

Challenges to Autonomous Vehicle Adoption Among Older Adults in the United States

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ABSTRACT

This study examines the adoption of autonomous vehicles (AVs) among older adults (ages 60 and older) in the United States (U.S.) and the main barriers that shape their perspectives. The purpose is to analyze how various characteristics, such as education, income, gender, and perceived safety, influence their readiness to use AVs. This topic is especially relevant for older adults, who may have declining physical abilities that limit their ability to drive safely. The survey results of 107 participants in this age group indicated that while some participants recognized the potential benefits of AVs, about 58.5% of participants expressed safety concerns as the most common issue. Only 19.8% of the participants expressed no hesitation toward autonomous vehicles. Although AVs have the potential to support independence and mobility, safety concerns and limited understanding of advanced technology are key barriers to widespread adoption among most older adults.

INTRODUCTION

As autonomous vehicle (AV) technology expands across cities in the United States, questions remain about its safety and adoptability among older adults. Companies, such as Waymo, are expanding options for autonomous rideshare services, and driverless trucks are beginning to operate on commercial routes (Lee, 2026, pp. 1-2). Consumers and lawmakers question whether this technology is safe and accessible for all populations. This issue is especially important for older adults, many of whom experience declining physical abilities and reduced competence to safely operate a vehicle. They may wonder whether they can depend on new technologies like AVs to maintain their independence and mobility (Blonar et al., 2021, p. 1). It is important for policymakers to consider the potential level of adoption of AV services among older populations, since there are approximately 61.2 million older adults aged 60 and older in the United States (Pollard, 2022, p. 3). AVs are not only associated with fewer motor vehicle accidents among elderly drivers on the roads, but they also improve the mobility and independence of older adults (Batbold et al., 2025, p. 2).

This study examines the challenges of AV adoption that the older population in the United States has expressed. To better understand the perspectives of older adults (aged 60 and older), the current study not only included a national survey of 107 seniors to understand how their education, income, gender, and willingness to ride in an AV are interconnected, but also whether geographic location impacted adoption.

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The results provide direct insight into how older adults perceive the safety and reliability of driverless transportation. Although autonomous vehicles offer significant benefits for seniors, widespread adoption requires addressing technological limitations, regulatory deficiencies, and their general reluctance toward driverless vehicles (Shu & Woo, 2025, p. 3).

LITERATURE REVIEW

The history of AVs is marked by four distinct eras: the early foundations of research and development, proof-of-concept of independent navigation, the application of artificial intelligence (AI), and lastly, commercialization (Alfonso et al., 2024, pp. 1-2). By 2017, the advent of AVs on the roads as a ridesharing service began with Google subsidiary Waymo, offering the first robotaxi rides in Phoenix, Arizona (White, 2025). Subsequently, the technology expanded into cities such as San Francisco, Atlanta, Los Angeles, Austin, and Miami (Waymo, 2026).

Complexity of Rideshare Applications

Waymo's ride-hailing app may be too complex for older adults, who may only have basic technological literacy. This suggests that digital literacy and limited experience, rather than the AV itself, may be the most significant barriers to adoption among older adults. The complexity of app-based services may discourage them from using AV rideshare platforms, despite the potential to improve older adults' quality of life and independence. Another concern for older adults is that current technology is still developing, which raises concerns about safety and reliability (Xiao et al., 2024, p. 2). Additionally, existing laws and policies do not fully address the responsibilities and protections required for this new technology. Questions about fairness, ethical decision-making, and accountability remain unanswered (MacCarthy, 2025, p. 1). These unresolved issues may increase uncertainty and reduce trust among older adults, which will further limit their willingness to adopt autonomous vehicle technology.

