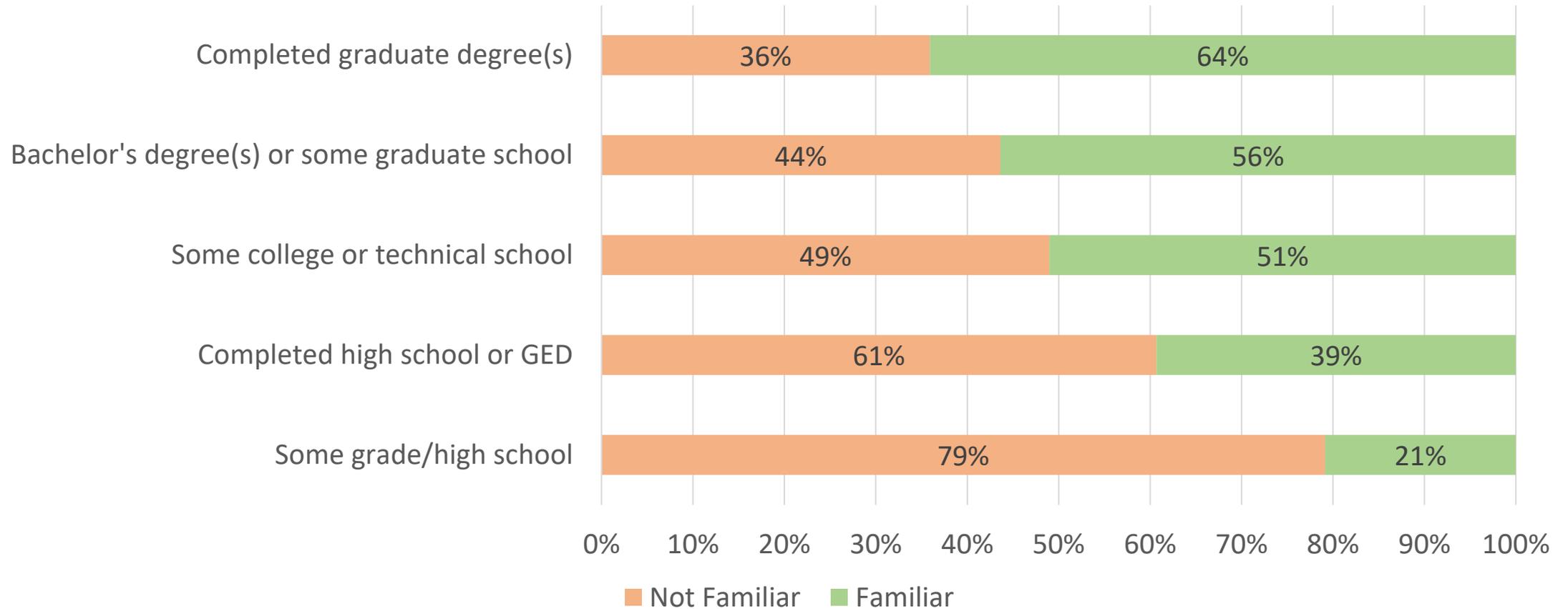
# AV Familiarity across Demographic Groups

N=3,355



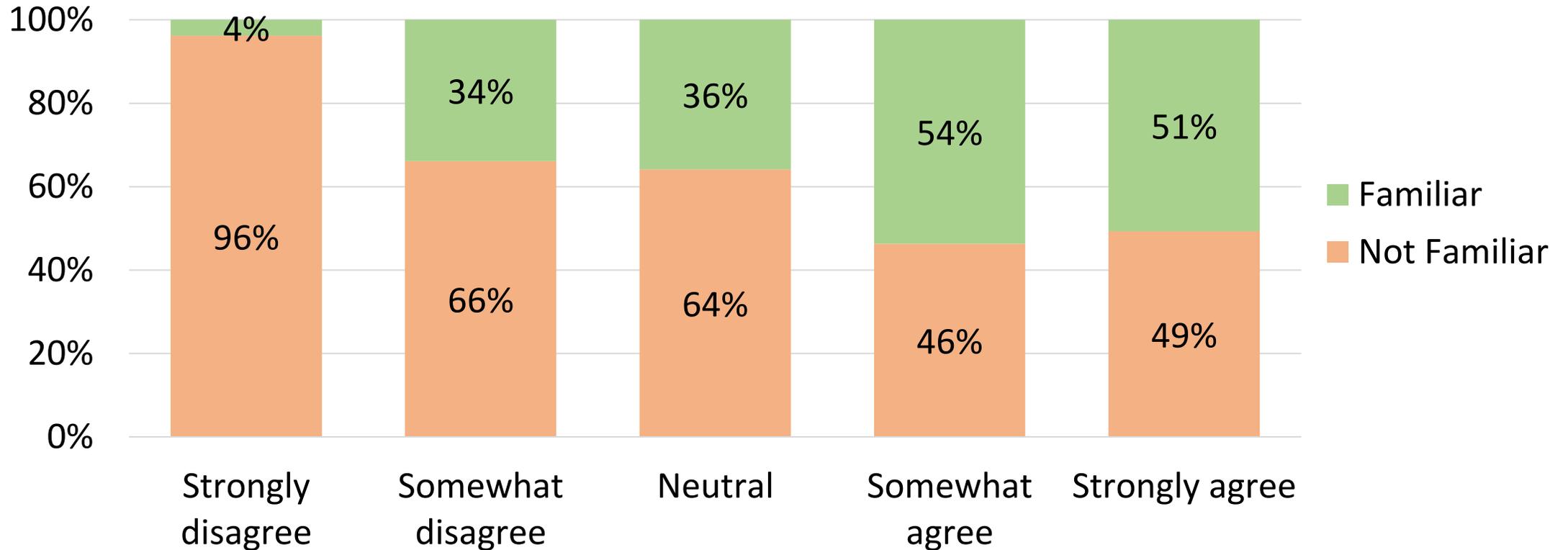
# AV Familiarity by Education Attainment

