The Effect of Attitudes on Women’s Willingness to Share Autonomous Vehicles

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6th International Conference on Women’s Issues in Transportation
Technical Session B4 – Transportation Tech: Moving Women
Wednesday, September 11, 2019
Background

- Transformative changes in transportation …
- People’s **attitudes towards and perceptions of** these technologies and services need to be measured
- Men and women may perceive new technologies differently
- **Gender differences** in willingness to adopt automated mobility needs to be understood
Provide a better understanding of gender differences in adoption of AVs and new shared mobility services.
Survey Metro Areas

- Phoenix
- Austin
- Atlanta
- Tampa
Survey Instrument

Attitudes and Preferences
Household Vehicles and Residential Preferences
Current Travel Patterns
Mobility on Demand
Autonomous Vehicles
Background Information
Survey Deployment

- Greater Phoenix Metropolitan Area
- Pilot Survey in Fall 2018 (262 responses)
- Full Survey in Summer 2019 (1071 responses)
- Random address-based sample
- Target size: 1,000 respondents per Metro Area
  - 50,000 e-mail invitations (2.0% response rate)
  - 10,000 postal invitations (2.1% response rate)
- Online instrument only
- Rewards: $10 for each of the first 250 respondents

987 Complete/Clean Responses
Unique Aspects of the Survey

• Comprehensive: AV + Ride-hailing in same survey
• Attitudes: Extensive set of attitudinal statements
• Range of Possible Impacts:
  • Residential location (long term)
  • Vehicle ownership (medium term)
  • Travel patterns (short term)
• Stated preference choice scenarios
Socioeconomics by Gender
Gender / Income

- Female (N=496)
- Male (N=491)

<table>
<thead>
<tr>
<th>Income Category</th>
<th>Female (%)</th>
<th>Male (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income not reported</td>
<td>5.4%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>6.3%</td>
<td>4.1%</td>
</tr>
<tr>
<td>$25,000 to $49,999</td>
<td>15.5%</td>
<td>13.2%</td>
</tr>
<tr>
<td>$50,000 to $74,999</td>
<td>23.0%</td>
<td>18.5%</td>
</tr>
<tr>
<td>$75,000 to $99,999</td>
<td>16.7%</td>
<td>16.3%</td>
</tr>
<tr>
<td>$100,000 to $149,999</td>
<td>17.7%</td>
<td>24.4%</td>
</tr>
<tr>
<td>$150,000 to $249,999</td>
<td>12.3%</td>
<td>12.2%</td>
</tr>
<tr>
<td>$250,000 or more</td>
<td>3.0%</td>
<td>7.3%</td>
</tr>
</tbody>
</table>
Gender / Familiarity with Autonomous Vehicles

Female (N=496)
- Never heard of AVs: 37.7%
- Don't know much about them: 4.2%
- Somewhat familiar: 12.3%
- Very familiar: 45.2%
- Actually taken a ride in an AV: 0.6%

Male (N=491)
- Never heard of AVs: 22.0%
- Don't know much about them: 22.6%
- Somewhat familiar: 3.1%
- Very familiar: 51.1%
- Actually taken a ride in an AV: 1.2%
Attitudes by Gender

Phoenix Metropolitan Area
Summer 2019
I feel uncomfortable around people I do not know.

(χ² = 15.108, df=2)**

* N_Female = 496, N_Male = 491

** Distributions are significantly different at the 95% confidence level.

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** Strongly agree/ Agree
** Neutral
** Strongly disagree/ Disagree
When traveling in a vehicle, I prefer to be driver rather than a passenger.

![Bar chart showing preferences of males and females]

- **Male**
  - Strongly disagree/Disagree: 9.0%
  - Neutral: 20.0%
  - Strongly agree/Agree: 71.0%

- **Female**
  - Strongly disagree/Disagree: 22.4%
  - Neutral: 30.2%
  - Strongly agree/Agree: 47.4%

\[ \chi^2 = 62.094, \text{df}=2 \]**

* \( N_{\text{Female}} = 496, \ N_{\text{Male}} = 491 \)

** Distributions are significantly different at the 95% confidence level.
For shared ridehailing (e.g., uberPOOL, Lyft Share), traveling with unfamiliar passengers makes me feel uncomfortable.