Mobility and Independence

For seniors, reliable transportation is essential for quality of life and independence as it provides mobility (Lin & Cui, 2026, p. 1). They want to safely and reliably go where they want to go, when they want to go, and how they want to go (Stozle et al., 2025, p. 2). Older adults will greatly benefit from a vehicle that can provide rides for them at any time or in any weather condition, without relying on another driver (Downey, 2025, p. 1). Furthermore, as people age, their number of independent daily trips tends to decline, mostly due to increased physical limitations and reduced reliable transportation (Siegfried et al., 2024, p. 3). The decrease in independence emphasizes the importance of alternative transportation solutions, such as AVs, that could help seniors to maintain their independence.

A key factor required in achieving mobility for seniors is the change to primary reliance on a private vehicle (Coenegrachts et al., 2025, p. 1). As changes in their health occur, such as declining vision and

slower reaction times, the dangers in driving may increase for themselves and those around them (Albert et al., 2018, pp. 1-3). Older adults need access to transportation to make everyday life easier and safer (Levin, 2019, p. 4). For example, they need the ability to get to and from doctors' appointments, the grocery store, and other essential errands. Without a dependable transportation solution, older adults may feel isolated and may experience reduced social activities and access to essential services. These factors for seniors reinforce the importance of transportation access as a key component in overall quality of life and social well-being.

Because AVs do not require self operation, they have the potential to address challenges by providing safe and reliable transportation. The potential benefits of adopting AV technology include enhanced mobility, efficiency, convenience, economic and societal benefits, and safety (Bayne et al., p. 2). This suggests that autonomous vehicles may address many of the mobility challenges faced by older adults through increased access to reliable transportation options allowing this group to remain independent.

Trust and Psychological Barriers

Many older adults are hesitant to adopt new transportation technologies because they feel concerned about safety and reliability. Furthermore, unfamiliar systems can reduce their trust in automated or unfamiliar mobility services (Chen, 2026, p. 5). They also have little interest in owning or even leasing an AV, and they maintain negative opinions about this advancing technology. They may wonder how well it works, and they fear relinquishing control (Eby et al., 2025). These studies indicate that when older adults perceive risk and feel anxious about unfamiliarity with technology, their reluctance toward AVs can become a prominent barrier to adoption for many. As a result, building trust through user-friendly design is crucial for the population of interest to benefit from using AV rideshare services such as Waymo (Rosa et al., 2023, p. 1).

In addition, media coverage of AV-related accidents and negative public attention may further erode trust and reinforce unfavorable perceptions (Templeton, 2026, p. 1). For example, widely-reported crashes involving self-driving technology reduce seniors' willingness to adopt these services (Schoettle & Sivak, 2025, p. 5). Such incidents may influence seniors to perceive AVs as unreliable or unsafe, even if the overall safety data suggests that AVs are a much safer alternative (Kusano et al., 2025, pp. 1-2). Their perception of risk, rather than actual safety data, may play a significant role in shaping their attitudes toward acceptance and implementation.

Because older adults often prioritize safety and predictability in transportation (Lin & Cui, 2026, p. 2), addressing public concerns through education and improved safety records will be essential for increasing trust in AV services. This hesitation may slow the adoption of autonomous vehicle services by the older adult population (Fisher et al., 2021, p. 1). Policymakers and developers must therefore clearly communicate how the technology works and what safeguards are in place. By doing so, fear can be reduced and confidence can be built among this group considering autonomous transportation. Even if

AVs provide continued mobility benefits, psychological barriers must be addressed before widespread adoption can be feasible.

Technological Limitations

AVs depend on advanced systems, such as AI, cameras, and sensors, to guide driving decisions, and older adults may feel less safe in this environment due to the lack of familiarity (Park et al., 2024, p. 5). Autonomous vehicles are not immune to technological limitations, even though they are designed to reduce human error (Park et al., 2024, p. 2). These systems are still in development and may not always respond correctly in unpredictable environments. Construction zones, poor weather, or unexpected human behavior (Chu et al., 2026, p. 1) are elements that could impact the safety of an AV. These limitations may reinforce concerns among older adults who prioritize predictability and control in transportation.