N=3,355



# AV Familiarity by Liking to Try New Things

N=3,356

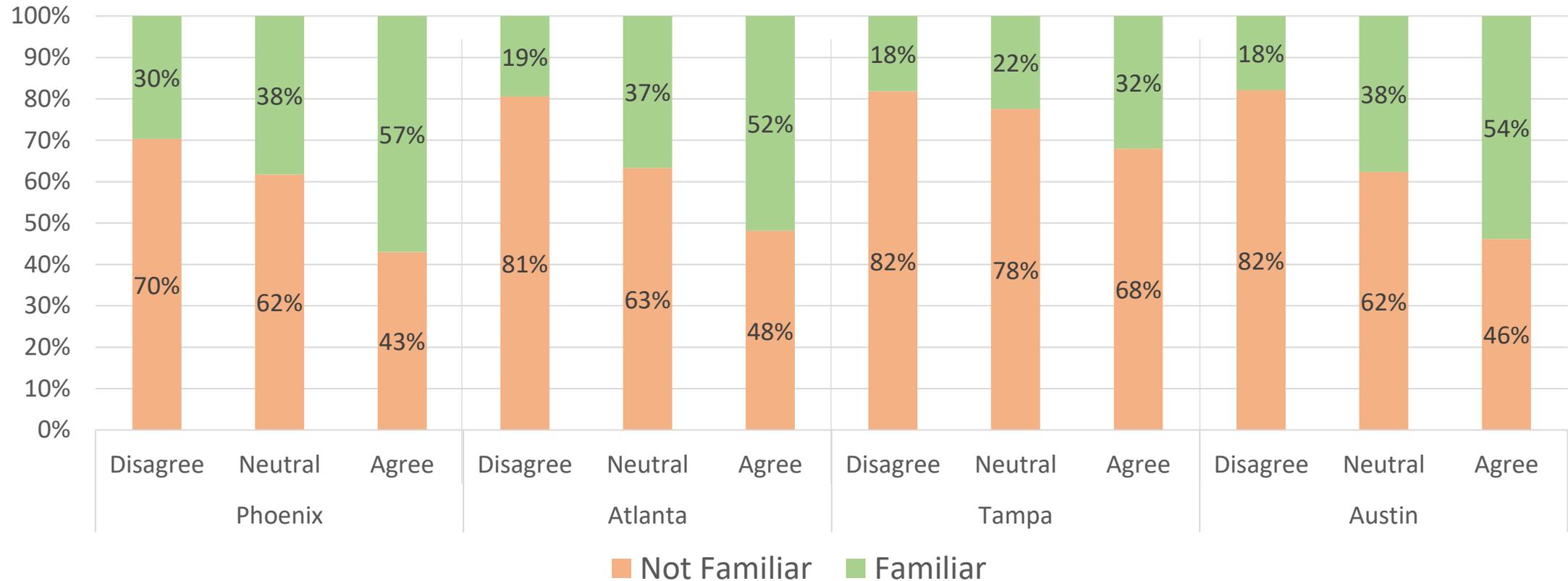


I like trying things that are new and different.

# AV Familiarity by Liking to Try New Things

N=3,356

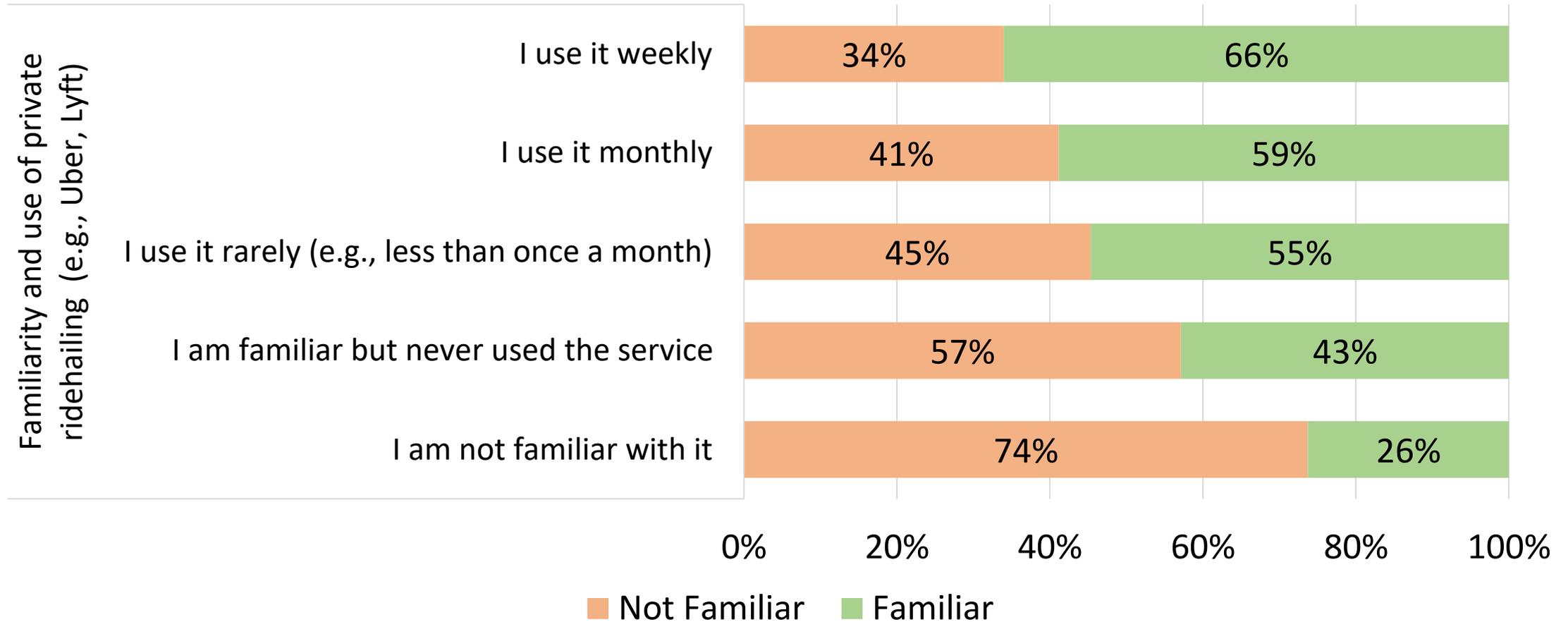
I like trying things that are new and different.



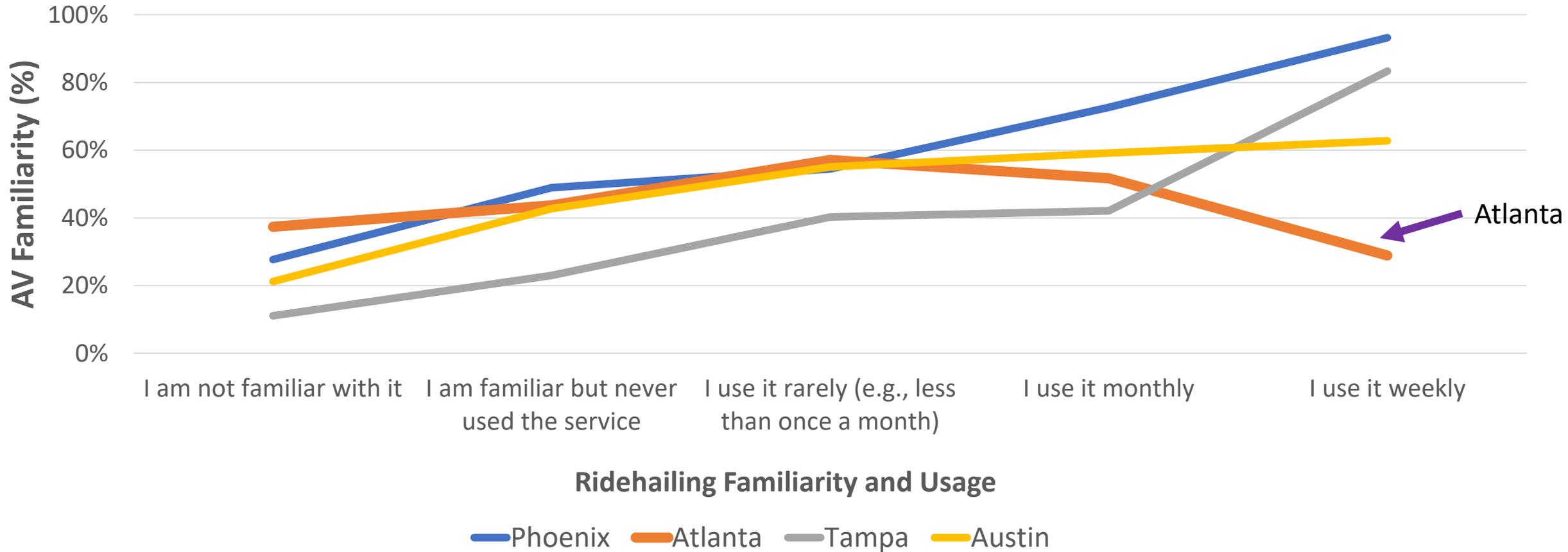
	Phoenix, AZ	Atlanta, GA	Austin, TX	Tampa, FL
Sample Size	1,026	930	1125	261

