



# Exploring built environment relationships with walking between and within metropolitan areas

Cities are looking for guidance from the research community on what elements of the built environment are correlated with more walking activity. However, there are questions about whether the relationships found in the literature are detailed enough to planners and if the results are applicable across different locations and different contexts within the same region. We know that the built environment has an effect on travel patterns and mode choice, but still, research needs to find more evidence to understand this relationship.

**Our study wants to explore in more detail the consistency of relationships between walking behavior and the built environment across and within different urban areas with an interest in the transferability of results from one location to another.**

Our hypothesis is that there is a direct effect between the built environment and walking. Whereas in places with high activity density and connectivity the propensity of walking is higher. This effect is mediated by the relation between the local built environment attributes and its position regional context.

## Methods and Data

We collected Household Travel Surveys, Population Census, and Open Street Maps data to generate a standardized dataset for the metropolitan areas of **New York City, Los Angeles, San Francisco, Portland, and Seattle in the United States, plus Bogotá, Colombia, and Santiago, Chile in Latin America**. We used the linked trip results of the travel surveys and merged them with built environment attributes, specifically residential density, intersection density, and streets per node average. These variables were constructed at a similar zonal representation in all cities. In the US we used Census Block Groups or Tracts, and in Bogotá and Santiago, Traffic Analysis Zones. We calibrated a discrete choice model (univariate logit) to estimate the probability of walking as a function of the built environment, including the interactions terms between the cities and the built environment. Additionally, we controlled the model calibration for age, gender, and income.

We used the built environment portion of the model to calculate a walkability score in each zone in the cities on the sample. A high score means that there is a higher probability of walking in that area, while a smaller score means the opposite. **The innovation of the indicator is that let us understand the influence on the built environment at a zonal level while considering in the calculation the regional level and that it is universal for the cities in the study.**

## Discussion

For the purpose of this study, the scores were divided into five levels using natural breaks. Santiago and Bogotá show to have the larger walkability than the other cities on the sample, with a high score in almost the whole city. In Bogotá, 100% of the people live in areas being in the two highest levels of walkability. In Santiago, over 80% of the people live in the two highest levels of walkability. In American cities, less than 25% of the people live in areas with a high level of walkability. This suggests that we could categorize metropolitan areas in terms of walkability, having an American and Latin American regime. In the American type of city, the walkability would be moderate and concentrated only in the central core of the city with very low walkability in the suburban areas. Latin American cities would have a more homogeneous distribution of walking with very high walkability in the central core. An interesting finding shows that Bogotá, being one of the densest city in Latin America and the densest in the sample, wouldn't increase walking propensity when increasing residential density. Santiago also shows a similar small influence of residential density. This finding suggests that after reaching a density tolerance the influence of density in walking extinguish and other variables may become important as safety, security, or urban design. In contrast, walking in American cities has a large influence on residential density as the ranges of density, with some exceptions, are smaller than Latin American.

## Further Research

Our main focus in the future is to improve the built environment representation, including elements that can capture the land use diversity. Our aim is to include attraction points of interest in the specification. Additionally, we want to extend our sample to more cities in different continents that may help us find a set of city characterization that in consequence can let us generate a set of policy recommendation depending on the regional configuration of the city or the distribution pattern.

