

Bike-share + Transit Integration: Best practices for increasing ridership

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- The relationship between bike-share and transit has not been studied well even while transit and bicycles are known to possess a synergistic relationship.
- This project models rail transit ridership in response to bike-share implementation across United States metropolitan areas.

ABSTRACT

Bicycling and bike-share have been growing in cities in the US as transportation alternatives. Bike-share systems are inherently positive additions to metro areas because they increase travel options, increase options for healthy, physical activity, and improve the safety of all cyclists by increasing the number of cyclists on the road (also known as the "safety in numbers"). Despite the impressions that these systems exist solely for tourism, recreation or for privileged users, research has shown that bike-share is becoming a transportation mode used by a diverse set of users for various transportation needs. Additionally, a positive relationship has been established between bike-share and transit, but most studies on this matter have studied systems outside the United States. Bike share and transit benefit each other by: contributing to sustainable transportation goals by improving mobility and greenhouse gas reductions, solving the "last mile" problem, reduce overcrowding at a fraction of traditional capacity capital investments, extending the radius of influence of mass transit stations.

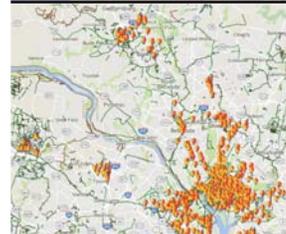
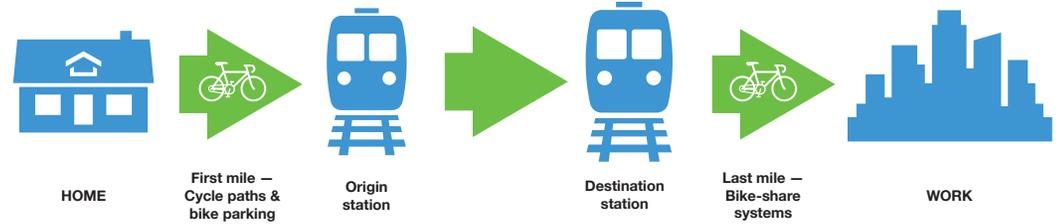
While the synergy between cycling and transit systems has been documented, the influence of bike-share and transit far less so. Since Capital Bikeshare (CaBi) was the first such modern system in the United States, data from this system will be used as a benchmark for comparing with other cities' systems. This system will be compared with the Los Angeles Metro Bikeshare to understand whether transit and bike-share fare integration has any significant differences in enticing users to use bicycles for the first or last leg of a bike-transit trip. This project will explore the factors that play a role in increasing the utility of bike-share systems based on streetscape (development patterns) and operational characteristics (travel distance and time) as well as sociodemographic characteristics.

The research suggests that in cities with high station density, bike-share replaces transit trips, suggesting a minimal change in transit ridership in stations located in downtowns, while in suburban contexts bike-share draws more users away from vehicle trips. The availability of bicycle infrastructure (cycle tracks, bike paths, bike lanes) is also essential in enabling these bike-transit trips. This research will also look to confirm whether this bike-transit synergy causes an increase in ridership at transit stations in suburban contexts.

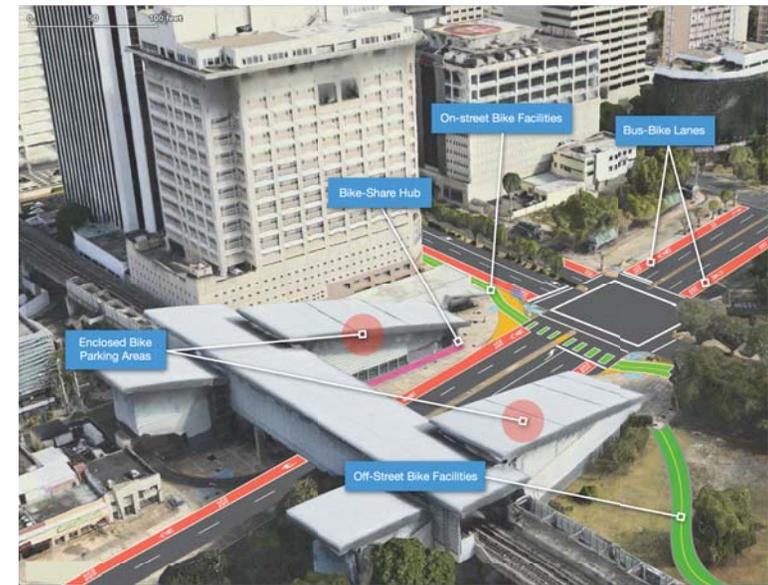
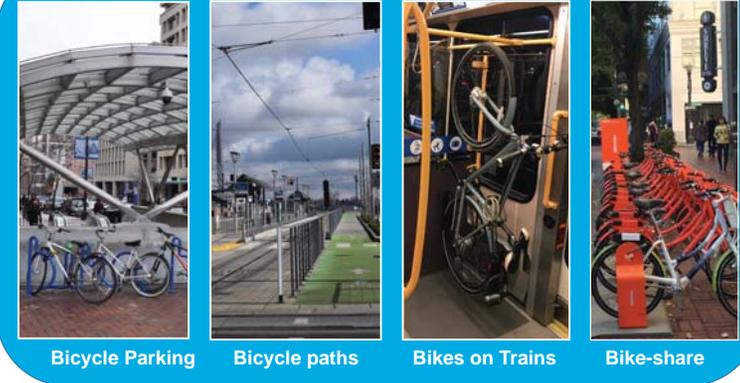
This research will inform practitioners of the effects of bicycle-transit integration strategies on transit ridership while providing a glimpse of the solutions being applied by cities at the forefront of innovation in bike-share systems.

Previous research on bike-share and transit integration

Author	Type	Findings
Villwock-Witte and van Grol (2015)	Case Study	<ul style="list-style-type: none"> • Upwards of 10% of program participants shifted vehicle trips to train-bicycle combined trips; meanwhile, transit-bicycle users increased from 30% of riders to 50% of riders
Ma et al. (2015)	Paper	<ul style="list-style-type: none"> • The highest bike share ridership occurred at locations close to Metro stations • A 10% increase in bike share trips would have a direct impact on transit ridership
Martin and Shaheen (2014)	Paper	<ul style="list-style-type: none"> • In areas of lower density, often outside city cores, bike share users are inclined to use the service to access transit, • In high-density cores, bike share may serve as an alternative to transit
Singleton and Clifton (2013)	Paper	<ul style="list-style-type: none"> • Bicycle and transit modes are short-term substitutes • Transit ridership leads growth in cycling
NACTO Bike Share Station Siting Guide	Guide	<ul style="list-style-type: none"> • Stations should be placed in locations that are clearly visible from multiple approaches, in full consideration of the necessary space requirements and circulation to and around the station.
FTA Report 0111	Synthesis	<ul style="list-style-type: none"> • The ability to access transit by using bike share can expand the reach of transit • The ability to substitute transit trips with bike share (and vice versa) gives users options and redundancy that can be particularly useful in times of service outages, between scheduled service, and in varying weather conditions.



Types of Bicycle + Rail Transit Integration



- Cities with underperforming rail transit systems stand to benefit the most from incorporating bicycle + rail strategies.
- Previous studies show that factors such as the built environment, socioeconomics and the quality of transit services is correlated with bicycle use.
- Future research includes:
 - Collect data from US metropolitan areas using data sources such as the National Transit Database, etc.
 - Asses whether locating bike-share services along transit corridors is beneficial to transportation agencies and the public at large.
 - Analyze whether significant changes in transit ridership are related to bike-share implementation