# AV Familiarity by Ridehailing Use

N=3,355



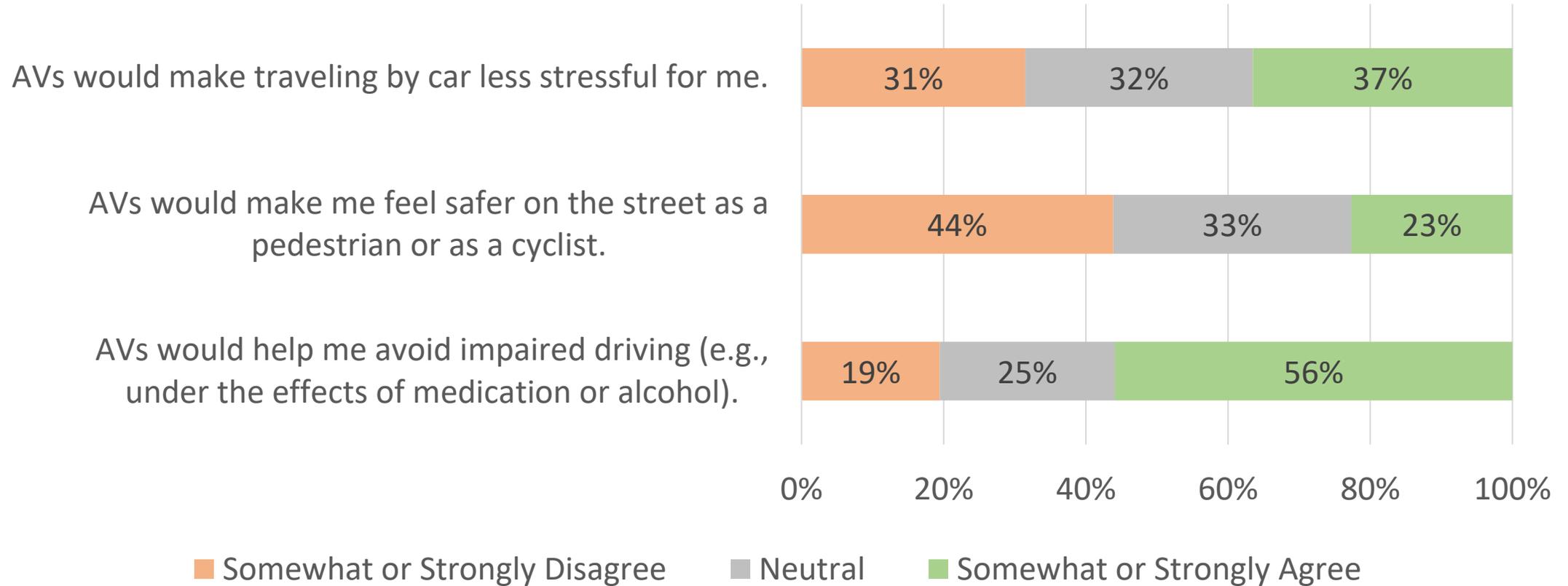
# AV Familiarity by Ridehailing Use Across Locations



	Phoenix, AZ	Atlanta, GA	Austin, TX	Tampa, FL
Sample Size	1,026	944	1125	260

# AV Positive Perceptions

N=3,356



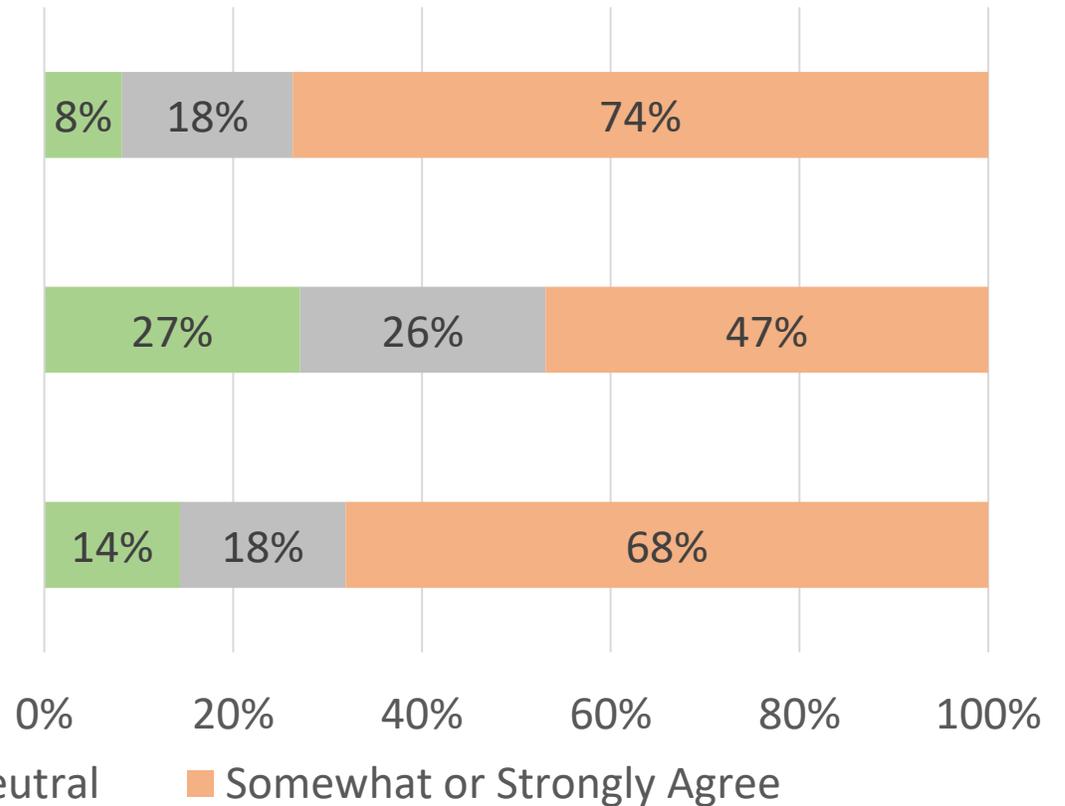
# AV Negative Perceptions

N=3,356

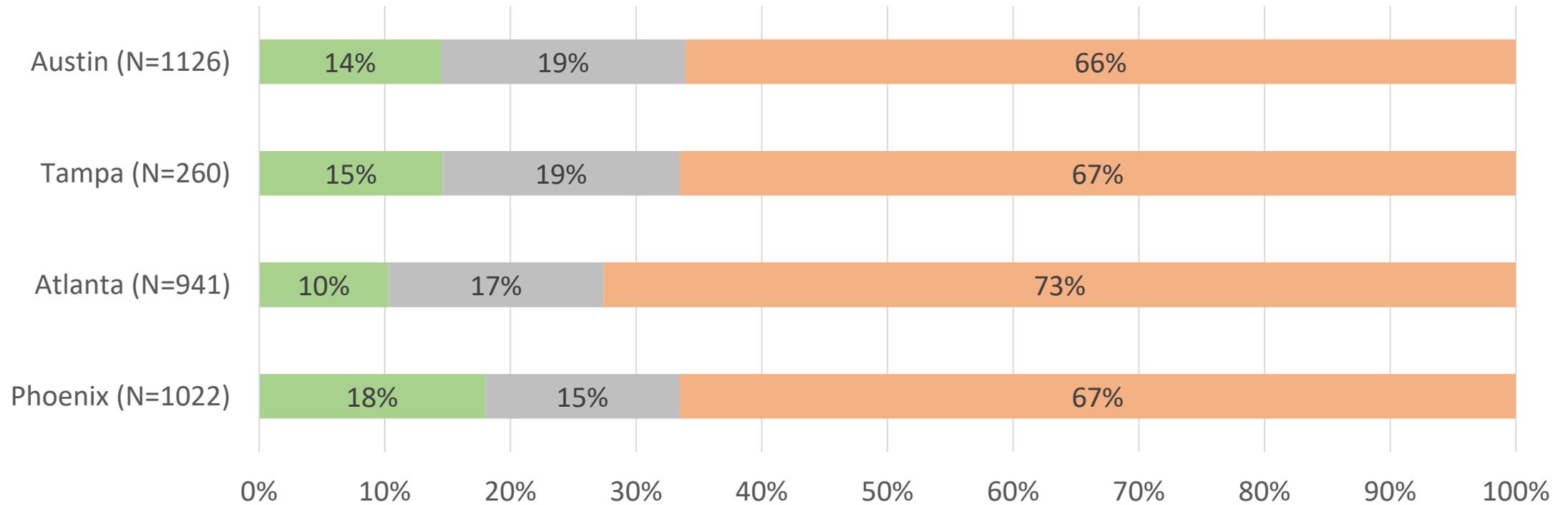
I want the ability to take control of the AV at any time during the ride.

