



Car availability explained by the structural relationships between lifestyles, residential location, and underlying residential and travel attitudes

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ABSTRACT

The majority of land use–travel behaviour studies only considers the direct influence of spatial characteristics on daily travel behaviour. However, this framework should be expanded. A first step is to explore the complex interdependencies of long-term lifestyle decisions, medium-term decisions about residential location and car ownership, and the underlying residential and travel attitudes. Travel behaviour should be considered within a hierarchy of decisions while considering the motivational background of these decisions. Using data from an Internet survey completed by +1800 respondents in Flanders, Belgium, this paper defines car ownership somewhat more broadly as car availability. Results of a structural equation model indicate a significant direct effect of the residential neighbourhood on car availability. However, effects are small compared to the influence of other variables such as stage of life and travel (mode) attitude, the latter referring to travel-related selfselection. Moreover, one should keep in mind that residential attitudes remain important in the initial selection of the residential neighbourhood and its spatial characteristics, indicating the need to control for residential self-selection.

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1. Introduction

Since the 1970s, the number of cars in Belgium has more than doubled, rising from 2 million cars in 1970 to almost 5.5 million cars in 2013. Today, households tend to own one car for every two household members (<http://statbel.fgov.be>, October 21, 2013). This trend is not restricted to Belgium; it also occurs in other European countries (<http://www.plan.be>, October 21, 2013). Car ownership is considered to be an important factor affecting travel behaviour; increased car ownership leads to increased car use (Dieleman et al., 2002; Van Acker and Witlox, 2010) and facilitates long-distance travel (Bagley and Mokhtarian, 2002; Schwanen et al., 2002). To control these increasing car numbers and their expanding mobility, we must first understand the reasons for the increase in car ownership.

Decisions about car ownership should be considered within a hierarchy of long-term lifestyle decisions, medium-term decisions

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about residential location and short-term decisions about travel behaviour (Salomon, 1981; Van Acker et al., 2010). This decision hierarchy might seem like it involves only observable behaviours and not fundamental motivations. Attitudes are one example of such subjective motivations underlying behavioural decisions. By categorising, transforming and interpreting information, an individual evaluates various aspects of a specific issue, such as choosing a residential location or purchasing a car. The sum of all these related evaluations then determines the general attitude toward that issue (Golledge and Stimson, 1997) and influences the individual's behaviour (Gärling et al., 1998; Brehm et al., 2005).

The attention to attitudes in travel behaviour research is not completely new. Many studies discuss the role of attitudes in travel behaviour decisions (e.g., Tardiff, 1977; Dobson et al., 1978; Golob et al., 1979; and more recently Parkany et al., 2004, and Thøgersen, 2006). However, these studies focus only on attitude–behaviour relationships without considering the complex interactions with decisions on other time scales (e.g., lifestyles, residential location). Only recently have researchers begun to study these complexities in empirical work on the relationship between land use and travel behaviour (e.g., Kitamura et al., 1997; van Wee et al., 2002; Handy et al., 2005; Schwanen and Mokhtarian, 2005). These studies attempt to determine how travel behaviour is directly influenced by attitudes and by land use configurations and lifestyles.

However, ignoring the complex interdependencies of behavioural decisions at various time scales and fundamental residential and travel attitudes might result in misspecification of the land use effects on travel behaviour (Bagley and Mokhtarian, 2002; Naess, 2005; Scheiner and Holz-Rau, 2007). People often choose a residential location that matches their residential attitudes and that also reflects their travel attitudes (Handy et al., 2005; Bhat and Guo, 2007; Mokhtarian and Cao, 2008). For example, people residing in a high-density neighbourhood with nearby grocery stores and public services may choose to walk not simply because the spatial layout itself encourages them to do so, but rather because their preference for walking is what motivated them to live in such a neighbourhood in the first place. A similar self-selection process occurs with respect to other characteristics such as car ownership and modal choices (van Wee, 2009). Efforts of urban planning policies to discourage car ownership and car use might thus be ineffective for people with an overall preference for auto-oriented travel and behaviour. However, travel-related self-selection has received less attention compared to residential self-selection. This paper analyses land use effects on car ownership and accounts for attitudinal influences that are fundamental to the complex relationships between lifestyles, residential location choices and car ownership.

The paper is organised as follows. Section 2 briefly summarises the literature on the interactions between car ownership, residential land use characteristics, lifestyles and fundamental residential and travel attitudes. Section 3 discusses the research design and the data available for this study. Section 4 discusses some important modelling issues and presents the empirical results. The final section summarises the main research findings and presents some policy implications.

2. Literature review

This section presents a brief review of the literature on car ownership and summarises some issues that are relevant to our analysis (see Fig. 1). Various studies argue that car ownership is significantly influenced by land use patterns (see arrow 1 in Fig. 1). Research findings indicate that car ownership is lower in urban

and traditional areas characterised by high density, high diversity and easy access (Kockelman, 1997; McNally and Kulkarni, 1997; Gorham, 2002; Simma and Axhausen, 2003; Bhat and Guo, 2007; Chen et al., 2008; Gao et al., 2008).

