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Making Bicycling Comfortable: Identifying Minimum Infrastructure Needs by Population Segment Using a Video Survey

Inform policy decisions makers pertaining to road design, bicycle planning, and investment needs for bicycling to become a mainstream travel mode in US cities.

WHAT WAS THE NEED?

Understanding what environments are comfortable (and perceived as safe) for bicyclists is essential for increasing bicycling, particularly for non-experienced riders. Surveys probing people's qualitative perceptions about bicycling environments thus have a key role in bicycle planning. In this study, the research team used survey data to analyze bicycling comfort and its relationship with socio-demographics, bicycling attitudes, and bicycling behavior. They used existing survey of students, faculty, and staff at University of California (UC) Davis (population size 3089) who rated video clips of bicycling environments based on their perceived comfort as a part of the UC Davis annual Campus Travel Survey (CTS).

The researchers used video clips from a variety of urban California state highways around the Bay Area where bicycling rates vary. They expected these results would help show the infrastructure minimums needed for most people to comfortably bicycle. In addition, the research team expected to identify groups of people (types of bicyclists) by their comfort needs. Groups they expected to look closely at are those with low incomes and low rents, women, those with less bicycling confidence, and those who rarely rode before living in Davis.

WHAT WAS OUR GOAL?

Understanding what environments are comfortable (and perceived as safe) for bicyclists to increase bicycling, particularly for non-experienced riders.



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economy and livability.

WHAT DID WE DO?

Task 1: Survey Data Processing

This task included writing computer code (R statistical language) to read, examine, and filter the survey data. Since survey data tends to have many missing values, data may need to be imputed at this step. The survey data was transposed into a workable dataset for analysis which includes conversion of qualitative data into quantitative representations. This task included the reduction of over 100 variables from the CTS to a smaller set specific to the project goal of determining bicycling comfort; and the formation of new variables by combining existing variables.

Task 2: Model Development and Statistical Analysis

This task included writing computer code (R statistical language) to analyze the survey data. The researchers generated a series of descriptive and bivariate statistics of the processed survey data. They also employed a series of statistical models to analyze multivariable relationships. The process for drawing inferences from these models is as follows: (1) simulate data from a known process (the hypothesized process of the empirical data), (2) build the model to match the data generating process, (3) test the model on the empirical data, (4) revise and expand the model for model comparisons, and (5) cross validate the models.

Task 3: Database Design and Documentation

This task included formatting the data so it can easily be shared amongst the transportation research and professional community. Because the data is relatively small, they built one comma delimited file that holds all the data. In addition, they built metadata for each field in the dataset covering the processing steps from the raw survey data.

Task 4: Research Report

This task included the detailed write up of the research. It included background information including a literature review, methodological details of the survey design, processing and analysis of the data, results and discussion, and policy implications for the research.

Task 5: Policy Outreach

The researchers conducted a webinar hosted at UC Davis, and some research material at the Annual Transportation Research Board Conference (2020). The webinar was aimed specifically at the application of the research for local/regional/state policy decisions. The researchers invited appropriate agencies to participate in this one-time webinar. They posted the resulting video and discussion on the National Center for Sustainable Transportation's website for archived viewing. The intent is for the research and engagement to give policy makers innovative ideas for improving bicycling environments, for increasing the level of bicycling, and for being smart about where and how they invest in bicycling infrastructure.

WHAT WAS THE OUTCOME?

The results indicated considerable effects of socio-demographics and attitudes on absolute video ratings, but found relative agreement about which videos are most comfortable and uncomfortable across the sample population segments.

In addition, the presence of bike infrastructure and low speed roads (low posted and equal or lower prevailing speeds) are the strongest video factors generating more comfortable ratings. However, the results suggest that even the best (according to attributes in our data) designed on-road bike facilities are unlikely to provide a comfortable bicycling environment for those without a predisposition to bicycle. Nonetheless, the results provide guidance for improving roads with on-street bike facilities where protected or separated facilities may not be suitable.

WHAT IS THE BENEFIT?

Understanding what environments are comfortable (and perceived as safe) for bicyclists is essential for increasing bicycling, particularly for non-experienced riders. Surveys probing people's qualitative perceptions about bicycling environments can inform bicycle planning in important ways.

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IMAGE



Very uncomfortable Moderately uncomfortable Slightly uncomfortable Neither comfortable nor uncomfortable Slightly comfortable Moderately comfortable Very comfortable

An example of survey question

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