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NATIONAL INSTITUTE for TRANSPORTATION and COMMUNITIES

IMPROVING BICYCLE CRASH PREDICTION:
STRATEGIES FOR MULTIMODAL SAFETY

The 2010 Highway Safety Manual (HSM) provides methods for predicting the number of motor vehicle crashes on various roadway facilities. However, it includes only a simplistic method for predicting the number of bicycle-related crashes. In this project, the research team investigated the bicycle-specific crash data in eight potential study areas around the U.S.: Arlington, Virginia; Bellingham, Washington; Boulder, Colorado; Denver, Colorado; Minneapolis and St. Paul, Minnesota; Philadelphia, Pennsylvania; Portland, Oregon; and San Diego, California. Researchers compared the available online data from each study area.

They selected Boulder, Colorado for future analysis based on the availability of, not just crash data, but also continuous and short-duration bicycle and pedestrian traffic count data. In this analysis, a negative binomial model with log link was used to predict annual non-fatal motorist-bicyclist crashes on road segments per mile. This report adopts methods from the HSM used for motor vehicle safety performance functions (SPFs) in order to develop bicycle-specific SPFs for roadway segments in Boulder, Colorado.

The analysis shows that motor vehicle volume is a leading factor associated with more crashes between motor vehicles and bicyclists. Bicyclist exposure, population density, and percent retail land use are also predictive. While both vehicle volume and bicycle volume data are used in the model in order to account for the "safety in numbers" effect, the model did not demonstrate this effect which is seen commonly in other research, including the bicycle SPF developed previously for intersections in Boulder. This effort at developing a bicycle-specific SPF for segments in the U.S. which utilizes bicycle volumes is an important first step towards further understanding bicyclist safety, and may inform future versions of the HSM.

This project investigated factors that predict bicycle collisions—such as motor vehicle volume, bicyclist exposure, land use and population density— and used them to begin the development of bicycle-specific safety performance functions.

PROJECT TITLE
Improving Bicycle Crash Prediction for Urban Road Segments (#2017-756)

INVESTIGATORS
Sirisha Kothuri, Ph.D, Portland State University; Krista Nordback, Ph.D, University of North Carolina; Wesley Marshall, Ph.D, P.E, University of Colorado, Denver

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