I am concerned that my travel logs and personal information stored in AVs could be leaked.

I am concerned about the potential failure of AV sensors, equipment, technology, or programs.



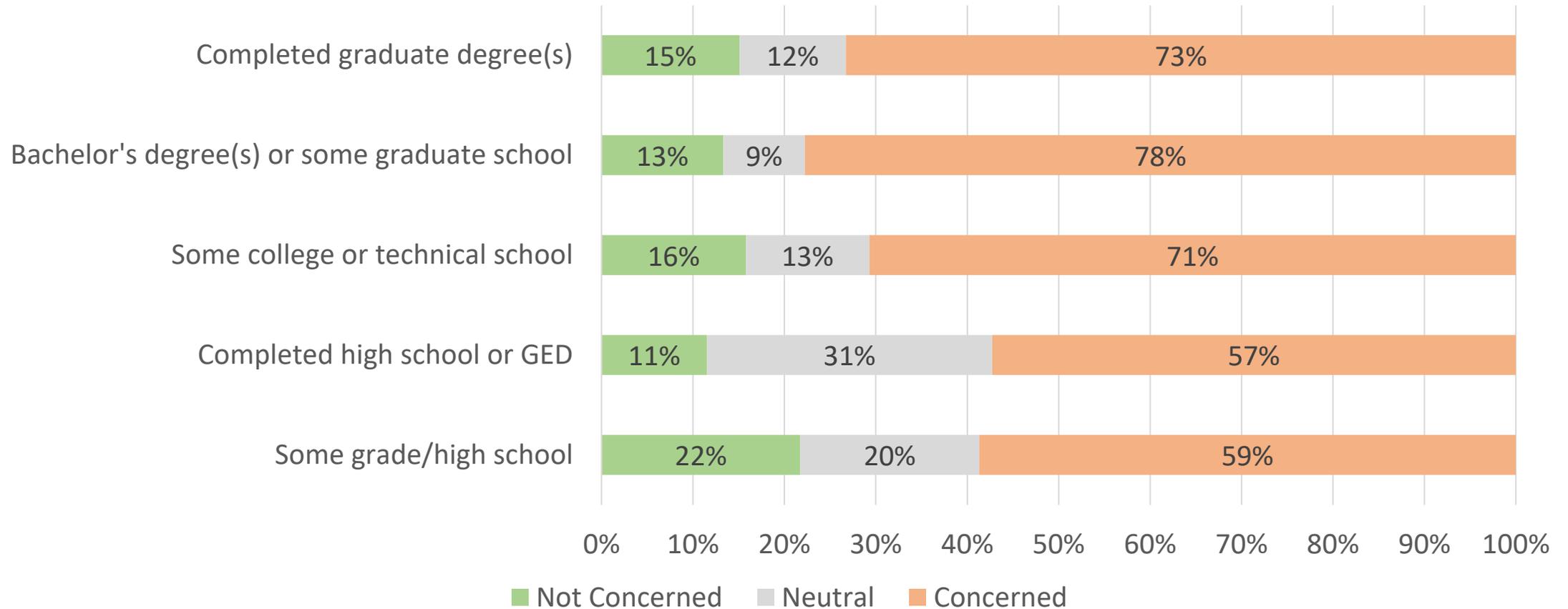
# AV Safety Concern Across Locations



I am concerned about the potential failure of AV sensors, equipment, technology, or programs.

