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Is transport poverty socially or environmentally driven? Comparing the travel behaviours of two low-income populations living in central and peripheral locations in the same city

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ABSTRACT

The paper presents a study to explore the relationship between travel poverty and social disadvantage at the local geographical level. The main aim of the research was to identify the extent to which the revealed travel behavioural outcomes of the study participants are due to personal social constraints or environmental conditions in their residential locations. Specifically, we sought to identify if the greater access to local amenities and public transport services of inner city residents led to an increase in their daily travel activities when compared with their urban peripheral counterparts. The research analysed data from a personal travel survey and one-day travel diary with 502 adults aged between 16 and 65 years in two different deprived areas in Merseyside, North West England. Our analysis is somewhat hampered by the small sample size, but the modelled results suggest that more trips, and longer journey distances *do not necessarily* imply greater social inclusion. The geographically weighted regression models (GWR) highlighted that *the physical location of where people live within the city is more influential on their trip-making patterns than social determinants* such as household income, age, gender, and/or employment status. Street connectivity, the level of bus services and neighbourhood safety were all particularly significant for determining spatial variations in the daily trips that were undertaken, with more trips being undertaken where there was a greater density of street nodes, bus stops and where people felt safer at night. This highlights the need for local transport and urban policymakers to carefully consider and target these micro-scale factors when attempting to introduce transport interventions to reduce social exclusion amongst low-income urban populations.

1. Introduction

This is the third in a trilogy of papers from a study to explore the linkages between transport and social disadvantage. It describes research to model the travel behaviours of a matched sample of working-age, low-income individuals living in two different deprived areas of the same city. In a first paper (Schwanen et al., 2015), we provided a critical overview of the literatures pertaining to transport-related social exclusion and the role of social capital in alleviating or exacerbating transport disadvantage. The paper concluded that the linkages are likely to be: *complex, multiple and entwined, whereby personal factors associated with financial deprivation combine with physical factors associated with the home location of affected persons to create mutually reinforcing cycles of transport and social disadvantage* (Schwanen et al. 2015: 128).

The second paper (Lucas et al., 2016) focused on national level datasets and analysis in the UK using data from the UK National Travel Survey (NTS). It modelled *the role of income as a key determinant of the suppressed travel behaviours of low-income households*. The study demonstrated that individuals in households earning below the average annual household income (approximately £26,000 p.a.) make significantly fewer trips per week, and over shorter trip distances, than the average population in the UK. This relationship

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remained significant when controlling for many of the other factors that are usually associated with people's differing travel behaviours, including socio-demographics such as age, gender, employment status *and* transport supply, such as vehicle ownership and holding a driving license.

However, the national-level study was unable to adequately control for the influence of micro-level factors in the built environment, such as the availability of local activity opportunities or the level of public transport supply. This is because the UK National Travel Survey (NTS) dataset is not sufficiently geographically disaggregated to make it suitable for micro-scale area analysis. However, local environmental factors, such as walkability, safety, and density of activities, have previously been shown to be important drivers of people's trip-making patterns (e.g. Ewing and Cervero, 2010). It is in light of this concern, that this third paper describes a local study to unpack *the independent effects of social and environmental factors on the revealed travel behaviours of low-income populations*.

Our modelled analysis is based on a bespoke travel survey that was undertaken in two socially deprived neighbourhoods in the Merseyside region of the UK. We initially hypothesised that the people who are living on low incomes in a dense urban environment with good walking facilities, in close proximity to a wide range of employment and other activity opportunities and with high access to public transport services are less likely to experience transport-related social exclusion (Kenyon et al., 2002) than those living in the urban periphery where there are fewer activity opportunities and public transport services. As such, we might expect that residents of a dense urban environment might have higher trip frequencies but shorter journey distances and will be less likely to experience transport-related economic stress and social exclusion (Mattioli, 2014).

Whereas nowadays, there is a considerable body of research concerned with determining the social impacts of transport (see Geurs et al, 2009 for an overview of this), few previous studies have specifically focused on the potential influence of local environmental factors in the context of low-income populations and how this might be translated into evidence based policy. However, these supply-side factors could be particularly relevant because many low-income households in the UK live in sub-optimal locations in terms of public transport supply and access to local facilities (Kourtit et al., 2014; Lucas, 2012).

2. Literature review

The link between transport and social disadvantage has been studied widely from many different perspectives (see Martens, 2017). The main quantitative approaches have involved GIS accessibility/activity space analysis (e.g. El-Geneidy et al, 2016; Pyrialakou, 2016; Delmelle and Casas, 2016), structural equation modelling (e.g. Currie and Delbosc, 2011), and regression approaches focusing on a variety of aspects of revealed travel behaviours, such as trip generation (e.g. Huntsinger and Rouphali, 2014), destination choice (Scott and He, 2012), mode choice (e.g. Mercado et al., 2012 and Schmöcker et al., 2008) and distance travelled (e.g. Morency et al., 2011). As we have already reported on the findings of a number of these studies in previous papers (see Lucas et al., 2016b; Lucas, 2012), we do not revisit them here, but rather focus more precisely on papers that directly model local environmental factors to determine the travel behavioural outcomes of different social groups.

In 2010, Ewing and Cervero produced a meta-analysis of the influences of the built environment on travel behaviours. Although they focus on the US context, there are some generalizable conclusions for policy and practice, which are pertinent to the current study. They found that the distance travelled is most strongly related to accessibility to destinations and network design and that, unsurprisingly, use of public transit is most likely in places where there is good access to the transit network, there is a good density of street networks and, latently, where there is a good diversity of land uses. The studies they synthesize have predominantly been conducted in the context of helping transport planners in the US to understand how to enact policies to reduce people's car travel, and so do not pay a great deal of attention to socio-economic conditions.

However, Handy et al. (2005) identify more than 70 studies looking at this same issue, conducted during the 1990s using cross-sectional designs, and assert that almost all of them do *control for* socio-economic factors, such as income, employment status, household composition, etc., in order to concentrate on the effects of people's travel preferences and attitudes on their behavioural outcomes. The authors conclude that policies which increase people's accessibility to alternative modes of transport to the car tend to lead to reduced driving, although there may be an element of self-selection in these outcomes, whereby the people who are more amenable to use transit and non-motorised modes elect to live in areas where these options are more available (Handy, Cao and Mohktarian, 2006).

In fact, very few studies can be found that specifically aim to differentiate between the socio-economic and environmental factors underpinning people's travel behaviours, and particularly not when applied to the travel behaviours of low-income population groups. Cerin et al. (2008) undertook a survey involving 2194 adults living in Adelaide to determine the separate effects of social and environmental factors on their revealed walking behaviours. They found higher educational attainment and area-level income (i.e. averages for the district) to be positively associated with greater walking frequencies, largely explained by a greater propensity to undertake leisure activities and positive associations with the local neighbourhood environment. Whereas individual incomes were negatively associated with walking frequencies, largely due to negative perceptions of the physical environment.

In a more recent Australian study, Turrell et al. (2013) aimed to assess why lower-income residents were more likely to walk than their higher income counterparts, considering environmental factors such as street connectivity, land use mix and car ownership. Based upon a survey of over 11,000 Brisbane residents, they found a strong, graded association between neighbourhood deprivation and walking, based on the application of their stepwise ecological model. This was partly explained by the denser street networks and land uses of these deprived neighbourhoods, but also their more limited access to private motor vehicles. Hence, Turrell et al. (2013) concluded that both social and environmental factors influence people's walking behaviours, which is consistent with the findings of other studies that consider the effect of social and environmental factors on people's behavioural outcomes. In a follow-up study using