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A Micro-Scale Analysis of Cycling Demand, Safety, and Network Quality

Project 1851
September 2020

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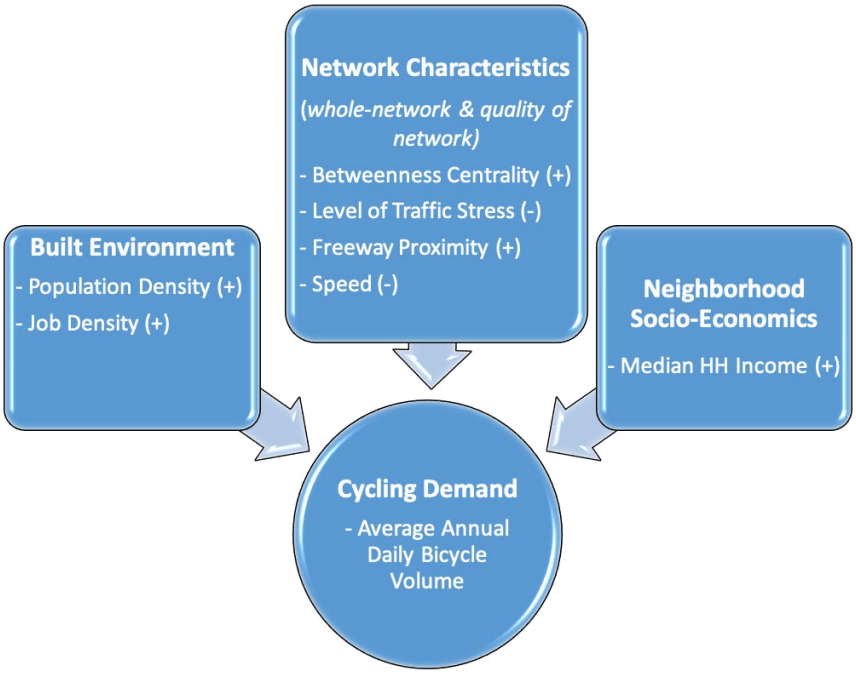

The State of California has ambitious goals to double walking and triple cycling trips by 2020, as well as reducing bicycle and pedestrian fatalities by ten percent each year. To this end, the 2008 California Complete Street Act delivered a mandate to carry out long-range planning for cycling, walking, and transit, in addition to vehicular-oriented systems, when any local government embarks on a general plan update. However, two major barriers to implement this exist: a lack of consistently collected bicycle and pedestrian data and a lack of standardized metrics and planning tools to assess infrastructure. To help overcome these barriers, this project uses a large network of automated count data to estimate Average Annual Daily Bicycle Volumes (AADB) across San Diego's bikeable roadway network, improve bicycle demand estimation models and cycling crash rate calculations, and assess and validate bicycle planning practices.

Study Methods

This research used a unique database of cycling volumes from the San Diego region to estimate a cycling demand and a cycling collision model. Continuous cycling count data collected from 34 automated counters were used to extrapolate over 1,400 short duration counts to average annual daily bicycle volumes (AADB). Network characteristics, built environment, and socio-economic characteristics were the primary independent variables employed in the modeling. A key contribution of this research is to incorporate both a whole-network measure (betweenness centrality) and a network quality measure (LTS) in estimating cycling volumes. Another key contribution is the assessment of the correlation between cycling propensity models used by practicing planners in San Diego and actual AADB.

Findings

The research revealed that betweenness centrality is positively and significantly related to average annual daily bicycle volumes, even when controlling for density and income. This finding means that as the importance of the roadway segment within the overall network increases, the number of cyclists using that segment increases.

The findings related to network quality are contrary to expectations. The analyses showed that LTS is positively associated with cycling volumes, meaning that when cycling stress along the roadway increases, bicycle volumes increase.

Next, in terms of cycling collision rates, this research shows that as cyclists get closer to freeways, collisions tend to go up. Cycling collision rates are also higher in lower income neighborhoods.

Finally, in terms of planning tools, there is an association between cycling propensity as developed by the City of San Diego for the purposes of long-range bicycle planning and actual bicycle volume.

Effectively calculating cycling demand ultimately makes cycling safer and more equitable.

Policy/Practice Recommendations

This research helps reveal the demand for cycling and holds promise for local and regional bicycle planners.

This research found that cyclists are sensitive to the centrality of roadway segments within the network, and accommodation priority should be placed on these segments. Another important finding, that of collision rates correlating to lower income neighborhoods, has important equity implications for bicycle planning.

Finally, more must be done to understand local government planning processes and to make academic research relevant to practicing planners.

About the Authors

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/1851

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