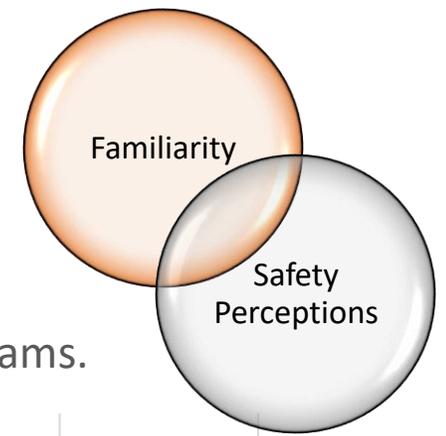
■ Disagree ■ Neutral ■ Agree

# AV Safety Concern and Education

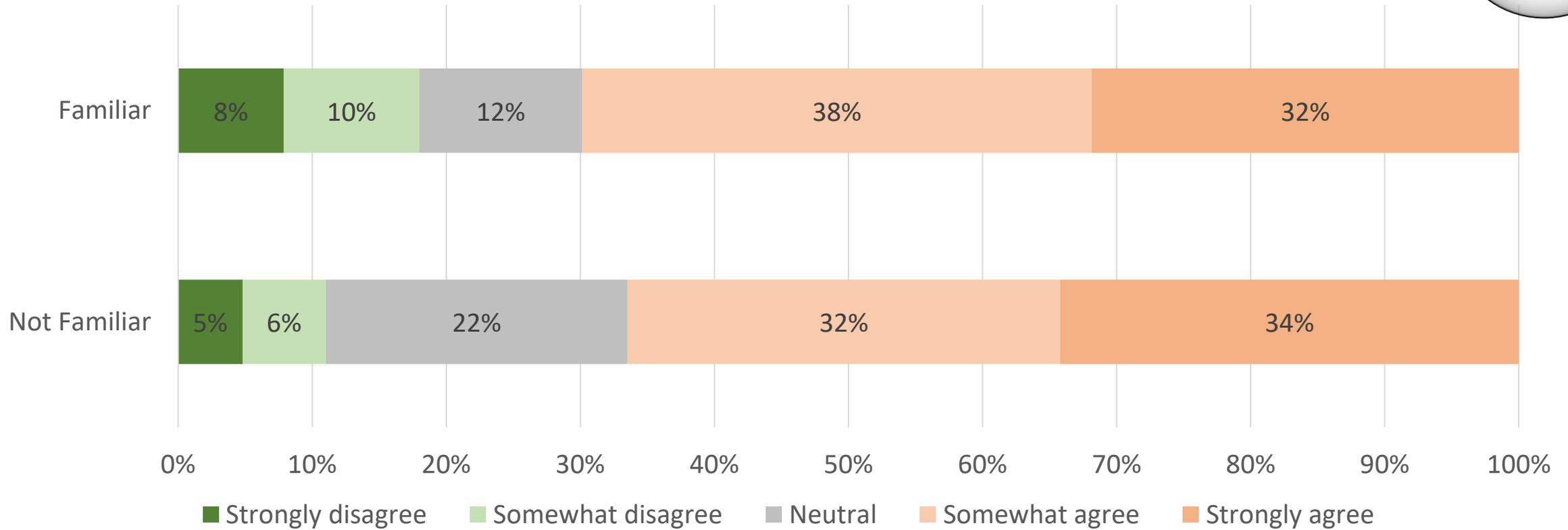


# AV Safety Concern by AV Familiarity

N=3,356



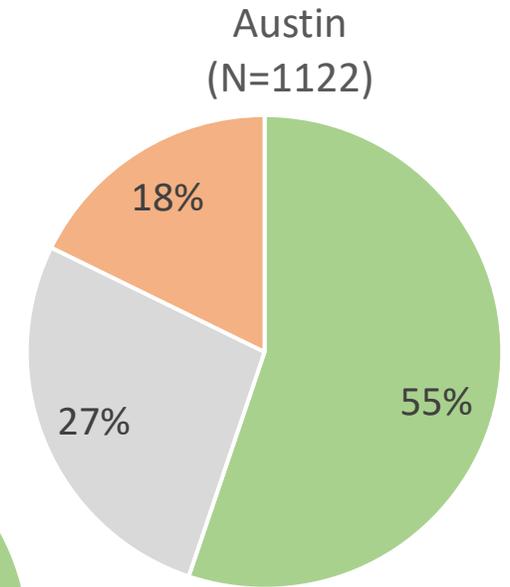
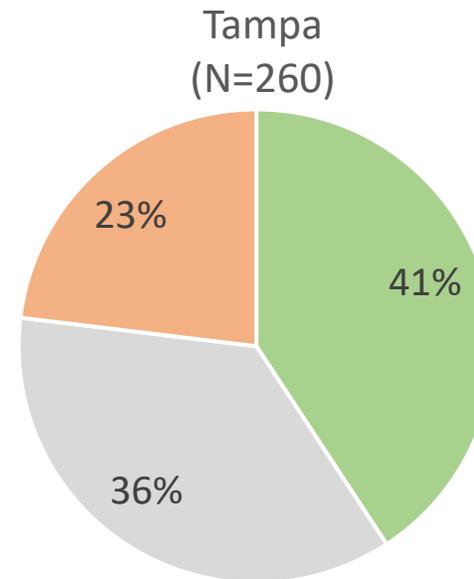
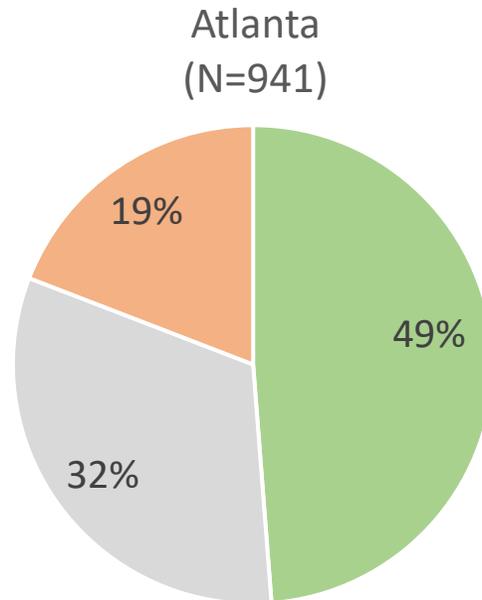
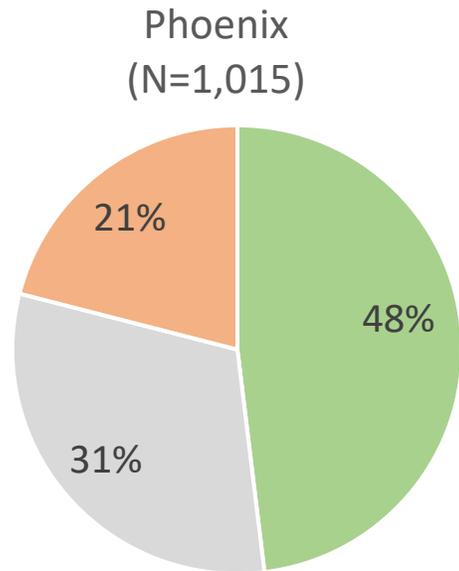
I am concerned about the potential failure of AV sensors, equipment, technology, or programs.



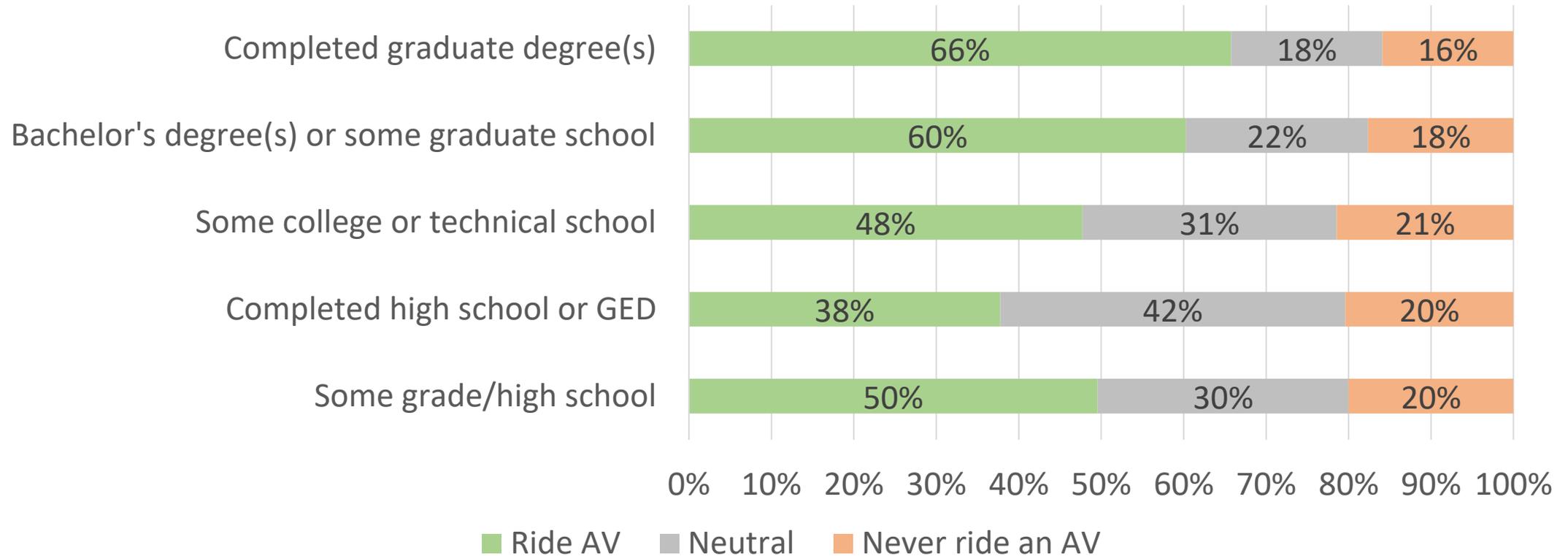
# Willingness to Ride in an AV Across Locations

