

Evaluating Alternative Measures of Bicycling “Level of Traffic Stress” Using Crowdsourced Route Satisfaction Data

Project 1711
September 2019

Chester Harvey, M.S., Kevin Fang, Ph.D., and Daniel A. Rodriguez Ph.D.



The “Level of Traffic Stress” (LTS) framework, first proposed in a 2012 Mineta Transportation Institute report, is an increasingly popular approach to evaluating the quality of roadways for bicycling. In their new MTI report, authors Chester Harvey, Kevin Fang, and Daniel A. Rodriguez further explore what LTS tells practitioners and researchers about the bicycling environment. To investigate the validity of LTS, the authors compare conceptual LTS ratings and LTS model inputs with real world, user-reported data on how satisfactory or not satisfactory bicycle trips are. Additionally, the authors look at the comparability of multiple variants of the LTS method developed since 2012.

Study Methods

The authors explored LTS through analyses of two case study cities: Portland, Oregon and Austin, Texas. LTS evaluations were conducted for both city’s bicycling networks using seven different LTS

method variants. Input data for the analysis was gathered through open source and government data sources and original data collection through “virtual auditing” of street view images. Additionally, crowdsourced bicycle user satisfaction data was gathered from riders in both cities. This data were captured by the mobile app Ride Report.

Once the data were gathered and the LTS ratings were calculated, various statistical analysis techniques were used to compare the LTS results from the various methods against each other and the crowdsourced user satisfaction data. Additionally, cycling environmental variables (used as inputs for the LTS evaluations) were directly compared against the crowdsourced user satisfaction data.

Findings

Comparing the theoretical LTS classifications with real world crowdsourced user data confirmed that less stressful facilities, as categorized by the LTS metric, are associated with greater rider satisfaction. The association between LTS and rider satisfaction is also reasonably linear. That said, the size of the association between LTS and rider satisfaction is somewhat modest, reflecting the complexity in how different riders judge their trips.

The comparison of multiple LTS method variants found that, perhaps unsurprisingly, using different methodologies can produce substantially different results. Additionally, within a single methodology, using different input sources for a variable can result in different estimations of stress levels.

The comparison between Level of Traffic Stress methods and crowdsourced user data confirms that less stressful facilities, as categorized by LTS, are associated with greater real-world bicyclist satisfaction.

Policy Recommendations

From a policy perspective, comparing LTS inputs with real world rider satisfaction found that the presence of bike lanes and other bicycling-specific infrastructure had the strongest and most consistently positive association with greater satisfaction. This supports the notion that the addition of such infrastructure and calming of vehicular traffic are among the most effective approaches for maximizing the bicyclist experience.

From an analysts perspective, the findings that the results of LTS analyses can vary substantially depending on methods and data sources used, indicates that results should be read with care to avoid apples-to-oranges comparisons.

About the Authors

Chester Harvey is a Ph.D. candidate in City and Regional Planning at the University of California, Berkeley. Kevin Fang, Ph.D. is Assistant Professor of Geography, Environment, and Planning at Sonoma State University. Daniel A. Rodríguez, Ph.D. is Chancellor's Professor in the Department of City and Regional Planning and Associate Director of the Institute for Transportation Studies at the University of California, Berkeley.

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/1711



MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business.