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# The role of urban form in sustaining public transport, car, and bicycle based travel styles.

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## Abstract

In the quest for sustainable mobility futures the promotion of car independent or less car dependent lifestyles is often mentioned. This partly reflects an acknowledgement of car use and travel as part of a pattern or style in which behaviors and possessions are interdependent and potentially reinforcing. Little research has, however, targeted behaviors in this manner, but generally tend to focus on the number of trips, km of travel or similar.

This paper makes the experiment of analyzing urban form effects on discrete weekly travel styles of 1970 (N) 16-74 year old respondents based on a two step methodology. In the first step, the weekly use of travel modes was analyzed by means of principal component analysis and k-means cluster analysis to identify discrete travel styles among adult Danes based on the main differences in the sample. Four travel styles were found and can be labeled as public transport (11% of the respondents); car-alone (36% of the respondents); and bicycle based travel styles (29% of the respondents); whereas the fourth style was mixed with important contributions from car-alone, co-driving and walking (24% of the respondents). In the second step the urban form correlates of the travel styles was analyzed in a multinomial logistic regression model with control for respondent attitudes as well as transport-related residential preferences to control for self-selection.

Four urban form and infrastructure variables were found to be significantly related to the travel styles of the respondents: the distance to a larger service centre/urban centre; proximity to S-train or Metro stations in the Greater Copenhagen area; service offers within walking distance; and finally population density within a larger neighborhood area (up to 1,5 km airline distance from the dwelling of the respondents). Separation from the large service centers as well as proximity to the well serviced and highly connected S-train and Metro network increases the probability of a public transport based travel style. Separation from the large service centers – indicating also a low level of accessibility – also increases the

probability of a car-based travel style. Cycling based travel styles appear mainly to be affected by local opportunities: positively if there is a high density in a larger neighborhood surrounding the dwelling, but negatively if there are good service offers within walking distance.

The results indicate that the travel styles are mainly shaped by the respondents needs to overcome a travel distance from their home location to important clusters of activities, as well as the degree to which the local accessibility offers support for cycling. The effects of proximity to S-train or Metro indicate that transport services can play a role, but also that a very high level of service and connectivity is likely to be required.

The travel styles and their correlations with urban form and transport variables also provide new evidence on how the different modes combine. The results indicate that walking and cycling for transport are not joined, but takes place in different travel styles that are living in different locations. Thus even in the 'cycling nation' Denmark, there is a substantial group that prefers walking over cycling. For public transport and cycling the results point to the existence of public transport travel styles that are dependent upon other access modes than walking, and that cycling for access as well as cycling as main mode are important. Thus, cycling is an integral part of public transport travel styles. Reversely cycling based travel styles can exist without significantly higher use of public transport compared to other non-public transport travel styles.

The interactions and dependencies between the travel styles should be the topic of further research aiming to understand mobility and the preconditions for promoting less car dependent lifestyles.

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