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The Why and Where of Active Travel: Modeling Bike and Foot Traffic across the United States

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Cycling and walking are healthy forms of active travel that can often substitute for transportation by car. However, which features in the built environment favor cycling and walking? Studies that relate features in the built environment to cycling and foot traffic patterns are typically limited to individual cities,[1,2,3,4] beyond which those studies' results are of limited use. To address this shortcoming, the authors of a study in *Environmental Health Perspectives* have developed generalizable estimates of how the built environment influences bike and pedestrian traffic across the United States.[5]

"Ideally, this work will help municipalities locate active travel facilities appropriately and thereby improve public safety while cutting exposure to air pollution," says Huyen T.K. Le, a PhD candidate in transportation planning at Virginia Polytechnic Institute and State University (Virginia Tech) and the study's first author.

Le's research employed so-called direct-demand models to forecast how walking and biking traffic varies with local land uses, sociodemographic factors, and transportation networks. These models are based on counts of how many walkers and cyclists pass by sites with different physical characteristics at varied times of the day.

Ralph Buehler, an associate professor of urban affairs and planning at Virginia Tech and a coauthor of the study, explains that by comparing counts in different parts of a city, researchers gain a better understanding of the features most associated with cycling and foot traffic. Those insights can then be applied in areas from the same city where count data are not available.

As a first step toward developing a nationally applicable model, Le et al. collected counts from as many locations in the country as possible. They scoured publicly available resources online, identified and corresponded with jurisdictions that gather the data, and ultimately collected morning and afternoon counts for 4,593 locations in 20 metropolitan areas.

Because some jurisdictions split counts of cyclists and walkers moving in opposite directions into separate categories, the researchers transformed the national data set by converting all the counts into measures of total traffic regardless of direction. Counts collected from street intersections and along street segments (for

Give people places to bike and walk, and they will bike and walk. Observations from metro areas across the United States indicate that investing in bike-related infrastructure helps to promote cycling. Walking, however, is predicted more by incidental infrastructure, such as transit stops—but walking paths are nice, too. Image: © JANIFEST/iStockphoto.

instance, stretches of road between intersections) were evaluated separately.

The team then collected data on the many local features that might influence active travel in an area. These features included land-use variables, employment demographics, access to public transportation, road network density, socioeconomic factors, and local weather patterns. For each count location, the team used Google Earth and local bike-route maps to investigate the presence and extent of bike lanes, trails, and shared-use paths (which are designed for multiple forms of active travel).

In the direct-demand model, traffic counts were the outcomes, and the local characteristics were the predictors. According to the results, bicycle and foot traffic were both associated with access to water bodies, greenspace, jobs, and university and college campuses. Pedestrian traffic was higher than bike traffic in areas with high household density, whereas off-street facilities such as shared-use trails were strong predictors of a greater amount of bike traffic.

Buehler notes, "When it comes to pedestrian traffic, land uses appear to be the major drivers, while biking depends more on cycling infrastructure, such as dedicated bike lanes, in addition to off-street facilities."

Susan Handy, a professor of environmental policy and planning at the University of California, Davis, who was not involved in the study, says the findings have implications for designing health-promoting cities. "Most cities have limited data on the numbers of cyclists and pedestrians," she says. "By using data from twenty metropolitan areas, the authors have given us the most generalizable model yet. With such an assessment in hand, planners can also target resources at the most dangerous locations, helping to create a safer environment that will encourage more active travel."

Charles W. Schmidt, MS, an award-winning science writer from Portland, Maine, writes for *Scientific American*, *Science*, various *Nature* publications, and many other magazines, research journals, and websites.

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