Seniors, therefore, often show lower trust in new transportation technologies because they feel unfamiliar with the complex systems. These safety concerns can increase their hesitation and unwillingness to rely on automated services (Anderson, 2025, p. 4). This research suggests that uncertainty can be exacerbated if they perceive the systems as unreliable or difficult to understand (Biastroni & Genre, 2024, p. 6). Even minor failures or inconsistencies in technology will significantly impact older adults' willingness to use an AV. Furthermore, regulatory frameworks that govern autonomous vehicle technology remain underdeveloped and inconsistent across states. These different factors increase uncertainty about liability and accountability for users and policymakers alike (MacCarthy, 2025, p. 1).

In addition, because advancing AV technology has outpaced current regulations, gaps arise that reduce clarity about who should be legally held responsible when accidents that involve automated systems occur (Patel, 2021). This uncertainty can also contribute to reluctance among older adults, as they may feel vulnerable in situations involving new and complex technology (Fisher et al., 2021, p. 3).

Research Gap and Current Study

Although existing literature examines public perceptions of AVs, very few studies focus specifically on older adults' perspectives. Older adults often lack confidence in AV technology and its ability to keep them safe (Nguyen, 2019, p. 1). Current research does not fully represent the specific concerns and experiences of older adults as a group. Without focusing on this population, AV development and policy decisions may overlook key user needs, which will limit adoption and reduce accessibility for this group.

To address this gap, the present study includes a survey of 107 seniors to explore their comfort levels and willingness to try AV/driverless transportation. The inclusion of data from older adults emphasizes that they are a large portion of the population that could be using AVs, and that their hesitations should be studied further.

METHODOLOGY

Participants

A total of 107 participants, aged 60 and older, completed a nine-question survey. Both in-person visits to senior facilities and emailed surveys to facilities in California, the Pacific Northwest, the South, and the Northeast were used to recruit participants. These recruitment methods were used to reflect geographic and socioeconomic diversity.

Data Collection

Data for this study were collected using a mixed-methods survey administered in person and by email, designed to reach a broad sample of older adults in the United States. Researchers visited senior centers across San Diego, California, to distribute paper surveys.

Participants were selected through senior homes and group activities where many older adults would be present and these locations were chosen to represent older adults from a wide array of socioeconomic, educational, racial, and geographic backgrounds. In addition to in-person data collection in San Diego, California, surveys were emailed to senior centers and homes in various regions of the Pacific Northwest, the Northeast, and the South. Ten multiple choice questions were provided in a single paper packet to each participant to be completed by hand. No question was mandatory and participants were instructed to select only one answer. Additionally, participants' surveys who resided outside of San Diego, were scanned and emailed to researchers to be coded in Microsoft Excel. In order to analyze and summarize the data, multiple choice responses were assigned a number between zero and three to represent choices a,b,c, and d respectively. Once compiled, the data were analyzed and examined using descriptive statistics, cross-tabulations, Chi-Square tests, and logistic regression.

RESULTS

Descriptive Statistics

The survey sample reflected a range of income levels, educational backgrounds, and racial identities (Table 1). Income distribution was spread across three main groups: 32.1% of respondents reported earning more than \$164,000 annually, 31.1% reported earning less than \$55,000, and 30.2% reported earning between \$55,000 and \$164,000. A small portion (6.6%) did not disclose their income. In terms of education, a majority of participants (51.9%) reported completing college, while 28.3% held advanced or specialized degrees. The remaining 19.8% had a high school level education. Racial demographics showed that most respondents identified as White/Caucasian (63.2%), followed by Latinx (18.9%), African American (11.3%), and Asian American (6.6%).

The survey was later balanced to better fit the U.S demographic. While 107 participants completed the survey, the final regression analysis used 98 observations due to the exclusion of participants with missing demographic data. Specifically, those who declined to report income levels.

Table 1
Participant Demographic Characteristics

Characteristic	<i>n</i>	%
Gender		
Female	67	63.8%
Male	38	36.2%
Race		
White / Caucasian	67	63.2%
Latino(a)	20	18.9%
African American	12	11.3%
Asian American	7	6.6%
Education		
High School	21	19.8%
College	55	51.9%
Advanced / Specialized Degree	30	28.3%
Previous AV Experience		
No	96	90.6%
Yes	10	9.4%

Note. *N*=106 for demographics; *N*=105 for Race. Total percentages may slightly deviate from 100% due to rounding.