However, the majority of studies simply point out associations rather than causal relationships (Handy et al., 2005). Although there are indications that land use matters, it is not necessarily true that land use characteristics themselves have a causal effect on car ownership. As already mentioned, attitudes are fundamental to residential location choices and decisions about car ownership (see arrows 2 in Fig. 1). In the case of residential and travel-related self-selection, these attitudes are as important as the objectively measured land use characteristics. Based on a cross-sectional analysis, Cao et al. (2007) noticed that the initially observed correlation between land use and car ownership disappeared if the model controlled for residential and travel attitudes that are fundamental to residential location choice. This finding suggests that the association between land use and car ownership is primarily the result of residential self-selection. Furthermore, their analysis based on quasi-panel data suggested that land use characteristics such as outdoor spaciousness and land use mix remain significant after accounting for attitudes, but their effects were found to be marginal compared to other socio-economic and demographic variables. Consequently, no strong evidence was found supporting the causal relationship between land use and car ownership. On the other hand, Bhat and Guo (2007), for example, controlled for the effects of residential self-selection and found that car ownership is still significantly influenced by land use patterns. This finding suggests that the empirically measured correlation between land use and car ownership is not simply a spurious correlation caused by the interaction between land use patterns and the residential attitudes of people who choose to live in a particular neighbourhood.

Cao et al. (2007) and Bhat and Guo (2007) both accounted for the indirect influence of attitudes on car ownership via residential location choice. Nevertheless, it might be important to consider the direct influence of (travel) attitudes on car ownership as well, to determine the influence of travel-related self-selection. A few studies have related travel attitudes to the choice of vehicle type (Kuppam et al., 1999; Johansson et al., 2006; Lane and Potter, 2007), but these studies did not control for differences in residential neighbourhoods. Thus, studies on travel-related self-selection remain scarce in land use-travel behaviour interaction research (e.g., Choo and Mokhtarian, 2004; Cao et al., 2006, 2007).

Furthermore, medium-term decisions about car ownership and residential location are in turn influenced by long-term lifestyle decisions (see arrows 3 in Fig. 1). Despite its frequent and colloquial use, there is no formally agreed-upon definition of 'lifestyle', nor is there an established body of theory and practice regarding its analysis. Lifestyles are often defined pragmatically rather than theoretically in behaviour studies. Nevertheless, some important theoretical contributions have been made, especially in the field of sociology by scholars such as Weber, Bourdieu, Ganzeboom and Schulz, who agree on the communicative character of lifestyles: individuals express their social position through specific patterns of behaviour in consumption and leisure. These behavioural patterns are shaped by underlying opinions and orientations, including beliefs, interests and attitudes (Kitamura, 1988; Munters, 1992). In this respect, residential location choices and car ownership can be considered as examples of behaviours in which lifestyles are reflected. For example, a family-oriented lifestyle might be reflected in ownership of one or several cars and living in a suburban or even rural area, in contrast to a low-budget lifestyle (Lanzendorf, 2002; Scheiner and Holz-Rau, 2007).

The dashed arrows in Fig. 1 represent feedback mechanisms. For example, Ganzeboom (1988) argues that the socio-economic

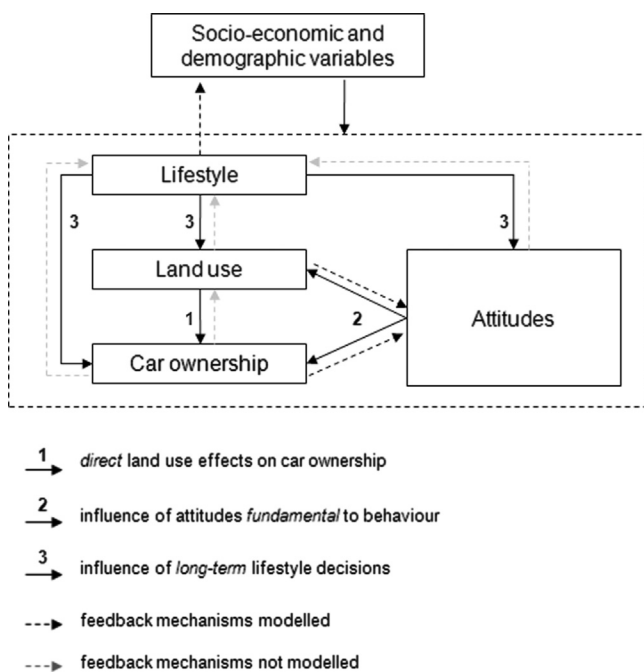


Fig. 1. Conceptual model of car ownership.

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