

Research at a Glance

# Technical Brief

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## Evaluating the Effects of Bicyclists and Motor Vehicles on Corridors' Operating Speed

This research study investigated the factors contributing to vehicle operating speed in the presence of bicyclists in New Jersey. The number of bicyclist-involved crashes has increased over the past two decades. Initiatives such as the National Roadway Safety Strategy (NRSS) have identified the safety of vulnerable road users (VRUs) including bicyclists as a primary area of concern.

### Research Question

Do motor vehicle and bicycle volumes influence the average speed on urban arterial roadways?

### Objectives

The key objective of this research was to identify the contributing factors that influence motor vehicle operating speed in the presence of bicyclists on urban arterials in New Jersey. A stronger understanding of speed reductions due to higher bicycle volumes may help better understand the frequency and severity of bicycle-vehicle crashes. Researchers intended to evaluate the feasibility of using probe vehicle data and crowdsourced data to collect relevant information, such as travel time and vehicle speeds.

### Methodology



- For this study, 27 unique urban segments were selected throughout New Jersey, each with 24-hour bicycle volume availability, for analysis.
- Bicycle traffic volumes from 2017 to 2021 were extracted from the Delaware Valley Regional Planning Commission's (DVRPC) pedestrian and bicycle counts dataset; design characteristics of the locations were obtained from NJDOT's 2015 Straight Line Diagrams (SLD) database, and the operating speed of the selected corridors was extracted using the Regional Integrated Transportation Information System (RITIS). This database is a comprehensive information system that integrates and provides real-time transportation-related data for a specific region.

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- In this study, Linear Regression, Random Forest, and XGBoost were applied to identify the effects of variables, such as bicycle traffic volume, roadway functional classification, speed limit, number of lanes, shoulder width, median type, season, day of the week, and time of day, on vehicle operating speed.

### Results

- The limited availability of comprehensive data such as bicyclist counts resulted in suboptimal model accuracy, hindering the generation of robust results. This limitation deterred the models' ability to capture dynamic changes in bicyclist patterns over time.
- Statistical and machine learning models (including regression Model, Random Forest, and XGBoost) have been used to identify the contributing factors to vehicle speed in other contexts, such as in cases of wrong way driving crashes, but applying similar methodology for this project became problematic due to inadequate data for bicycle counts.

### Conclusions

- Historically, transportation agencies have invested in collecting motor vehicle data, such as traffic volumes. However, this is not the case for people who ride bicycles. There are very limited state or national programs to standardize and collect bicycle counts or determine where bicycle trips occur.
- The lack of bicycle count data inhibits the research team from completing an adequate analysis on the relationship between bicycle volumes and corridor operating speed.
- Due to the limited availability of bicyclist counts, the results of this study cannot be generalized to the entire state of New Jersey.
- This methodology cannot be applied to questions pertaining to bicycle volumes until there is a larger inventory of bicycle count data.

### Recommendations

- Create and maintain an inventory of bicycle facilities such as bike lanes, bike paths, bike share stations, bicycle parking facilities.
- Expand the deployment of bicycle counters throughout the state.
- Repeat the study once adequate bicycle count data is available.

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