OBJECTIVES

- The primary objective of this study is to identify the causal relationships between exogenous factors and the frequency of bicycle and pedestrian related crashes by using structural equation models (SEMs) with different model scenarios.
- Use variables that quantify the socioeconomic characteristics of the communities surrounding each study corridor. These socioeconomic characteristics could potentially be proxies that account for additional components of exposure of pedestrian or bicyclist that impact safety in the local area.

APPROACH

Selection of Wisconsin State Highway Study Corridors

- 200 one-mile study corridors located in areas with more than 100 people per square mile were selected. This generally included cities, suburbs, and villages but excluded rural areas. The focus was more on urbanized areas since they tend to have higher volumes of pedestrians and bicyclists and is more susceptible to pedestrian and bicyclist crashes.
- The selection process involved identifying all census tracts with more than 100 people per square mile and imposing an imaginary 200m by 200m grid on the selected census tracts using GIS. Then the 200m by 200m cells that contained a state highway was selected. This set of cells was assigned an identification number, and an initial set of 200 identification numbers were selected randomly. The geographic center of these cells were considered as the starting points for one-mile corridors along the state highway. For each of the 200 starting points, a direction was randomly selected (north or south; east or west) and measured one mile in that direction to define the corridor.

RESULTS

• Pedestrian Crash Model Results
  - Pedestrian crashes were positively related to natural log of the state highway AADT, non-residential driveways, total intersections, percent sidewalk coverage, percent side path coverage, and negatively related to percentage of corridor with a median.

• Bike Crash Model Results
  - The core exposure variables used in the bicycle crash models were the natural logarithm of population density, the percentage of households with zero vehicles, and the square root of retail job density for the census block groups that contained the roadway corridor. The square root of retail job density generally performed better than the natural logarithm of total job density in the exposure on and most other bicycle crash models.

CONCLUSION

- The SEM model with two latent variables (Roadway Geometry and Pedestrian Exposure) had the best statistical goodness of fit and the most statistically significant variables at a significance level of 5%.
- SEM results have revealed that the vehicle speed can positively influence crash frequency, and both vehicle speed and exposure can significantly increase crash frequency.
- Males are more likely to drive faster than females, and older drivers tend to drive slower than younger drivers, although this variable is not significant in any of the three at the 5% level.

BIBLIOGRAPHY


