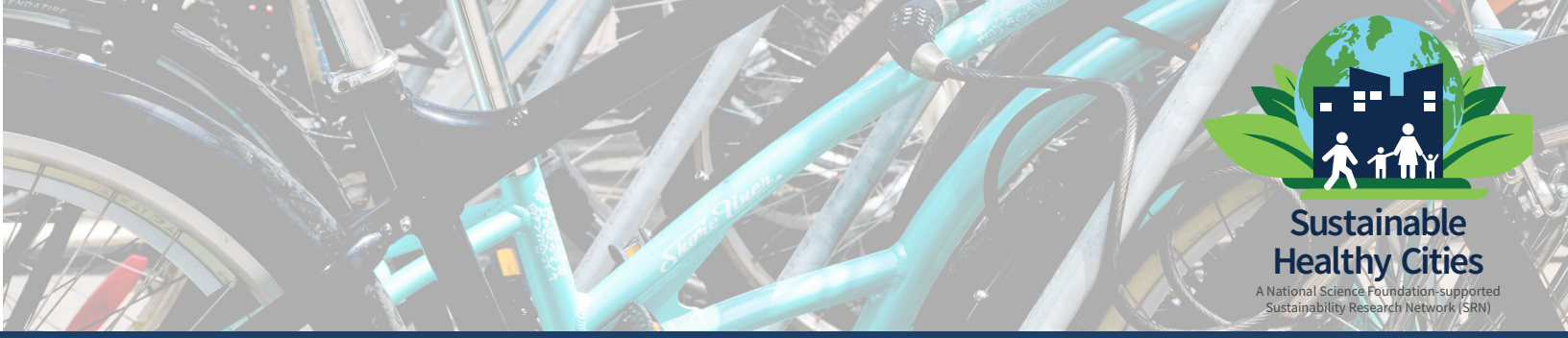

Sustainable Healthy Cities
A National Science Foundation-supported Sustainability Research Network (SRN)

JOURNAL BRIEF: How the built environment influences biking and walking

Sustainable Healthy Cities Journal Brief - 2020, No. 22 - Active travel and built environment

This brief is adapted from the following peer-reviewed journal article: Tao, T., Wu, X., Cao, J., Fan, Y., Das, K. & Ramaswami, A. (2020). Exploring the Nonlinear Relationship Between the Built Environment and Active Travel in the Twin Cities, *Journal of Planning Education and Research*, 1-16.

Study Intent and Research Question

Active travel—biking and walking instead of driving—is important to both public health and the environment. This study sought to understand the collective influence of built environment features, such as distance to parks, land use, and transit accessibility, on active travel.

Additionally, this study investigated the common assumption that environmental features linked with biking and walking have a linear relationship with active travel—i.e., the impacts remain constant across the entire ranges of the environmental features. Results showed that associations between various environmental features and active travel are better understood as threshold effects—i.e., the associations change drastically after passing certain values of the environmental features.

This research can help planners identify improvement priorities and support the design of effective planning policies.

Key Background Information

Land-use policies often change several dimensions of the built environment simultaneously. For example, a transit-oriented development may lead to an increase in transit access and density, as well as a reduction in parking supply. This makes it important to consider multiple dimensions of the built environment when exploring their relationship with active travel.

Furthermore, when exploring an association between the built environment and active travel, it is critical to understand the true nature of the correlation. For example, people may assume a linear correlation between parks and active travel. However, it is possible that a park only encourages more biking and walking within a certain radius. If someone lives a greater distance from the park, it may not affect their travel choices. Overlooking such threshold effects of nonlinear associations may misestimate the true impact of features like parks and could offer erroneous implications for planning practice.

To investigate these questions, researchers recruited residents from six neighborhoods in the Minneapolis-St. Paul Twin Cities area, representing urban and suburban locations and low- and middle- incomes. Residents used a smartphone app called Daynamica™ to submit information on their daily activities and trips for a period of seven consecutive days, including trip distance, trip durations, and travel modes. Data was collected from 400 respondents over the course of a year (2016-2017).

Key Findings

Built environment characteristics collectively account for more than two-thirds of the predictive power for active travel, suggesting that neighborhood features greatly influence the amount of active travel.

Among individual built environment characteristics, **distance to the nearest park** is the most important, followed by the **distance to downtown Minneapolis** and the **number of bus stops** within a half-mile from respondents' homes.

These associations between built environment features and active travel showed interesting **threshold effects**. Proximity to parks is associated with more active travel, but only when someone lives within 0.2 miles of a park. Beyond

that distance, the impact becomes saturated. Park size also matters. Larger parks are associated with more active travel. However, distance to the park matters most.

Similarly, respondents who live within 0 to 0.9 miles from a light rail station report more active travel. Beyond the walkable distance to light rail, active travel decreases substantially.

People living within four miles of downtown Minneapolis conduct more active travel than those living farther away. **Mix of land uses** and **population density** are both associated with active travel. When services and business are close to residential areas, people can walk or bike a shorter distance to reach these destinations. Dead end streets and cul-de-sacs are negatively associated with active travel.

Besides environmental features, **age** was an important factor. Individuals reach peak active travel at 42 years old and report the least active travel beyond 71 years old.

Temperature also plays a role. Bikers and walkers are exposed directly to the environment and travel less on cold days. Active travel grows at an exponential rate when the temperature is above the freezing level. Its marginal effect is saturated at about 77 degrees.

Policy and Practice Implications

This study highlights the importance of land use to active living. A comprehensive package of strategies is needed to promote active travel effectively.

Parks are particularly important. Even small parks encourage active travel if they are close to residents' homes. This finding may be encouraging to urban planners who face difficulties in acquiring large pieces of parkland.

Active travel is higher within four miles of downtown, suggesting that population densification in city centers can promote active travel. Policy incentives should direct future development toward the central city, such as planning more residential buildings within a few miles from the city center.

Transit-oriented development promotes transit use and facilitates active travel. Transit riders often engage in active travel to reach transit stops and nearby destinations. Municipalities can fund station-area improvements around transit stations to improve pedestrian and bicycle access.

Local land use reinforces transit infrastructure because density and land-use mix are positively associated with active travel.

Transportation

Spatial Reconfiguration

Further Reading and References

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About the Sustainable Healthy Cities Network

The Sustainable Healthy Cities Network is a U.S. National Science Foundation-supported sustainability research network focused on the scientific advancement of integrated urban infrastructure solutions for environmentally sustainable, healthy, and livable cities. We are a network of scientists, industry leaders, and policy partners committed to building better cities through innovations in infrastructure design, technology, and policy. SHCN connects nine research universities, major metropolitan cities in the U.S. and India, and infrastructure firms and policy groups to bridge research and education with concrete action in cities.