Study investigates the extent to which e-scooters and e-bikes displace cars using real-world data

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Credit: Background Stories.

Drastically reducing greenhouse gas emissions is of utmost importance to mitigate climate change and its detrimental effects. To work toward this goal, most automotive and transport companies are investing in hybrid and electric vehicles, as well as other emission-free means of transportation.

In recent years, micro-mobility technologies, such as e-scooters and e-bikes, have become increasingly popular in many countries, including the United States, the Netherlands, Germany, and Austria. These technologies could be an affordable and environmentally friendly alternative to motor vehicles for both residents and tourists, allowing

them to circumvent traffic and easily navigate urban environments.

While in some U.S. states and in other countries worldwide these vehicles are no longer allowed on the road due to a rise in accidents, some experts believe that they could drastically reduce greenhouse gas emissions, by displacing (i.e., substituting) existing cars. So far, this has primarily been a hypothesis, due to a lack of evidence supporting its validity.

Researchers at Georgia Institute of Technology have recently carried out a study investigating the impact of e-scooters and e-bikes on car displacement in an urban environment. Their findings, published in a paper in *Nature Energy*, suggest that micromobility technologies do tend to substitute cars and reduce traffic, consequently reducing greenhouse gas emissions.

"There is an unsettled debate on whether the use of e-scooters and e-bikes reduces emissions and provides sustainability benefits by displacing cars for last-mile travel," Omar Isaac Asensio, one of the researchers who carried out the study, told TechXplore. "Many advocates claim that e-scooters and e-bikes can reduce emissions and therefore should be encouraged; while other studies, based mainly on surveys or simulated datasets, claim that scooters mainly displace trips that would otherwise be made by walking or public transit and therefore do not meaningfully reduce congestion or provide sustainability benefits."

In 2019, the City of Atlanta banned e-scooters from the road between 9pm and 4am, after a series of fatal accidents and complaints about their presence on sidewalks). This ban offered Asensio and his colleagues the opportunity to test what happens when micromobility technologies are no longer available in a real-world, natural setting.

"We leveraged high-resolution data from Uber Movement to study the effects of the e-scooter ban on travel times for recurring evening trips pre- and post-policy intervention," Asensio explained. "Through our analyses, we settle a standing debate and provide definitive evidence that e-scooters and e-bikes displace cars for last-mile travel in the urban center. Based on this finding, cities will have to weigh trade-offs between micromobility restrictions designed to promote public safety and unintended congestion and its associated emissions, worth up to $536 million in the value of lost time nationally."

Interestingly, Asensio and his colleagues observed that after the 2019 e-scooter ban, the average commute across the city of Atlanta increased by 9–11% in normal traffic conditions and by 37% at the time of large events, such as a soccer game at the Mercedes-Benz Stadium. Based on the results they collected, the researchers estimated that micromobility bans could have a significant economic and environmental impact, costing the U.S. government several millions of dollars, while also increasing greenhouse gas emissions.

Overall, the findings presented in the researchers' paper confirm that e-scooters and e-bikes displace existing motor vehicles, reducing greenhouse emissions and traffic congestion in urban areas. In the future, they could guide the decisions of policymakers related to micromobility solutions, perhaps encouraging the development of alternative and less-restrictive strategies aimed at preventing accidents and fatalities.

"My lab is studying how behavioral decisions can impact policy design choices for transport electrification," Asensio added. "Our next studies will focus on understanding the relationship between short-run and long-run behavioral changes that can promote sustainability benefits, particularly from a broader set of users who may not necessarily be environmentally conscious. E-scooter mobility provides a promising path

forward to help users engage in pro-environmental behavior."

More information: Omar Isaac Asensio et al, Impacts of micromobility on car displacement with evidence from a natural experiment and geofencing policy. *Nature Energy* (2022). DOI: 10.1038/s41560-022-01135-1. www.nature.com/articles/s41560-022-01135-1