Variable 1: Employment and Living Situation

This variable examined participants' employment status and living arrangements. The majority of respondents (65.1%) were not currently employed, while 34.9% were employed. In terms of living

situation, most participants reported living independently in a house or apartment (87.7%), with smaller proportions residing in senior communities or living with family and requiring assistance. The sample was composed primarily of independent living individuals with relatively limited representation from assisted living environments.

Variable 2: Transportation and AV Experience

This variable assessed participants' primary modes of transportation as well as their previous exposure to and experience with AVs. Most participants reported using a vehicle for their primary mode of transportation (93.4%), while few participants reported using a bus or walking/biking (4.7% and 1.9%, respectively).

Of the participants, 9.4% reported using or encountering an autonomous vehicle, whereas 90.6% had no prior experience with them. These data suggest that the majority of participants' perceptions of AVs were formed without having direct experience; rather, their attitudes toward AVs are likely shaped by indirect sources, such as media coverage or secondhand information. The lack of exposure may contribute to increased uncertainty and hesitation.

Variable 3: Hesitations

Figure 1

Respondents' Primary Reason for Hesitation (%)

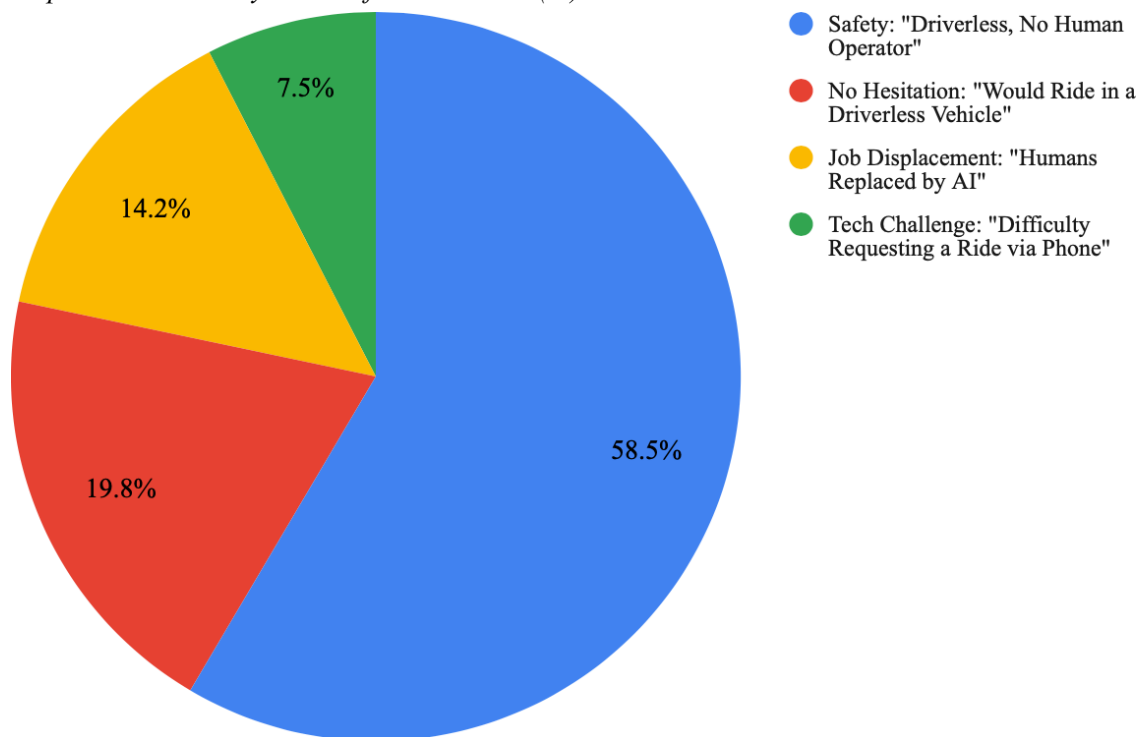


Table 2*Primary Reasons for AV Hesitation*

Reason for Hesitation	<i>n</i>
Safety: Driverless, no human operator	62
No Hesitation: Would ride in a driverless vehicle	21
Job Displacement: Humans replaced by AI	15
Tech Challenge: Difficulty requesting a ride via phone	8

Note. *N*=106. Participants were asked to identify their primary concern regarding the use of autonomous vehicles.

