Autonomous Shuttles in the Public Eye: Mediators on the Path to Successful Expansion

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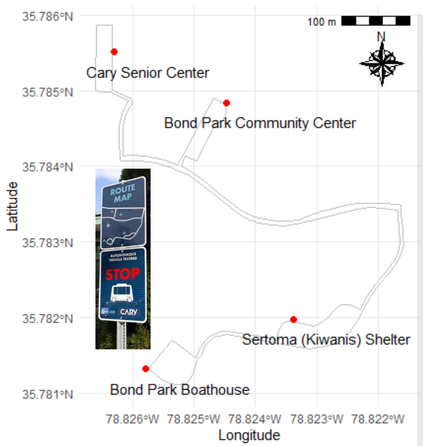
Background

- The integration of autonomous shuttles into public transportation systems heralds a potential paradigm shift in how society perceives them.
- There is a need to understand the complexities of public opinions surrounding the integration and future large-scale deployment of autonomous shuttles into public transportation systems in the United States, particularly in North Carolina (Cary).

The objectives are: *(1)* identifying and understanding the factors that influence public support or opposition to the expansion of autonomous shuttles, *(2)* investigating the determinants of public perceptions regarding the safety or lack of safety associated with autonomous shuttles, and *(3)* revealing the reasons behind individuals' reluctance or refusal to ride them again.

Data & Methods

The study used survey data from the pilot project conducted in Cary, North Carolina, through the Cary Autonomous Shuttle Service Initiative (CASSI), which was launched in October 2023.



Shuttle route and stops

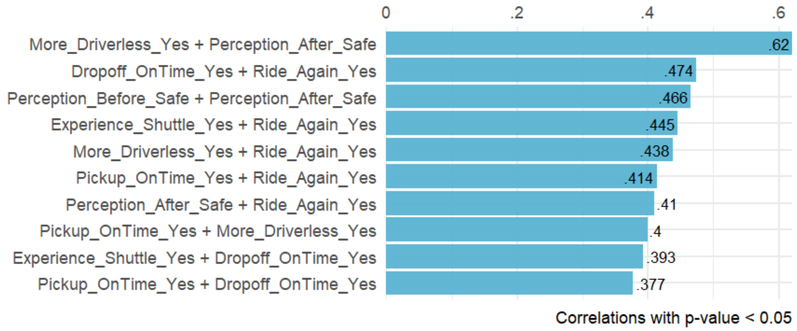
145 respondents used the shuttle, with the following data reported

- Age
- Residency status (Cary resident or not)
- Purpose of riding the shuttle
- Experience riding the shuttle
- Alternative transportation mode
- Timeliness of pickup
- Timeliness of drop-off
- Perception before using the shuttle
- Perception after using the shuttle
- Willingness to ride again
- Support or opposition to more autonomous shuttles
- Reasons for not riding the shuttle again (open-ended question)

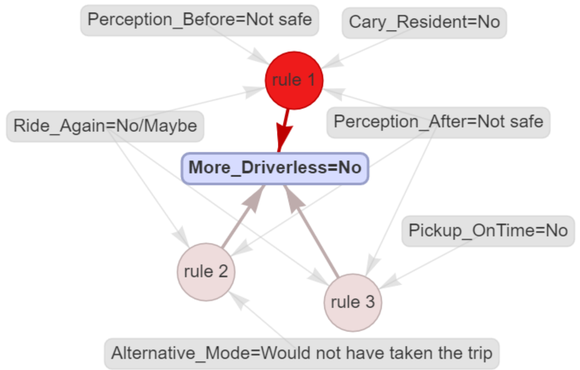
Four-step methodological framework

Bivariate correlation analysis → Association rule mining (ARM) → Mediation analysis → Thematic analysis

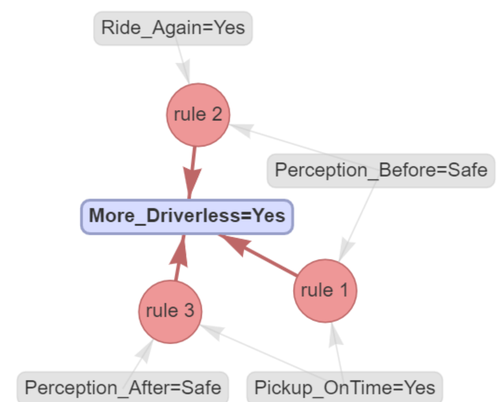
Results



The first significant correlation revealed a strong positive association (>0.5) between support for shuttle expansion (More_Driverless=Yes) and post-ride perceptions of the shuttle as safe (Perception_After=Safe).

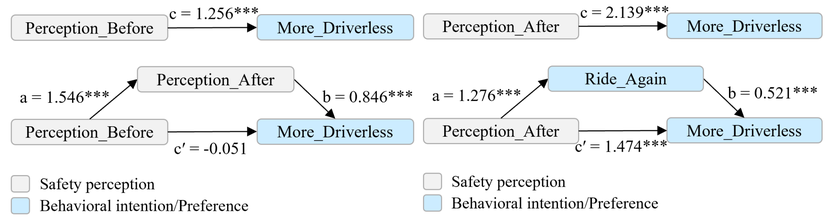


Most individuals in this category perceived the autonomous shuttle to be unsafe. Additionally, untimely pickups were another reason for their lack of support.



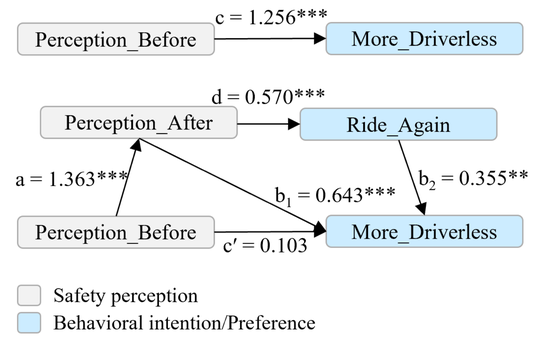
Individuals who already perceived autonomous shuttles as safe and expressed a willingness to ride the shuttle again were more inclined to support the idea of seeing more autonomous shuttles on Cary roads

Results



Model with the mediator of safety perception post-ride

Model with the mediator of intention to re-ride



Model with mediators of safety perception post-ride and intention to re-ride

- Post-ride safety perception significantly influences support (b1 = 0.643, p-value <0.01), with those perceiving the service as safe after use being more likely to support expansion.
- The likelihood of perceiving the shuttle as safe after riding it is higher for those who initially perceived it as safe (a = 1.363, p-value <0.01), and the likelihood of riding it again is higher for those perceiving it as safe post-ride (d = 0.57, p-value <0.01).
- The intention to re-ride significantly influences support for expansion (b2 = 0.355, p-value = 0.042).
- The indirect effect of initial safety perception on support through post-ride perception is significant (a•b1 = 0.877, p-value <0.01), as is the indirect effect through the combined mediation of post-ride perception and intention to re-ride (a•d•b2 = 0.276, p-value = 0.047).

Conclusions

The study found evidence that post-ride safety perception and the intention to re-ride are critical factors in fostering autonomous shuttle expansion. *(1)* Post-ride safety perception mediates the relationship between initial safety perception and support for shuttle expansion. *(2)* The intention to re-ride also mediates the perception of post-ride safety and support for shuttle expansion.

Acknowledgment

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