

The Impacts of LRT and Neighborhood Characteristics on Auto Ownership

A Transitway Impacts Research Program (TIRP) Research Brief



Photo Michelle Riedel

Project Background

There is growing interest in understanding the impact of light-rail transit (LRT) development on auto ownership. Gaining reliable insight into this relationship, however, presents a complex challenge: disentangling the impact of LRT from the influences of residential self-selection and the built environment near station areas.

A Web of Influences

To separate the impacts of LRT, built environment, and residential self-selection on auto ownership, it is important to first understand how they're connected. For example, the built environment influences travel behavior through vehicle ownership, which is based in part on neighborhood characteristics such as business density.

The relationship between residential self-selection and auto ownership is also critical. For example, many previous studies have inferred that moving into a transit-oriented development (TOD) allows individuals to shed a car. However, it is possible that individuals with fewer cars may intentionally choose to live in a TOD. TOD and auto ownership can also have a simultaneous relationship. Moreover, the individual's attitudes and preferences may reinforce the connections between TOD and auto ownership.

While limited evidence shows that residents living in rail transit station areas tend to own fewer vehicles, it has remained uncertain whether the impact of rail transit on auto ownership is attributable to rail transit itself or to some combination of built environment and residential self-selection.

Project Design

To shed light on these questions, University of Minnesota researchers conducted a study to examine the effects of LRT, neighborhood design, and self-selection on auto ownership using the Blue Line LRT (formerly known as Hiawatha) in the Minneapolis–St. Paul metropolitan area. The 12-mile Blue Line was completed in 2004; the section of the corridor used for this study is the middle section of the line, a traditional urban area in south Minneapolis. Two sets of control corridors were also chosen: two urban corridors that resemble the Blue Line corridor in terms of location, built environment, transit access (via high-frequency bus), and demographics, and two suburban control corridors that have demographics similar to the Blue Line corridor but with limited access to transit.

Key Findings

- LRT and associated transit-oriented development enable those who want to own fewer vehicles to better match their preferences.
- A new LRT line in itself is not sufficient to reduce auto ownership—neighborhood design is important as well.
- Auto ownership is higher in households with higher income and more licensed drivers.
- People with a pro-drive attitude and preferences for large back yards and off-street parking own a greater number of autos, whereas those with a pro-transit attitude and preference for transit access own fewer autos.
- Lower parking availability, higher job accessibility, and the presence of more businesses within a quarter-mile of home are associated with lower levels of auto ownership.

Program Supporters:

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The data for the study came from a ten-page survey mailed to households in all five corridors in May 2011. Researchers used two databases of residents for each corridor: a database of “movers” and a database of “non-movers.” The movers included all current residents who had moved to their corridor after 2004, the year the Blue Line opened. The variables examined fall into five categories: auto ownership, neighborhood characteristics, residential preferences, travel attitudes, and demographics.

Research Findings

Modeling the factors that contribute to auto ownership while controlling for built environment and residential self-selection yielded valuable insights. Researchers found that several demographic variables play a significant role in auto ownership. Household income, the number of drivers in a household, and having a driver’s license are all associated with increased auto ownership, while women tend to own fewer autos than men.

In terms of neighborhood characteristics, lower parking availability, high job accessibility, and more businesses within a quarter-mile of the respondent’s home (a density measure) are associated with lower levels of auto ownership. In addition, respondents with a pro-drive attitude and preferences for large back yards and off-street parking owned a greater number of autos, whereas those with a pro-transit attitude and preference for transit access owned fewer autos.

Ultimately, researchers found:

- Income plays a dominant role in the auto ownership decision.
- Neighborhood characteristics marginally affect auto ownership.
- Residential self-selection influences auto ownership, and LRT and surrounding development enable people to self-select.
- LRT does not have a unique impact on auto ownership apart from the influences of neighborhood characteristics and self-selection.

Conclusions and Policy Implications

The important takeaway for planners and transportation professionals is that rail transit development alone is not sufficient to reduce auto ownership—neighborhood design is important as well. In terms of specific neighborhood attributes, low business density, poor job access, and abundant off-street parking tend to increase auto ownership.

The researchers also note that people self-select residential location based on their predisposition toward travel and residence. The Blue Line allows those who want to live near rail transit (but could not previously do so) select to live in the corridor and hence own fewer vehicles. If parking reform is seen as undesirable by policymakers, offering alternative development such as TOD will enable those who dislike driving to find a neighborhood to match their preference.

About the Research

“The Impacts of LRT, Neighbourhood Characteristics, and Self-Selection on Auto Ownership: Evidence from Minneapolis–St. Paul” was authored by University of Minnesota Humphrey School of Public Affairs associate professor Jason Cao and his collaborator Xiaoshu Cao and first published by *Urban Studies* in August 2014.

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