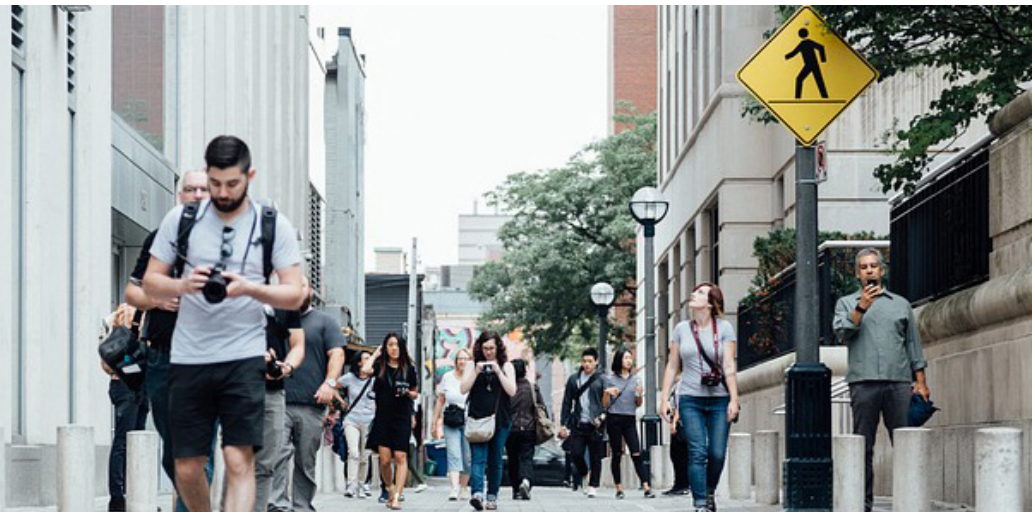

HOW TO ESTIMATE PEDESTRIAN DEMAND

Researchers develop a tool for forecasting walk trips and pedestrian destination choice.

The Issue

There is growing support to improve the quality of the walking environment and make investments to promote pedestrian travel. Such efforts often require analytical non-motorized planning tools to estimate levels of pedestrian demand that are sensitive to environmental and demographic factors at an appropriate scale. Despite this interest and need, current forecasting tools, particularly regional travel demand models, often fall short.

To address this gap, Oregon Metro and NITC researcher Kelly Clifton worked together to develop a pedestrian demand estimation tool. For generations, planners have been using statistical models to forecast travel demand, but these models have traditionally been auto-centered. The new tool will allow planners to allocate infrastructure based on pedestrian demand in the Portland, Oregon metropolitan area. The tool is also designed to be replicable, so that other metropolitan areas can adapt the model to begin estimating pedestrian demand in their cities.

The Research

In a previous project completed last year as part of the same partnership, Clifton developed a way to collect data about the pedestrian environment on a small, neighborhood scale that made sense for walk trips. Following the initial project, the next step was to take that micro-level pedestrian data and use it to predict destination choice. For every walk trip generated by the model in the first project, this tool matches it to a likely destination based on traveler characteristics and environmental attributes.

NITC
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THE ISSUE

Pedestrians need to be better represented in travel demand models.

THE RESEARCH

This project expands on previous work by:

- Matching walk trips with destinations;
- Identifying factors which influence pedestrian travel behavior;
- Developing a statistical model of pedestrian choice behavior.

IMPLICATIONS

This tool provides a new analytical method for regional demand modeling, which stands to improve pedestrian safety analyses, health assessments and other pedestrian planning applications.

Photo: Pedestrians in urban area

Specifically, this project developed statistical models of pedestrian choice behavior, predicting the distribution of walk trips generated (from the previous project) to destinations also at a small spatial scale. Using about 4,500 walk trips from a 2011 household travel survey in the Portland region—the Oregon Household Activity Survey—multinomial logit pedestrian destination choice models were estimated for six trip purposes.

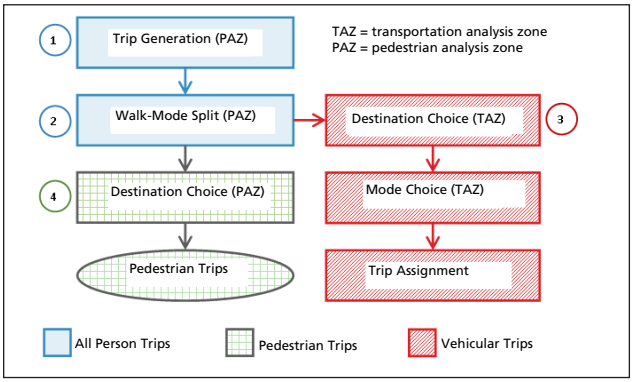
Independent variables included terms for walk-trip distance; employment by type; households; supportive pedestrian environments (parks, the quality of the pedestrian environment); barriers to walking (terrain, freeways, industrial-type employment); and traveler characteristics.

Implications

The results of the study suggest important behavioral influences on walking. Distance was a significant deterrent (i.e. the farther away a destination, the less likely people are to walk to it). However, the research revealed that after controlling for other factors, more attractive pedestrian environments generate more walk trips. This means that even when the distance is equal, people are more likely to walk if the walk is a pleasant one.

These results highlight policies that could encourage walking. For instance, increasing the number of activity opportunities in a neighborhood center or installing sidewalks and connecting street grids along a suburban strip could encourage people to walk from further away, helping to overcome the distance barrier. Employment (especially retail) was another strong attractor: doubling the number of jobs nearly doubled the odds of choosing a destination for home-based shopping walk trips.

This research makes several important contributions. Notably, it is one of the first studies to explore the destination-choice dimension of pedestrian travel behavior. It advances both knowledge and practice by analyzing walking behavior at a small scale commensurate with walk trips and including relevant measures of the pedestrian environment. More broadly, this research opens the door to potential planning applications. The existing work can be used to modify a regional travel demand model or it could operate as a standalone pedestrian planning tool. Either way, such a planning tool can help to inform pedestrian infrastructure investments, quantify mode shifts, improve transportation safety analyses, and provide better inputs to health impact assessments.



Framework to increase representation of walking in models

This figure demonstrates how the pedestrian tool increases the ability of regional travel models to represent walking within a trip-based structure without adding significant complexity.

PROJECT INFORMATION

TITLE: Development of a Pedestrian Demand Estimation Tool

LEAD INVESTIGATOR: Kelly Clifton, Ph.D., Portland State University

PROJECT NUMBER: 2015-677

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