Title
New Metrics Are Needed to Understand the Environmental Benefits of Micromobility Services

Authors
Fukushige, Tatsuya
Fitch, Dillon T.
Mohiuddin, Hossain
et al.

Publication Date
2022-05-01

DOI
10.7922/G2MC8XBC

Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

New Metrics Are Needed to Understand the Environmental Benefits of Micromobility Services

Tatsuya Fukushige, Dillon T. Fitch, Hossain Mohiuddin, Hayden Andersen, and Alan Jenn
Institute of Transportation Studies, University of California, Davis

May 2022

Issue

Micromobility services (e.g., conventional and electric bikeshare programs and electric scootershare programs) hold great potential for reducing vehicle miles traveled and greenhouse gas emissions if these services are used as substitutes for car travel and/or to access public transit. But estimating these environmental effects is challenging, as it requires measuring changes in human behavior—that is, the choice of what transportation mode to use. While many cities collect various micromobility usage metrics to regulate services, these metrics are not sufficient for calculating the sustainability benefits of these services.

Researchers at the University of California, Davis leveraged survey data and micromobility usage data from 30 cities across the country[1] to assemble estimates of mode substitution, trip distance, and trip frequency. The researchers also analyzed the effect of micromobility services on transit use through city- and stop-scale analysis of micromobility trips and transit ridership, and they examined micromobility usage trends before and after the initial shock of the COVID-19 pandemic. Their findings can inform the California Air Resources Board's (CARB's) development of future Clean Miles Standard regulations and cities' efforts to monitor and improve the sustainability of micromobility services.

Key Research Findings

In almost all cities included in the study, at least 35% of micromobility trips replaced car trips. This number was as high as 60% in Rosslyn, Virginia and St. Louis, Missouri. Micromobility users also reported frequently using these services as a substitute for walking, and for making trips they wouldn't otherwise have taken. In bigger cities (e.g., Washington DC, Minneapolis, Chicago), a considerable percentage of micromobility trips also substituted for transit trips. This suggests that transit substitution is primarily a concern in larger cities.

Micromobility services seem to serve as a better connector to rail transit service than to bus service. The researchers found higher light rail ridership at stations with more micromobility trips ending nearby, but found a much weaker connection between micromobility use and bus ridership. The city of Portland, Oregon represented an outlier, demonstrating a very strong positive relationship between micromobility use and both bus and rail transit use. This finding suggests that micromobility services are perhaps more likely to facilitate transit use when high-quality light rail service is in place, as is the case in Portland.

Docked bikeshare systems proved to be more stable and reliable forms of transportation than dockless micromobility services during the COVID-19 pandemic. The pandemic had dramatic effects on all micromobility services but affected docked and dockless services differently. Most dockless bikeshare and scootershare services were suspended during the initial shock of the pandemic. Most cities' docked bike-share systems experienced declines in ridership initially, but recovered relatively quickly to near pre-pandemic usage, especially on weekends.

Table 1. Recommended metrics for monitoring sustainability of micromobility (MM) services

Types of Metric	Metric
Micromobility (MM) Vehicle Metrics	• MM fleet vehicle miles traveled • MM vehicle emission factor
Ridehail Substitution Metrics	• % of MM trips that substitute for ridehail trips • Length of MM trips that substitute for ridehail trips
Car Substitution Metrics	• % of MM trips that substitute for car trips • Length of MM trips that substitute for car trips
Transit Connection Metrics	• % of MM trips that connect to transit • Length of MM trips that connect to transit • % of transit trips that substitute for car trips and are connected to MM • Length of transit trips that substitute for car trips and are connected to MM
Operation Van Metrics	• Van vehicle miles traveled (operations) • Operation van emission factor

Policy Considerations

Local governments and regulators may want to consider collecting the following metrics to better track the sustainability impact of micromobility services (Table 1).

These metrics would provide the detailed data necessary for CARB to integrate micromobility services into future revisions to the Clean Miles Standard regulation, although CARB would still need to determine how micromobility services would fit into the existing regulatory framework. CARB would also need to consider the vehicle miles traveled associated with rebalancing and recharging bicycles and scooters.

Finally, a seamless payment system that allows for purchase of both micromobility rentals and transit passes from a single source could also make it possible to measure the mileage of a micromobility trip that connects a traveler to public transit and the share such trips comprise in the micromobility service.

More Information

This policy brief is drawn from the report “Micromobility Trip Characteristics, Transit Connections, and COVID-19 Effects,” prepared by Tatsuya Fukushige, Dillon T. Fitch, Hossain Mohiuddin, Hayden Andersen, and Alan Jenn with the University of California, Davis. The report can be found here: https://www.ucits.org/research-project/2021-32/.

For more information about findings presented in this brief, contact Tatsuya Fukushige at tfukushige@ucdavis.edu.

[1]The study cities were: Alexandria, VA; Arlington, VA; Atlanta, GA; Austin, TX; Baltimore, MD; Bloomington, IN; Boston, MA; Brookline, MA; Buffalo, NY; Chicago, IL; Denver, CO; Harrisonburg, VA; Hoboken, NJ; Los Angeles, CA; Memphis, TN; Miami, FL; Milwaukee, WI; Minneapolis, MN; Portland, OR; Rosslyn, VA; Sacramento, CA; San Francisco, CA; San Ramon, CA; Santa Monica, CA; Seattle, WA; Spokane, WA; St. Louis, MO; Tampa, FL; Tucson, AZ; and Washington, DC.

Research presented in this policy brief was made possible through funding received by the University of California Institute of Transportation Studies (UC ITS) from the State of California through the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1). The UC ITS is a network of faculty, research and administrative staff, and students dedicated to advancing the state of the art in transportation engineering, planning, and policy for the people of California. Established by the Legislature in 1947, the UC ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

Project ID UC-ITS-2021-32 | DOI: 10.7922/G2MC8XBC