Pandemic bike-share boom crossed socioeconomic lines

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Working in the lab of Megan Ryerson (above), Ph.D. candidate Josh Davidson found that during the pandemic, bike share trip duration increased regardless of socioeconomic status. Credit: Thomas Orgren

Reliable transportation is crucial for reaching basic necessities like employment, education, and health care, but racial and economic factors

often create barriers to transportation access. Many city bike-share programs concentrate infrastructure in upper-class neighborhoods, contending that there has been historically lower use of bike-share programs in low-income communities.

A new study led by Penn's Stuart Weitzman School of Design questions this assumption, finding that people in low-income neighborhoods of Philadelphia increased their bike-share usage during the pandemic as much as the general population.

The study, published in the *Journal of the Transportation Research Board*, analyzed how different geographical populations used bike-share services before and after onset of the coronavirus lockdowns. The researchers found that after March of 2020, the average length of these bike trips in Philadelphia increased regardless of socioeconomic status (SES). These findings support the notion that low SES populations may be just as likely to utilize bike shares as higher SES populations.

The effects of the pandemic lockdowns were like "experiments in the streets" for transportation researchers, says Josh Davidson, a Penn Ph.D. candidate in city and regional planning and senior author on the study. "All these different ideas that people had talked about doing for years"—closing roads to cars and using bikes instead, for instance—"suddenly just started happening."

Davidson primarily studies transportation, and his dissertation focuses on how circumstances beyond people's control affect their commuting patterns. With guidance from city and regional planning and electrical and systems engineering professor Megan S. Ryerson, Davidson wanted to see how the pandemic had influenced bike-share usage and whether that influence fell along racial or economic lines.

Using data from Indego, a Philadelphia bike-sharing company that has

long worked to prioritize services in low SES neighborhoods, Davidson and three undergraduates in the Center for Safe Mobility calculated the daily average duration of bike trips in 17 different city planning districts. According to census data, these districts closely mirror racial and economic demographics. By following which city planning district a trip occurred in, the researchers could reasonably estimate its rider's SES.

An interrupted time series approach—a statistical method that analyzes long-term data before and after a major interruption—revealed that "at the start of the pandemic, there was a huge spike in bike-share trip duration," says Shriya Karam, a fourth-year in the School of Engineering and Applied Science from Nashville, and one of four undergraduate student co-authors on the paper. Across Philadelphia, the duration of bike-share rides rose an average of 7 to 12 minutes.

This increase was observed regardless of city planning district and provides evidence that bike-share programs offered resilient backup public transportation when other forms, like buses and subways, felt unsafe or weren't available, the study found.

These results challenge the long-held assumption that low SES populations are less likely to use bike-share programs. "In the literature, bike shares were characterized to be used by a very specific audience, which was white, upper-income, and male," says Stephanie Nam. Nam, who is in the School of Arts & Sciences and from Long Beach, California, has worked for two years in Ryerson's Center for Safe Mobility. Questioning such notions is essential for building an equitable society, says Penn Engineering student co-author Fatima Koroma, from Olney, Maryland.

"Transportation is more than just getting from point A to point B," she says. "It's about accessing school, accessing jobs, and maintaining a consistent lifestyle."

The research team says this work has implications for how city planners and bike-share operators should build transportation infrastructure. "What I would like planners to think about," Ryerson says, "is how allocating resources based on historical use continues to perpetuate the biases in our transportation systems."

Expanding bike-share services into lower-income areas could be a start, Davidson says. "This system has an enormous amount of potential to make a lot of people's lives a lot better."

More information: Joshua H. Davidson et al, New Equity Inputs to Prioritize Bikeshare Infrastructure Allocation: Learning From the COVID-19 Period, *Transportation Research Record: Journal of the Transportation Research Board* (2022). DOI: 10.1177/03611981221098390

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