## I will never ride in an AV.

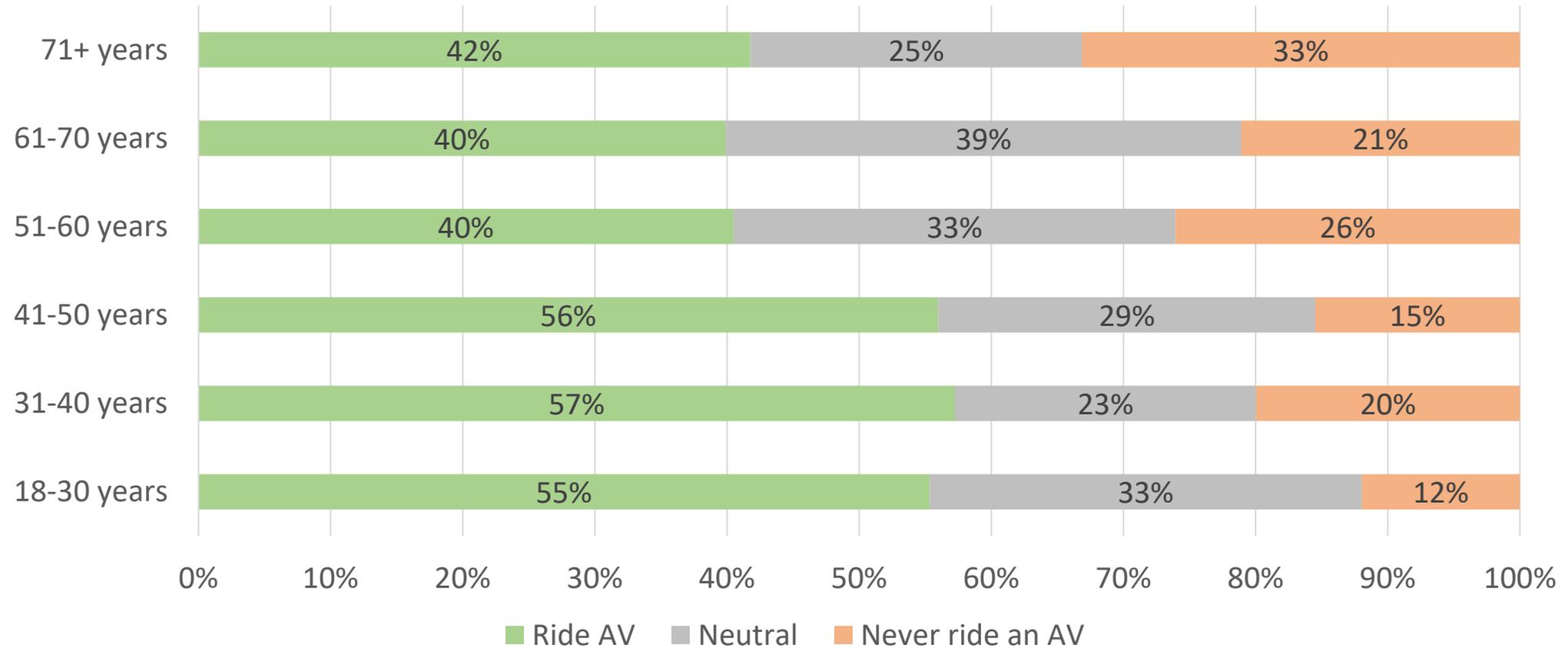
- Strongly or somewhat disagree
- Neutral
- Strongly or somewhat agree



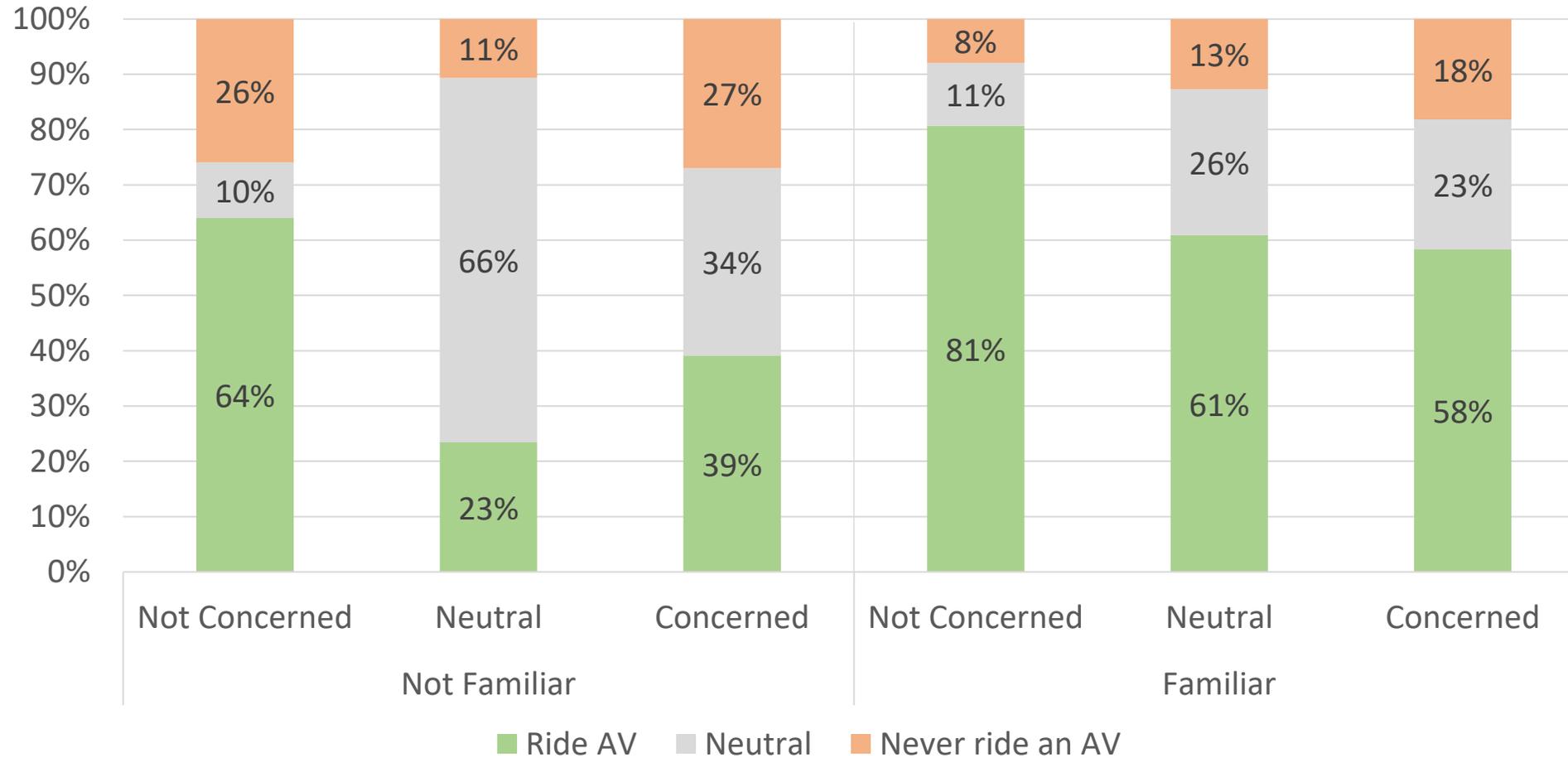
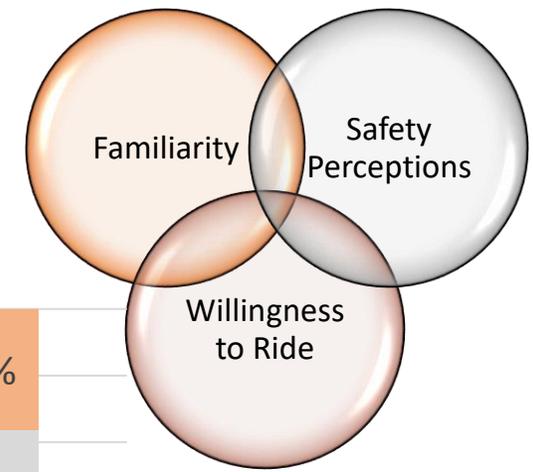
# Willingness to Ride in an AV by Education Levels



