

Built environment changes and adjustment process of waking behavior: Causal inference analysis based on behavioral big data of relocated residents

Abstract: The causal effect of changes in built environment on travel behavior is increasingly emphasized in behavioral research, particularly in the context of residential relocation. However, there remains a lack of consensus on the causal relationship between these changes and walking behavior and the adaptation process of relocated residents. To address this issue, this study uses mobile phone data from individuals who relocated in Shenzhen from May to July 2019, employing an interrupted time series analysis to evaluate how changes in the built environment impact walking distance after relocation. The research focuses on both the initial and long-term effects of these changes on travel behavior. The study finds that spatial adjustments can change residents' travel behavior, with varying effects depending on different built environment elements. Higher road network density, subway station density, and the proportion of open space consistently promote longer walking distances in both the short and long term. In contrast, the impact of the same built environment element may differ over time: the effects of distance to city center and land use mix are inconsistent over time; land use mix promotes walking initially but loses significance over time. Population density and bus stop density show delayed effects. These findings suggest that policymakers should formulate planning interventions flexibly and with specificity, and should adopt a patient, long-term perspective in planning and evaluation.

Keywords: Residential relocation, walking distance, built environment change, interrupted time series analysis, Causal Inference