

## TRANSPORT FINDINGS

# Perceptions of Service Enhancements in Shared Autonomous Vehicles: A Demographic Perspective

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## Findings

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As the pressure on urban mobility rises, shared autonomous vehicles (SAVs) offer enhanced transportation efficiency and safety. This study investigates the valuations of additional services in SAVs, examining demographics' impact on preferences for different service features. We use data from 1723 Norwegian respondents to an online survey. We find that women put increased value on a safety host. Younger respondents value fast travel time. More tech-savvy individuals showing a higher valuation for services enhancing personal utility and comfort. Intention to use strongly predicts valuation of utilities, but not social factors.

## 1. Questions

The widespread adoption of autonomous vehicles (AVs) hinges on more than just societal benefits like reduced emissions and traffic safety — it also depends on factors like trust, privacy, and travel time. Different social groups may have different valuations of these benefits. Demographics like age and socioeconomic status have shown mixed impact on willingness to use AVs, while young men often are more optimistic about AVs (Greifenstein 2024; Gurumurthy and Kockelman 2020). Price is a key determinant of intention to use shared AVs (SAVs), with many willing to pay a premium for privacy (Camps-Aragó et al. 2022; Clayton et al. 2020; Krueger, Rashidi, and Rose 2016; S. Nordhoff et al. 2019; Venkatesh, Thong, and Xu 2012). Thus, the valuation of service enhancements, like private trips or paying for faster arrivals, might be influenced by the baseline intention to use that varies across different demographic groups (Camps-Aragó et al. 2022). It is unclear how different social groups value different service enhancements, particularly when controlling for their intention to use. This endeavor will provide insights that are crucial for developers and policymakers to align SAV services with diverse user preferences. This paper aims to explore the impact of demographics on valuation of additional SAV services.

## 2. Methods

Data was collected from 2,141 Norwegian respondents via an online survey in summer 2022, with a 20% response rate from 8,892 contacts. We informed about SAV services in the survey, as most people would not necessarily know what this largely future service might entail. The survey included five

demographic variables: gender, age (in ten-year intervals), public transport usage, socioeconomic status (aggregate of education and income), and tech-savviness (aggregate of technological interest, awareness of AV pilots, and use of advanced driver assistance systems). The latter two aggregate constructs were z-transformed.

Interest in paying for faster arrival, being picked up at their home, sitting alone, having a safety host onboard, and being driven all the way to their destination was measured on a five-point scale ranging from 1 = “Never”, through 5 = “Always”. The five items were presented as statements: “When using this bus service, I am willing to pay extra for (...)”. Intention to use SAVs was similarly measured and aggregated using three items. After excluding participants failing attention checks, 1,723 valid responses were analyzed using R Studio (version 4.4.0). Details on methods and descriptive results can be found in supplementary materials.

### 3. Findings

[Table 1](#) presents multiple ordered logistic regression models predicting the five valuation-items from demographic variables. Full models are presented in supplementary materials.

The regression models all show modest pseudo  $R^2$ -values. This suggests that there are other more important predictors of wanting to pay for extra services. Previous research has suggested that socio-psychological factors may be more important in predicting intentions to use SAVs than socio-demographics, and this may impact these results as well (S. Nordhoff et al. 2019). We still find some statistically significant differences.

Notably, women were more likely to value having a safety host onboard. There’s an opposite, but insignificant effect of gender on paying for sitting alone where men value sitting alone. This suggests that the social experiences of using a SAV is different for men and women. Women have been found to be less trusting of SAVs, and are generally more skeptical of the technology, which may help explain why they want to pay for a safety host (Aasvik et al. 2024; Sina Nordhoff et al. 2022; Wexler and Fan 2022). Thus, there seems to be situations besides ridesharing with strangers that increases women’s willingness to pay for a safety host. The gender gap in AV acceptance is well known, also in Norway, but controlling for intention to use still yields some differences in the perceptions of the social situation in SAVs (Aasvik et al. 2024; Torrao, Lehtonen, and Innamaa 2024).

