Associations between neighbourhood walkability and cycling in Denmark

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Environmental attributes and physical activity

Previous research has established four environmental attributes that contribute to neighbourhood ‘walkability’: street connectivity, land use mix, residential density, and retail floor area ratio. The aim of this study was to examine the link between walkability and cycling across three Danish cities where cycling culture differs from most other countries and bicycle share is much higher (17% of all trips in Denmark (2011)).

Geospatial and transportation data

Geospatial and transportation data representing 123 geographic zones were extracted via GIS and from the Danish National Transportation Survey (DNTS). Data were obtained from interviews with 10,846 participants aged 10-84 years conducted between 2006 and 2010 in Denmark’s three largest cities: Copenhagen, Aarhus, and Odense. Walkability index scores were calculated for each zone by combining z-scores for street connectivity, land use mix, residential density, and retail floor area ratio. A 4-level variable was created which made it possible to compare groups with similar walkability index scores but different educational levels: 1) high walkability – high % higher education; 2) high walkability – low % higher education; 3) low walkability – high % higher education; 4) low walkability – low % higher education.

The figure shows the city of Aarhus with 20 DNTS zones. The CBD is close to the harbour. More walkable zones equal more active transport, but adjacent zones shows very different mode share which indicates that other factors are related to transport choice. The red GPS track shows a subject’s cycling on 1 day and the turquoise zone is the home zone of the subject indicating lots of cycling outside the DNTS zone where the subject resides.

Walkability versus Bikeability

The association between walkability and cycle- and walking trips cannot be explained by variation in the other variables (education level, age and city) even though the association is weak. Only cycle- and walking trips remained significant in the multiple linear regression which suggests that the index best predicts the number of trips within the DNTS zone. This indicates that the use of a more bike-friendly index is needed to encompass the larger radius of action bicyclists have, compared to pedestrians (see GPS track in the map).

The present study offers results to the growing evidence that the built environment possibly affects physical activity, but is confounded by other factors. It is therefore acknowledged that multilevel interventions might work better in order to facilitate physical activity. Future studies should focus on re-considering what factors to include in the development of a distinct bikeability index and the walkability index factors might need to be altered and accompanied by e.g. topography and kilometres of cycle path to better fit the demands of cyclists.

References:

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