National Center for Sustainable Transportation

POLICY BRIEF

Bike Lanes and Slow Car Speeds Can Improve Bicycling Comfort for Some (But Not All) People

Dillon T. Fitch and Susan L. Handy, *University of California, Davis*
Jane Carlen, *Los Angeles Times*

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Issue

Transportation planners in cities across the country are trying to increase bicycling to achieve mobility, public health, and environmental goals. For bicycling to become a mainstream travel mode, however, riders must feel safe and comfortable in the bicycling environment. Thus, cities are changing transportation infrastructure to provide more bicycling-friendly streets.

It remains unclear exactly how much infrastructure change is needed to make potential cyclists feel comfortable enough to bicycle regularly. Protected bike lanes and off-street paths provide a safer and more comfortable bicycling environment than on-road bike lanes and mixed-traffic lanes, especially for less experienced bicyclists. However, cities often find it difficult to provide these types of facilities due to their higher costs, political opposition, and the challenge of integrating them into the transportation network. For this reason, on-road bike infrastructure remains a key focus, and planners face the challenge of designing it to feel safe and comfortable despite the limited protection from traffic it provides.

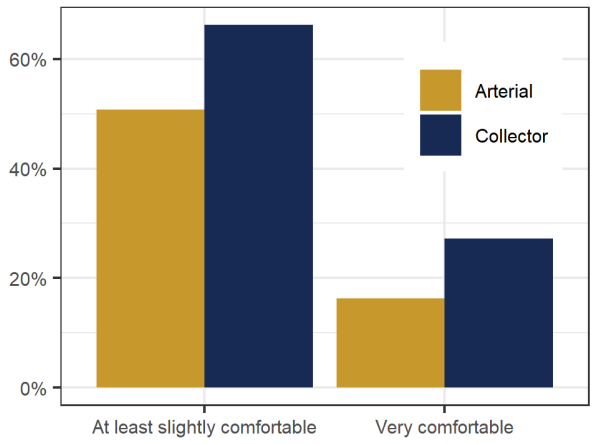

Figure 1. Model-simulated ratings of a hypothetical cohort of people disinclined to ride a bike to "ideal" on-road conditions, such as wide bike lanes and slow traffic speeds, for a two-lane collector and four-lane arterial.

To better understand what road characteristics contribute to more comfortable bicycling, researchers at UC Davis surveyed 3,089 travelers to the UC Davis campus to measure perceived comfort of bicycling in different road environments using video recordings of 25 urban and rural roads from the San Francisco Bay Area. The findings provide guidance for communities aiming to increase bicycling.

Key Research Findings

Infrastructure that provides more space for bicyclists on roads creates a more comfortable cycling environment. People reported more comfort on roads with a conventional bike lane than on roads with no bike lane. Roads with a buffered bike lane were rated as even more comfortable. However, the magnitudes of the infrastructure effects were greatly uncertain. This suggests that on-road bike infrastructure is likely to vary in its effectiveness based on the context of other environmental attributes.

Combining car speed management with on-road bike lanes and greater bike operating space is the best way to improve comfort on roads where protected or separated lanes are not feasible. Simulations based on survey responses found that the combination of low posted speed limits, narrow outside car travel lanes, low prevailing car speeds, and wide buffered bike lanes shows the most potential for creating comfortable on-road bicycling.

Even roads with wide bike lanes and slow traffic speeds are unlikely to provide a comfortable environment for all people. Results from those same simulations showed that people who are not predisposed to bicycling would rarely consider these roads "very comfortable" for bicycling, although a majority would agree they are at least "slightly comfortable" (Figure 1). This result suggests that either the characteristics observed in the videos do not go far enough for designing a comfortable on-road lane for bicycling, or protected/separate lanes may be needed to ensure a very comfortable space to bicycle for those least predisposed to bike.

Providing a comfortable bicycling environment for a cohort of the most cautious and risk-averse population may be a good strategy for defining infrastructure minimums that encourage mass bicycling. People of different sociodemographics showed general agreement on the important road characteristics for providing a comfortable bicycling environment. While further research is needed to ensure these results reflect the general population, the results suggest that designing infrastructure with one cautious and risk-averse cohort in mind may be more prudent than attempting to tailor road environments for different sociodemographic/attitudinal groups.

Existing measures of bike suitability used in planning do not accurately reflect people's reported bicycling comfort. Bicycle Level of Service and Level of Traffic Stress metrics—two commonly used measures of a road's suitability for bicycling—correlated with average comfort ratings, but a large minority of respondents were at least "slightly uncomfortable" even on roads with the best ratings under these metrics (Figure 2). This suggests that current metrics stop short of providing a class of road environments that is suitable for the masses.

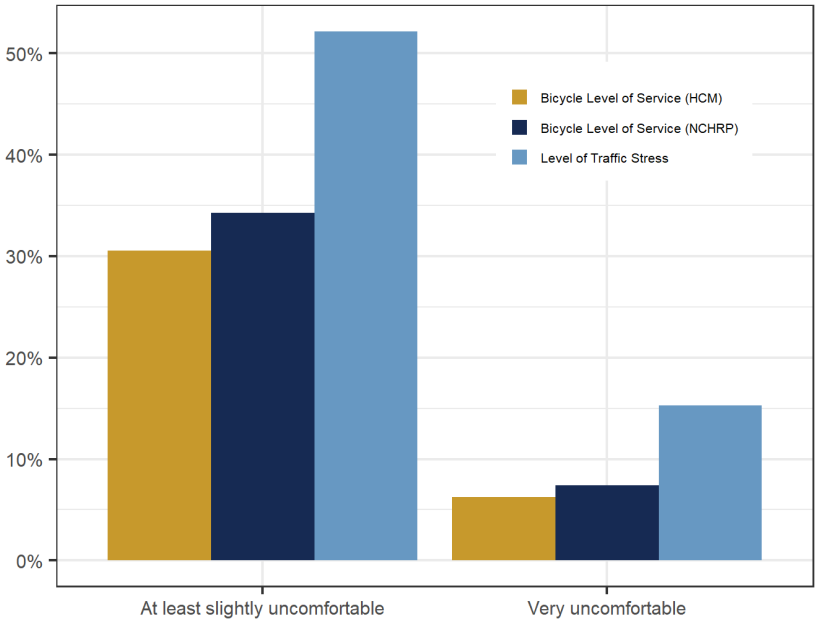

Figure 2. Raw survey response percentages for roads classified as most suitable for bicycling by common metrics - Level of Traffic Stress class 1 and Bicycle Level of Service class A from the Highway Capacity Manual (HCM) and the National Cooperative Highway Research Program (NCHRP).

More Information

This policy brief is drawn from "Making Bicycling Comfortable: Identifying Minimum Infrastructure Needs by Population Segments Using a Video Survey," a report from the National Center for Sustainable Transportation, authored by Dillon Fitch and Susan Handy of the University of California, Davis, and Jane Carlen of the Los Angeles Times. The full report can be found on the NCST website at https://ncst.ucdavis.edu/project/making-bicycling-comfortable-identifying-minimum-infrastructure-needs-population-segment.

For more information about the findings presented in this brief, please contact Dillon Fitch at dtfitch@ucdavis.edu.

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