Pedestrian Movement and the Built Environment – A Big Data-Based Analysis

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Abstract. Over the years, the urban planning literature has focused substantial attention on walkability research, aiming to enhance physical activity and healthy communities in the city through urban planning and design. However, while motorized traffic research seems to gain momentum in combining innovative technologies for traffic monitoring in recent years, pedestrian research seems to be left behind; the common tools used to collect pedestrian data are limited in time and scale. The increasing availability of quantitative data on the built environment holds great potential for a new generation of walkability studies, based on direct evidence of pedestrians' flow around the city. This study aims at scrutinizing the added value of big data and crowdsourced big data to pedestrian and walkability research while experimenting with a new emerging technology of Bluetooth sensors. We used a dataset of over 53 million pedestrian records, monitored in 83 street-segments in Tel-Aviv, Israel, to analyze tempo-spatial dynamics of pedestrian movement at the street-level. The data was collected 24/7 for five months, including the time of COVID-19's first lockdown. The results provide new insights on the relationship between attributes of the built environment and pedestrian movement, while identifying and evaluating attractive street segments across temporal changes. We discuss the role of street characteristics as determinants of walking, the impact of policy decisions on walking behavior and the possible implications of crowdsourced big data as tools for supporting planning decisions.