

Research You Can Use

The Perils of Causal Inference: Bicycling in Davis, California

Every winter, transportation planners and engineers converge in Washington, D.C., for the annual meeting of the Transportation Research Board. Hundreds of papers are presented at TRB—possibly the greatest concentration of transportation research anywhere in the universe. In 2005, Norman Garrick of the University of Connecticut presented a provocative paper on bicycling in Davis, California. It's the kind of paper practitioners love, and academics love to challenge, because it asserts causality without proving it.

Garrick lays out three sets of facts about bicycling in Davis, a university town 15 miles west of Sacramento.

- Davis has a uniquely high bicycle mode share, about 15 percent of all trips to work. This is two and a half times the bicycle mode share of Palo Alto, the California runner-up, and 35 times the U.S. average. It is the only city on the peer list with no pedestrian or bicycle fatalities for a five-year period, and an extraordinarily low rate of pedestrian and bicycle injuries.

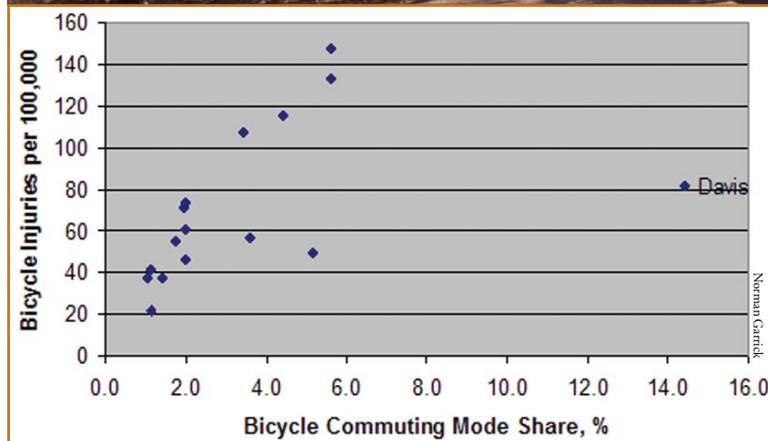
- Davis is compact. It has a strong downtown for a city its size (65,000 residents, including 10,000 students at the University of California, Davis), and it has almost no urban sprawl beyond the 10-square-mile city limit. Virtually every point in the city is easily reachable by bike. Davis pioneered bike lanes (which until the late 1960s were prohibited by California traffic codes) and bike-activated traffic signals (reputed to be the first in the nation). Today the city boasts bike lanes or paths on 90 percent of its arterials and collectors.

- Davis adopted a general plan in 1973 that made growth control its guiding principle, only the second California city to do so. Through various amendments, this plan has always favored the downtown by focusing growth inward. Its mobility section calls for bicycle lanes on all arterials and collectors, and shared-use paths along arterials where feasible.

Where Garrick's paper may raise academic and other eyebrows is in asserting that these sets of facts are linked causally—that bike-friendly planning is the cause of bike-friendly physical form, which in turn is the cause of unmatched bike usage.



Reid Ewing



Norman Garrick

Bicycle injuries per capita vs. mode share in 16 California cities.

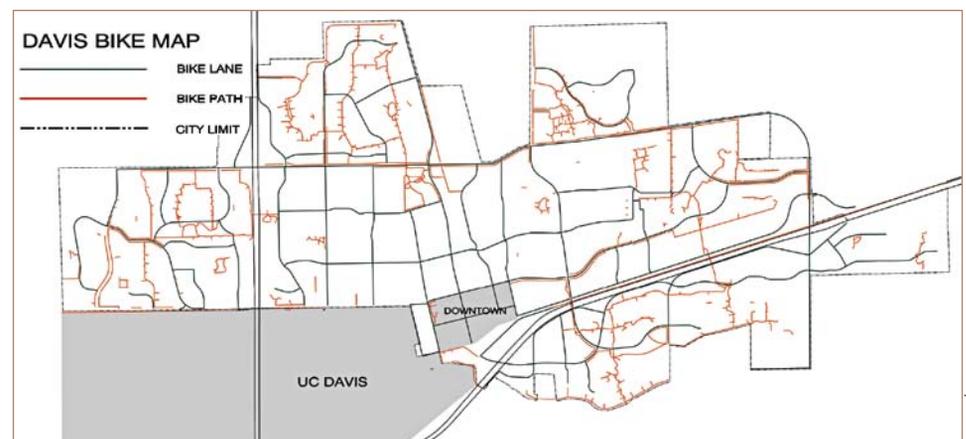
Davis's success, Garrick boldly asserts, "is due in no small part to the fact that, from a planning and design perspective, Davis has worked to integrate bicycle use as a fundamental element of its mobility program and its land-use planning."

Threats to causal inference generally come from "confounders," underlying factors that could account for apparent relationships. As Garrick himself notes, many factors, beyond planning and design, encourage bicycle use in Davis, including the presence of a large

Garrick's explanation for both facts, in terms of integrated land use and transportation, is novel and instructive.

Reid Ewing

Ewing is a research professor at the National Center for Smart Growth at the University of Maryland, an associate editor of *JAPA*, and a consultant with Fehr & Peers Associates in Los Angeles. Garrick's original paper, "Land Use Planning and Transportation Network Design in a Bicycle-Friendly American City," is available on the 2005 TRB Annual Meeting CD (paper 05-2520). An update is available from the author at norman.garrick@uconn.edu.



City of Davis