

Analyzing the Street Pattern Characteristics on Young People's Choice to Walk or Not: A Study Based on Accelerometer and Global Positioning Systems Data

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Abstract : Obesity and overweight cause serious health problems. Public and private organizations aim to encourage walking in various ways in order to cope with the problem of obesity and overweight. This study aims to understand how the spatial characteristics of urban street pattern, connectivity and complexity influence young people's choice to walk or not. 185 public university students in Izmir, the third largest city in Turkey, participated in the study. Each participant had worn an accelerometer and a global positioning (GPS) device for a week. The accelerometer device records data on the intensity of the participant's activity at a specified time interval, and the GPS device on the activities' locations. Combining the two datasets, activity maps are derived. These maps are then used to differentiate the participants' walk trips and motor vehicle trips. Given that, the frequency of walk and motor vehicle trips are calculated at the street segment level, and the street segments are then categorized into two as 'preferred by pedestrians' and 'preferred by motor vehicles'. Graph Theory-based accessibility indices are calculated to quantify the spatial characteristics of the streets in the sample. Six different indices are used: (I) edge density, (II) edge sinuosity, (III) eta index, (IV) node density, (V) order of a node, and (VI) beta index. T-tests show that the index values for the 'preferred by pedestrians' and 'preferred by motor vehicles' are significantly different. The findings indicate that the spatial characteristics of the street network have a measurable effect on young people's choice to walk or not. Policy implications are discussed. This study is funded by the Scientific and Technological Research Council of Turkey, Project No: 116K358.

Keywords : graph theory, walkability, accessibility, street network

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