This variable examined participants' primary concerns regarding the use of AVs. Safety concerns were the most frequently reported hesitation (58.5%), followed by no hesitation (19.8%), job displacement (14.2%), and technological challenges (7.5%). These findings indicate that two major obstacles to adoption, as reported by participants, are trust and knowledge of the technology.

Variable 4: Regional Analysis

A chi-square test of independence was conducted to examine the relationship between the geographic location of participants and their willingness to use an AV (or report 'no hesitation'). The relationship between these variables was not statistically significant, $\chi^2(9, N = 106) = 13.97, p = .123$. This suggests that, based on the question asked, participants' willingness to ride in a driverless vehicle was not related to region, despite factors that vary with region, such as traffic density and weather.

Table 3*Chi-Square Analysis of AV Hesitation by Geographic Region*

Region	Total <i>n</i>	Willing to Use AV ("No Hesitation")	% Willing
Region 0 (California)	65	15	23.1%
Region 1 (Northeast)	20	3	15.0%
Region 2 (Midwest/South)	13	2	15.4%
Region 3 (Pacific NW)	8	1	12.5%

Note. *N*=106. Regional differences in willingness to use AVs were not statistically significant.

Logistic Regression

The relationship between demographic characteristics, prior AV experience, and participants' likelihood of expressing no hesitation toward AV use was investigated using logistic regression analysis. To control for location-specific factors such as traffic density, regional infrastructure, and weather patterns, geographic region was included as a primary control variable, with California (Region 0) serving as the reference group. The final model utilized 98 responses, using only cases with complete demographic data.

The overall model was statistically significant, $X^2(8, N = 98) = 29.29, p < .001$, predicting the likelihood of reporting no hesitation toward AVs, and using McFadden's Pseudo R^2 explained approximately 30.4% of the variance in willingness to use an AV.

As shown in Table 4, these results indicated that, when controlling for all demographic and regional factors, previous AV experience was the only significant predictor of having no hesitation ($B=4.04, p=.001$). Participants with prior exposure to AVs were significantly more likely to report a willingness to ride in a driverless vehicle when compared to those without prior experience. However, since only 9.4% of all participants reported previous experience, these results highlight a significant experience gap in the older adult population.

Geographic region was not a significant predictor of adoption, with no significant differences found for the Northeast ($p=1.000$), Midwest/South ($p=.572$), or Pacific NorthWest ($p=.995$) when compared to California. This suggests that the primary hesitations and barriers to adoption are universal and do not vary by a participant's location or environment. Additionally, while higher education, specifically holding an advanced or specialized degree, suggested a trend toward reduced hesitation ($B=2.41, p=.076$), this effect did not achieve statistical significance. Other factors, such as income level and geographic region, were not found to be significant predictors in this model.

Table 4
Logistic Regression Results Predicting "No Hesitation" Toward Autonomous Vehicles

Predictor	<i>B</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Previous AV Experience (Yes)	4.04	1.22	3.30	.001
Region				
Region 1 (Northeast) ^a	-23.03	9.77e+04	-0.00	1.000
Region 2 (Midwest/South) ^a	-0.63	1.11	-0.57	.572
Region 3 (Pacific NW) ^a	-0.00	0.78	-0.01	.995

Income				
Less than \$55k ^a	-1.35	0.99	-1.36	.173
Roughly \$55k-\$100k ^a	-0.39	0.85	-0.45	.650
Education				
College	1.84	1.26	1.46	.143
Advanced Degree	2.41	1.36	1.77	.076
Constant	-3.10	1.14	-2.71	.007