\( \chi^2 = 18.716, \text{ df}=2 \) **

* N\text{Female} = 496, N\text{Male} = 491

** Distributions are significantly different at the 95% confidence level.
Traveling with a driver I do not know makes me feel uncomfortable.

\[ \chi^2 = 34.169, \text{ df}=2 \]

* \( N_{\text{Female}} = 496, \; N_{\text{Male}} = 491 \)

** Distributions are significantly different at the 95% confidence level.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree/ Disagree</th>
<th>Neutral</th>
<th>Strongly agree/ Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female</strong></td>
<td>22.4%</td>
<td>23.0%</td>
<td>54.6%</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>37.3%</td>
<td>25.1%</td>
<td>37.6%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 34.169, \text{ df}=2 \]

* \( N_{\text{Female}} = 496, \; N_{\text{Male}} = 491 \)

** Distributions are significantly different at the 95% confidence level.
I would use AV ridehailing services alone or with coworkers, friends, or family.

\[ \chi^2 = 4.804, \text{df}=2 \]

* \( N_{\text{Female}} = 496, \ N_{\text{Male}} = 491 \)
I would use AV ridehailing services with other passengers I don’t know.

(χ² = 8.009, df=2)**
* N_Female = 496, N_Male = 491
** Distributions are significantly different at the 95% confidence level.
I will never ride in an AV.

** \( \chi^2 = 21.162, \text{ df}=2 \)**

* \( N_{\text{Female}} = 496, \ N_{\text{Male}} = 491 \)

** Distributions are significantly different at the 95% confidence level.

![Bar chart showing responses to the statement](chart.png)
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Phoenix Metropolitan Area
Summer 2019
For shared ridehailing (e.g., uberPOOL, Lyft Share), traveling with unfamiliar passengers makes me feel uncomfortable. (Adj. P-value=0.000, $\chi^2=160.061$, df=4)

I would use AV ridehailing services with other passengers I don't know:
- Strongly disagree/Disagree
- Neutral
- Strongly agree/Agree

All Respondents (N=987)

For shared ridehailing (e.g., uberPOOL, Lyft Share), traveling with unfamiliar passengers makes me feel uncomfortable. (Adj. P-value=0.000, $\chi^2=160.061$, df=4)

Strongly agree/Agree (N=514)

Neutral (N=281)

Strongly disagree/Disagree (N=192)

Gender (Adj. P-value=0.306, $\chi^2=2.370$, df=2)

Female (N=291)
- Strongly disagree/Disagree (9.9%)
- Neutral (16.3%)
- Strongly agree/Agree (73.8%)

Male (N=223)
- Strongly disagree/Disagree (10.8%)
- Neutral (18.8%)
- Strongly agree/Agree (70.4%)

Gender (Adj. P-value=0.084, $\chi^2=4.958$, df=2)

Female (N=77)
- Strongly disagree/Disagree (45.3%)
- Neutral (40.6%)
- Strongly agree/Agree (14.1%)

Male (N=115)
- Strongly disagree/Disagree (48.7%)
- Neutral (35.6%)
- Strongly agree/Agree (15.7%)
• There are significant gender differences in willingness to share AV rides.

• Even when women and men have the same attitude towards riding with strangers, women are less likely to adopt AV-based ridesharing services.

• Develop safety protocols and targeted campaigns for enhancing women’s willingness to share AV rides.

• Special services such as female-only services might enhance automated mobility acceptance for women.
Further Research

• Control for other socioeconomic variables (e.g., age, income, education).

• Understand the magnitude of gender and attitude effects in explaining AV adoption.

• Expand the analysis to other aspects related to adoption of and adaptation to automated mobility (e.g., vehicle ownership).
Thank you!

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