Sustainable Healthy Cities
A National Science Foundation-supported Sustainability Research Network (SRN)

# *JOURNAL BRIEF*: Public interest in self-driving vehicles: Does land use play a role?

Sustainable Healthy Cities Journal Brief - 2020, No. 20 - Land use and automated vehicles

This brief is adapted from the following peer-reviewed journal article: Nodjomian, A. & K. Kockelman. (2019). How does the built environment affect interest in the ownership and use of self-driving vehicles? *Journal of Transport Geography*, 78, 115-134.

## Study Intent and Research Question

As improvements in automated vehicles (AVs) make them an increasingly viable mode of transportation, what types of people will use them? Two nationwide surveys of more than 4,000 U.S. households looked at how land use characteristics affect interest in AVs. Controlling for demographic attributes, the surveys found that a poor mix of land uses and limited access to key destinations are associated with higher levels of interest in AVs, higher anticipated use of AVs, higher likelihood of using dynamic ride-sharing, and increased willingness-to-pay for self-driving capability in new cars. This research will help planners, engineers, and policymakers predict interest in and prepare for AVs.

## Key Background Information

As companies improve AV technology, fully automated vehicles could make up 25 to 80% market share by 2045 (Bansal and Kockelman, 2017). This study evaluated how current land use influences future adoption of self-driving vehicles. The relationship between land use and transportation is interrelated and complex. One's environment informs his or her transportation decisions and vice versa.

People's mode choices are influenced by land use characteristics of the places where they live, such as density, diversity of land uses (residential, retail, offices, etc.), urban design, destination accessibility, and distance to transit (Krueger et al., 2016; Wellik and Kockelman, 2020). These built environment characteristics will likely affect interest in new vehicle technology like AVs.

AVs could change transportation norms and land use. They may encourage suburban sprawl by making it easier for people to commute (Lee and Kockelman, 2019). On the other hand, shared AVs could be used for on-demand transportation services, with users renting AVs for individual trips rather than privately owning a vehicle—potentially reducing car ownership and use.

While past research has focused on how AVs will affect future land use and transportation behavior, this research took a different angle by looking at how current land use affects interest in AVs.

## Key Findings

There is a clear correlation between the built environment and people's predicted use of AVs.

### ▶ *Diversity of land use*

Respondents in neighborhoods with limited land uses expressed greater interest in AVs, higher likelihood of using dynamic ride-sharing, and increased willingness to pay for self-driving capability. These respondents may travel longer distances and are thus interested in how AVs may improve their travel experience.

### ▶ *Destination accessibility*

Destination accessibility for non-residential land

uses appears to be an important indicator of AV interest. People with limited ability to reach jobs, downtown, or stores show more interest in AVs, expect to make greater use of dynamic ride-sharing, and are willing to pay more for AVs.

### ▶ *Job accessibility*

Respondents living in areas with poor job accessibility (reached via personal vehicle) are more likely to identify a high number of benefits associated with AVs. The opposite is true when considering the number of jobs accessible via transit. This is likely due to the way the question was phrased and the options which were presented to respondents.

### ▶ *Dynamic ride-sharing*

Respondents who indicated a higher willingness to pay for AVs were also likely to indicate interest in dynamic-ride sharing (DRS), a travel option where passengers share a portion of their vehicle and trip with strangers headed in the same general direction. If a significant number of AV users choose to complete trips via DRS, there is potential for reducing the number of vehicles on the road, alleviating traffic and pollution.

## Policy and Practice Implications

This work suggests single-use developments are likely to see AVs before developments with multiple uses. ***Planners and engineers*** can use this information to plan for AVs in appropriate neighborhoods.

***Manufacturers of AVs*** may be able to use this information to target potential buyers of their products. This work suggests the focus should be on those who have longer trips from their home to important destinations.

***Policymakers and local and state governments*** can use this information to anticipate the spatial introduction of AVs to a region's transportation network. Policies attempting to limit empty vehicle travel, particularly in already congested areas or those aimed at limiting congestion on commonly used routes from suburbs to downtown and other important destinations may prove beneficial.

**Transportation**

**Environmental Sustainability**

## Further Reading and References


Bansal, P., & Kockelman, K. M. (2017). Forecasting Americans' long-term adoption of connected and autonomous vehicle technologies. Transportation Research Part A: Policy and Practice, 95, 49-63

Krueger, R., Rashidi, T. H., & Rose, J. M. (2016). Preferences for shared autonomous vehicles. Transportation Research Part C, 69, 343-355

Lee, J., & Kockelman, K. M. (2019). Energy implications of self-driving vehicles. In 98th Annual Meeting of the Transportation Research Board, Washington DC.

Wellik, T., & Kockelman, K. (2020). Anticipating land-use impacts of self-driving vehicles in the Austin, Texas, region. Journal of Transport and Land Use, 13(1), 185-205.



**Corresponding Author:** Kara Kockelman (kkockelm@mail.utexas.edu)


## About the Sustainable Healthy Cities Network

The Sustainable Healthy Cities Network is a U.S. National Science Foundation-supported sustainability research network focused on the scientific advancement of integrated urban infrastructure solutions for environmentally sustainable, healthy, and livable cities. We are a network of scientists, industry leaders, and policy partners committed to building better cities through innovations in infrastructure design, technology, and policy. SHCN connects nine research universities, major metropolitan cities in the U.S. and India, and infrastructure firms and policy groups to bridge research and education with concrete action in cities.