Note. N=98

Summary of Findings

The results show that although older adults represent a variety of socioeconomic backgrounds, the vast majority (90.6%) have no direct experience with autonomous vehicles. Additionally, safety concerns regarding the lack of a human operator were the primary reported hesitation, selected by 58.5% of participants, outweighing the worries about job loss or technological challenges. However, as demonstrated by the small group with prior experience, exposure is a powerful driver of acceptance, as 80% of participants with previous AV experience reported having no hesitation, compared to just 13.5% without it.

Figure 2

AV Attitudes by Previous Experience

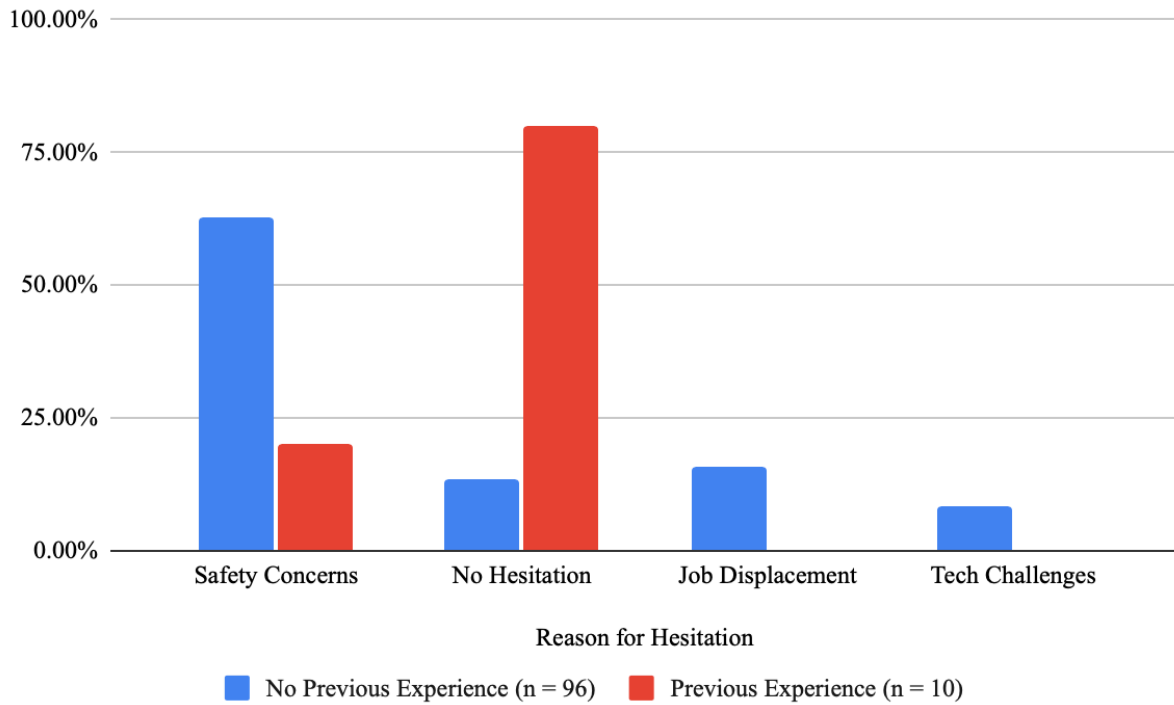


Table 5
Comparison of AV Hesitation by Previous Experience

Hesitation Reason	No Previous Experience (<i>n</i> = 96)	Previous Experience (<i>n</i> = 10)
Safety Concerns	62.5%	20.0%
No Hesitation	13.5%	80.0%
Job Displacement	15.6%	0.0%
Tech Challenges	8.3%	0.0%

Note. This table illustrates the contrast in willingness to use AVs based on prior exposure.