Age effects are often ambiguous (S. Nordhoff et al. 2019). Older adults have shown lower willingness to use AVs, and controlling for this may give a unique insight into their preferences (Greifenstein 2024; Haghzare et al. 2021). Older participants were less likely to value fast arrivals and sitting alone. They may prioritize comfort and convenience over speed and

Table 1. Ordered logistic regression models predicting valuations of different extra services using demographics, n=1723.

	Fast arrival		Pick up at house		Sit alone		Safety host onboard		Driven to destination	
	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>
Gender (0=women)	1.24	0.525	0.76	0.412	1.86	0.063	<b>0.23</b>	<b>&lt;0.001</b>	1.08	0.814
Age	<b>0.85</b>	<b>0.002</b>	0.94	0.253	<b>0.86</b>	<b>0.005</b>	1.00	0.952	0.99	0.804
Socioeconomic indicator	<b>1.17</b>	<b>0.006</b>	1.00	0.997	0.97	0.620	<b>0.78</b>	<b>&lt;0.001</b>	1.10	0.090
Public transport use	1.08	0.393	0.96	0.671	1.04	0.683	<b>1.28</b>	<b>0.005</b>	1.01	0.914
Tech-savviness	1.15	0.059	1.19	0.017	<b>1.25</b>	<b>0.002</b>	1.00	0.998	1.08	0.321
Intention to use	<b>1.80</b>	<b>&lt;0.001</b>	<b>1.93</b>	<b>&lt;0.001</b>	1.04	0.473	0.92	0.154	<b>1.92</b>	<b>&lt;0.001</b>
Gender * Age	0.95	0.449	1.01	0.824	0.91	0.144	1.11	0.101	0.94	0.328
R <sup>2</sup> Nagelkerke	0.11		0.09		0.04		0.09		0.08	

Note: Bonferroni corrected p-values (0.05/30 tests) = 0.002. Bold =  $p < 0.01$

riding alone. Older participants showed no increased willingness to pay. The interaction between age and gender is not significant in any model, suggesting that these are only main effects.

Individuals with higher socioeconomic status were somewhat more likely to value fast arrivals but not having a safety host onboard. There may be a slight positive trend that higher earners are more willing to try SAVs (Greifenstein 2024). Beyond this, it seems that they are willing to pay a premium to have an efficient travel route, but not willing to pay a “privacy premium” (Clayton et al. 2020). Their reduced valuation of a safety host may suggest more trust in automation and lower perceived social vulnerability. They may also to a larger extent think that one of the benefits of SAVs is to save resources by eliminating the safety host.

Users of public transport are inclined to pay for a safety host, probably because that is something they are used to. This could be echoed by their relative unwillingness to pay for any other service, as these are not available for traditional public transport. More tech-savvy people are willing to pay for sitting alone. Perhaps these are car drivers to a larger extent, as we enquired about ADAS use, and that these would prefer to retain their use of transport as private and quiet time.

Finally, higher intentions to use suggests nearly doubled likelihood of willingness to pay for fast arrival, pick up at home, and being driven to their destination, corroborating recent research (Bellet and Banet 2023). Sitting alone or having a safety host did not share this relationship, suggesting that intention to use relates to the practical utility of the service more than social factors.

These results further our understanding of SAV acceptance by going beyond intention to use the service. By controlling for intention to use, we can better isolate the previously ambiguous effects of variables such as age and socioeconomic status. Our findings contribute to the emerging literature on SAV adoption by demonstrating the nuanced role of demographics in shaping user preferences. This work provides valuable insights for policymakers and industry stakeholders aiming to tailor AV services to meet consumer demands and optimize market penetration.

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## *Competing interests*

The authors have no competing interests to declare.

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## SUPPLEMENTARY MATERIALS

### **Supplementary materials**

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