# Willingness to Ride in an AV by Age Group

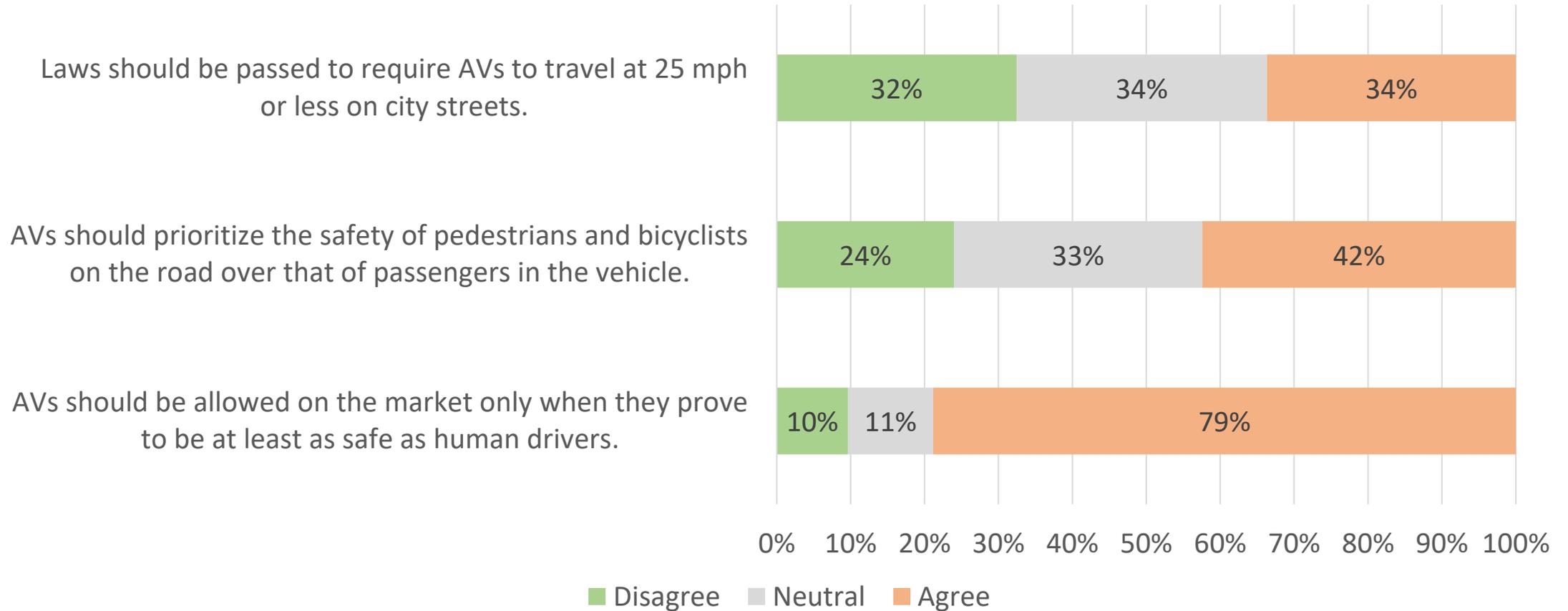


# AV Perceptions Relationships



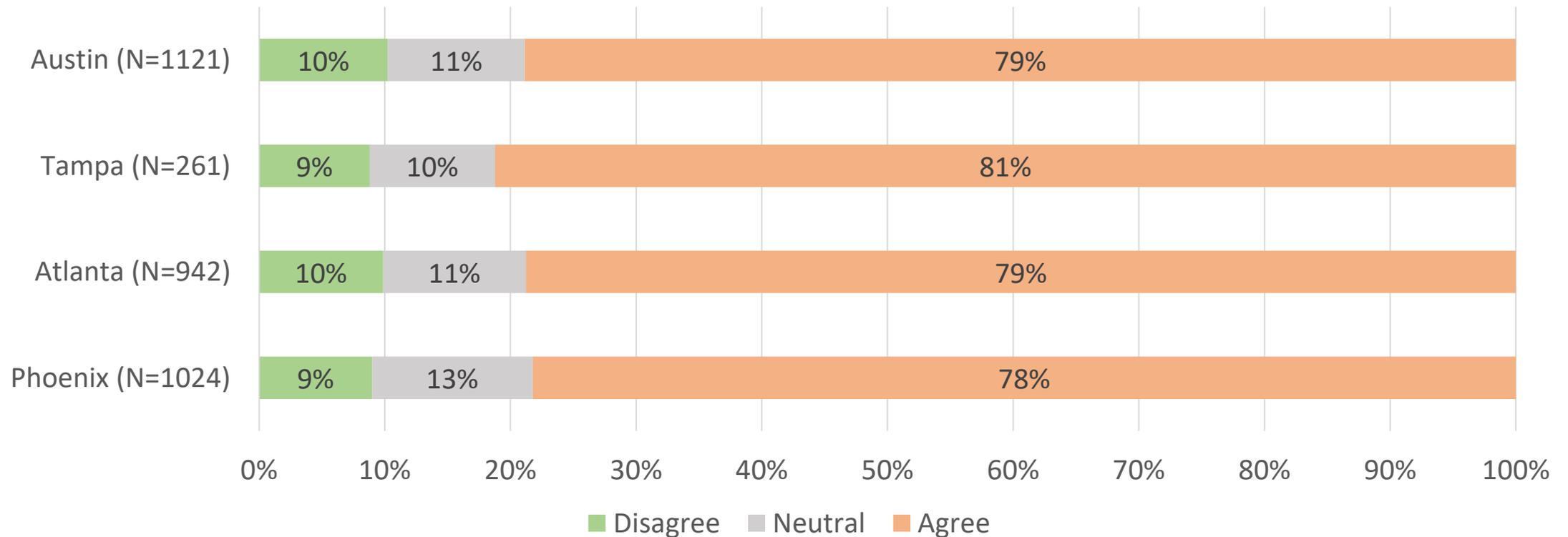
# Attitudes Towards AV Policies

N=3,356



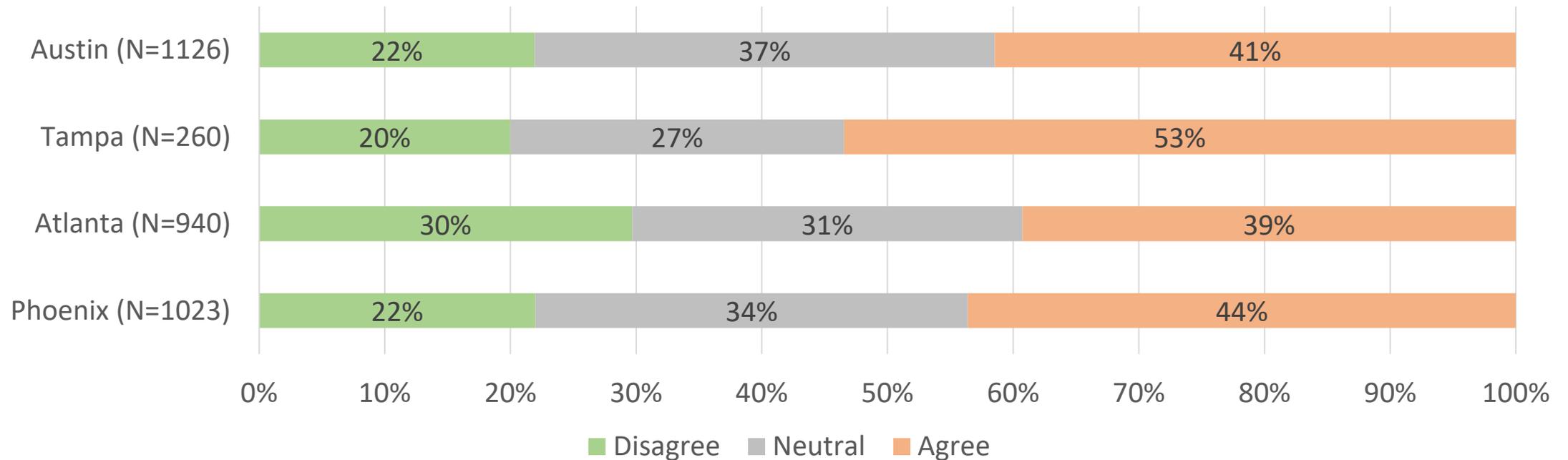
# Attitudes Towards AV Policies – Across Locations

AVs should be allowed on the market only when they prove to be at least as safe as human drivers.