DISCUSSION

Summary of Key Findings

This study's findings illustrate that some older adults are aware of the potential benefits of self-driving cars, but most participants remained unsure about using them. Many respondents indicated that they were worried about safety, reliability, and not knowing how the technology works. Some participants agreed

that AVs could make it easier for people to get around, especially those who can't drive anymore. However, uncertainty and doubt were common themes in all of the answers.

Interpretations and Implications

The data suggests that once seniors actually use the technology, their "no hesitation" rate jumps from 13.5% to 80%, indicating that direct experience, such as "ride-along" programs or public demonstrations, could be more effective than traditional advertising. These results demonstrate that, despite the potential benefits of autonomous vehicles, a considerable disparity persists between technological capabilities and user trust among older adults. The findings of this study also reveal that although a select few older adults recognize the potential advantages of autonomous vehicles, a significant majority of participants exhibit reluctance towards their use.

Many participants reported feeling worried about safety, reliability, and not understanding how the technology works; they stated that AVs could make it easier for people to get around, especially those who cannot drive anymore. However, uncertainty and doubt were common themes in all of the responses. Direct exposure may reduce reluctance by allowing individuals to observe the technology's functionality and safety firsthand.

Limitations

Several features of the study design limit the strength and generalizability of these findings. Because convenience sampling was used, participants were selected based on availability rather than randomly, which may make it harder to generalize the results to other geographical locations. The sample size was also small, which makes statistical analysis limited. Additionally, with an already limited sample size, this issue was exacerbated because nine participants did not answer all questions. The responses of participants may have been affected by their previous exposure to or knowledge of autonomous vehicles, which could differ significantly if more than 10 participants or 9.4% of participants had previous experience with AVs. The demographic representation in the current sample of older adults aged 60 and older is similar to the U.S. population based on 2024 Census data. In the current sample, 63.2% of participants identified as White, while 72.6% of all U.S. citizens who responded to the Census identified as White (U.S. Census Bureau, 2025). In the current sample, 18.9% of participants identified as Hispanic or Latino compared to 20% reported in the Census. people are slightly overrepresented at 15-18% (compared to 10-12% nationally) (U.S. Census Bureau, 2025). The percent of Black or African American and Asian participants in the current sample were 11.3% and 6.6% compared to 12.1% and 6.3% nationally, respectively. Around 63.8% of participants were women, which is higher than the national average of 50.5% (U.S. Census Bureau, 2025).

Future Directions

Future research should aim to include a larger and more diverse sample of older adults to better represent the broader population and increase the ability to make generalizations. It would also be beneficial to

study how direct interaction with autonomous vehicles affects perceptions, as hands-on experience may reduce uncertainty and increase trust. Specifically, an experimental or longitudinal study measuring how direct experience affects future/regular AV adoption, to see whether trust increases with experience. Additionally, future studies could explore specific factors such as cost, accessibility, and technological literacy to better understand how different variables can influence AV adoption.

CONCLUSION

While AVs offer significant potential to improve safety and independence for older adults, this study demonstrates that hesitation and lack of trust remain key barriers. Addressing these concerns through education, improved design, and increased exposure will be essential in ensuring that older adults can fully benefit from advancements in autonomous vehicle technology.

While AVs can provide important benefits for older adults, their widespread adoption will depend on resolving technological, regulatory, and attitudinal barriers among the elderly. For older adults, AVs present significant potential to enhance independence, mobility, and overall quality of life. Additionally, AVs may provide an additional element of safety that Uber, Lyft, and taxis cannot, to a vulnerable population because the vehicle is driverless. AV technology may help them to maintain their social connections and access to essential services as their reliance on personal driving reduces.

However, technological vulnerabilities, trust barriers, ethical concerns, and regulatory uncertainties complicate widespread adoption in the older adult population. The scholarly literature indicates that older adults' perceptions must remain central to discussions of AV implementation and policy development. To better examine these perspectives, this study incorporated a survey of 100 older adults that evaluates their comfort levels with AV security, reliability, and acceptance of driverless transportation. By including academic research with senior-focused inquiry, this study places older adults at the center of the evolving conversation about driverless transportation.

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