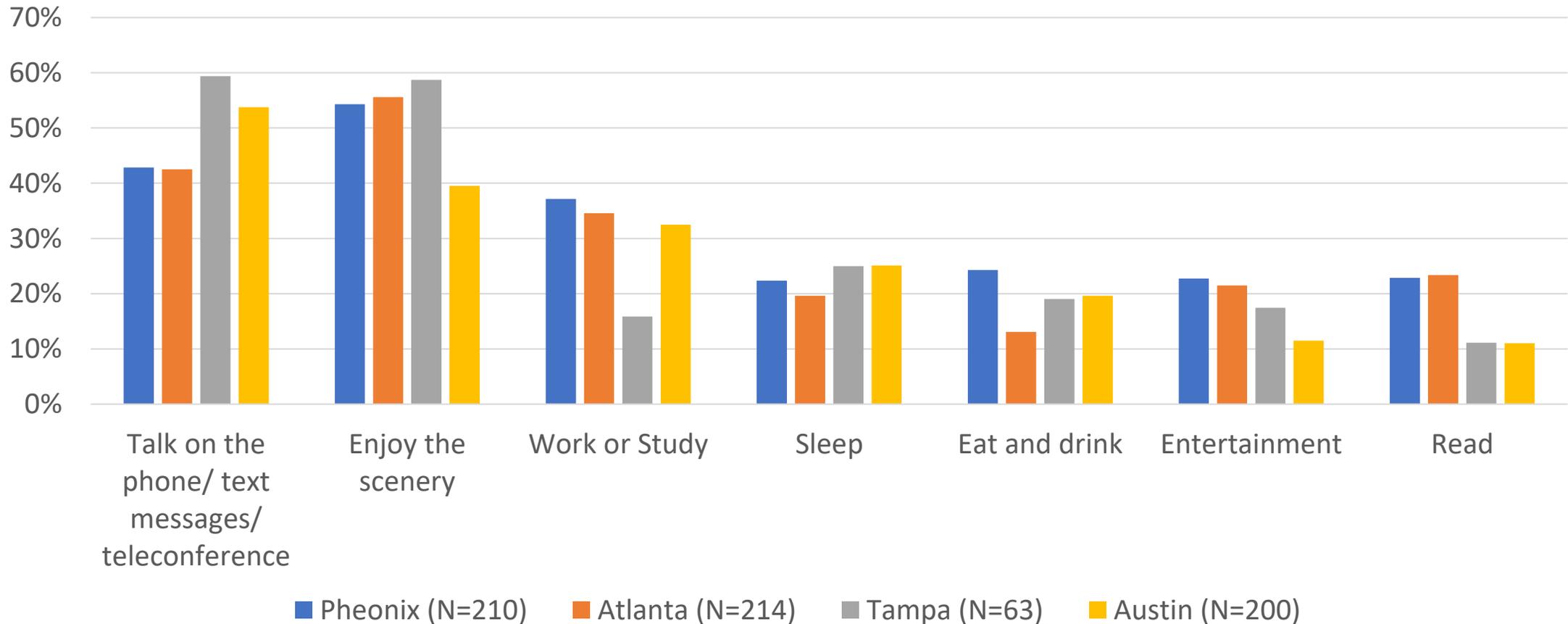


# Attitudes Towards AV Policies – Across Locations

AVs should prioritize the safety of pedestrians and bicyclists on the road over that of passengers in the vehicle.



# Multitasking in AV During Commute



# How AVs Shape the Future of Mobility?

N=3,356

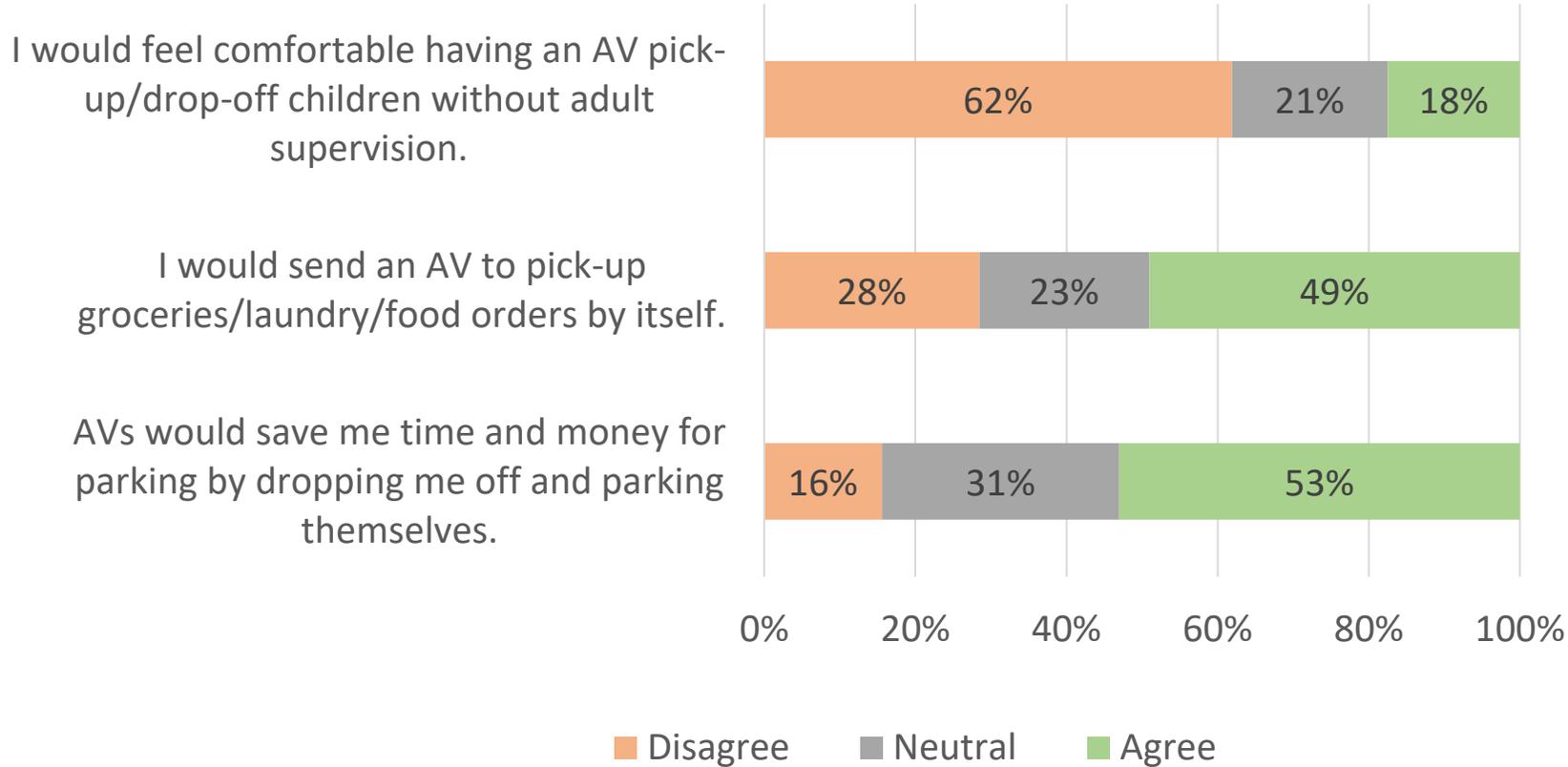


Photo: Brian Tietz for Transdev



Photo: Ross D. Franklin, STF / Associated Press

# Key Findings across Locations

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## Phoenix

Highest AV familiarity and average willingness to ride

Lowest AV safety concern

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## Atlanta

Average AV familiarity and willingness to ride

Highest AV safety concern

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## Austin

Highest AV willingness to ride

Average AV familiarity

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## Tampa

Lowest AV familiarity

Lowest willingness to ride

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## Key Highlights

- AV familiarity, safety concerns, and willingness to ride are closely related to one another
- But familiarity does not necessarily eliminate concerns around safety
- Remarkable consistency and similarity between geographic areas, suggesting that transferability of assumptions may be quite high

## Next Step

- Further investigate relationships between AV familiarity, perceptions, and willingness to ride, both across locations and across demographic groups





**Thank you!**

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