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## The shifting role of attitudes in travel behaviour research

Jonas De Vos 

Bartlett School of Planning, University College London, London, UK

Travel behaviour studies taking into account attitudes have existed for a long time. At the end of the 1970s, studies discovered that attitudes and behaviour are mutually dependent on each other. For instance, Dobson, Dunbar, Smith, Reibstein, and Lovelock (1978) and Reibstein, Lovelock, and Dobson (1980) – using a sample of approximately 800 Los Angeles residents – found that the frequency of bus use and attitude towards bus use positively affect each other. At the end of the 1990s, a renewed interest in the link between travel attitudes and travel behaviour emerged. This interest was strongly influenced by the well-known theory of planned behaviour (Ajzen, 1991). According to this theory, attitudes (which are considered stable over time) are a strong predictor of behaviour. As a result, many travel behaviour researchers included attitudinal statements in their survey to capture travel attitudes, and mostly found strong effects of attitudes (e.g. mode-specific attitudes) on travel behaviour (e.g. travel mode choice) (e.g. Bagley & Mokhtarian, 2002; Bamberg, Ajzen, & Schmidt, 2003; Kitamura, Mokhtarian, & Laidet, 1997). From the middle of the 2000s, studies revealed that travel attitudes are not only linked to travel behaviour, but that travel attitudes also differ according to where people live. People living in suburban neighbourhoods often have positive driving attitudes, while those living in more urban-type neighbourhoods tend to have positive attitudes towards public transport use and active travel. These outcomes suggest that people select a neighbourhood enabling them to travel in a desirable way (i.e. with a preferred travel mode). Consequently, travel attitudes may influence the residential location choice, and the effect of the built environment on travel behaviour may be overestimated as attitudes may be the true predictor of travel behaviour (e.g. Cao, Mokhtarian, & Handy, 2009; Handy, Cao, & Mokhtarian, 2005).

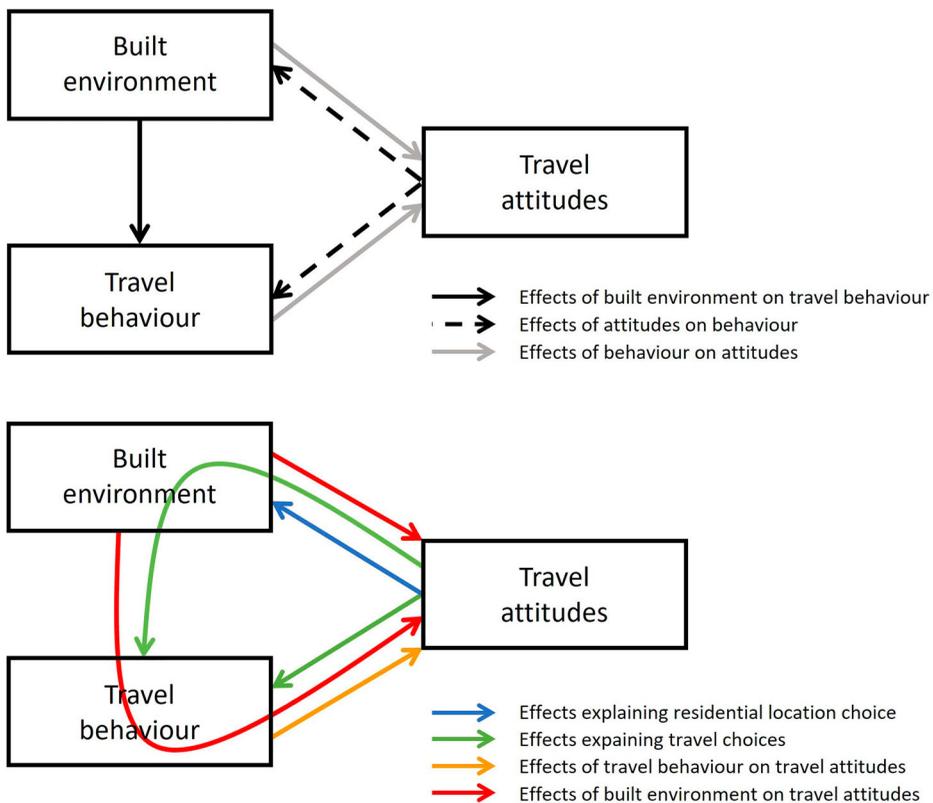
Despite the focus on the effects of travel attitudes on travel behaviour and residential location choice, recent studies also took into account opposite effects. Kroesen, Handy, and Chorus (2017), for instance – using a two-wave mobility panel of approximately 8,000 respondents from the Netherlands – found that travel attitudes and behaviours mutually influence each other over time, and that behaviour influences attitudes more than vice versa. De Vos, Cheng, and Witlox (2021) found that a change in the type of residential neighbourhood (due to a relocation) has strong impacts on travel attitudes for 1,650 recently relocated residents in Belgium. The above studies are inspired by the theory of cognitive dissonance (Festinger, 1957), and to a lesser extent by the related

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**CONTACT** Jonas De Vos  jonas.devos@ucl.ac.uk  Associate Professor of Transport Planning, Bartlett School of Planning, University College London, London, UK

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balance theory (Heider, 1958). These theories indicate that attitudes are not stable constructs and that they are subject to change, especially when an inconsistency (or dissonance) exists between attitudes and related behaviour.<sup>1</sup> In terms of travel behaviour, such an inconsistency may occur when travel attitudes do not match with the chosen travel mode (i.e. travel mode dissonance; De Vos, 2018), or when travel attitudes do not match with the type of travel stimulated by the residential location (i.e. residential dissonance; Schwanen & Mokhtarian, 2005). In line with the theory of cognitive dissonance, McCarthy, Delbosc, Kroesen, and de Haas (2021) – using 3,851 respondents from the Netherlands mobility panel – observed that people with a negative attitude towards a frequently chosen travel mode often had improved attitudes towards that mode in the following wave. Lin, Wang, and Guan (2017) – analysing 467 recently relocated households in Beijing – noticed that the effect of the built environment on travel attitudes was stronger than the reverse effect for people who were not able to choose a residential location based on travel preferences (which was not the case for people living in a desired residential neighbourhood). The effects of travel behaviour and the built environment on travel attitudes are often referred to as the reverse causality hypothesis (e.g. van Wee, De Vos, & Maat, 2019), designating opposite effects of the well-known impacts of attitudes on travel behaviour and the residential location choice.



**Figure 1.** Effects at play between travel attitudes, travel behaviour, and the built environment.

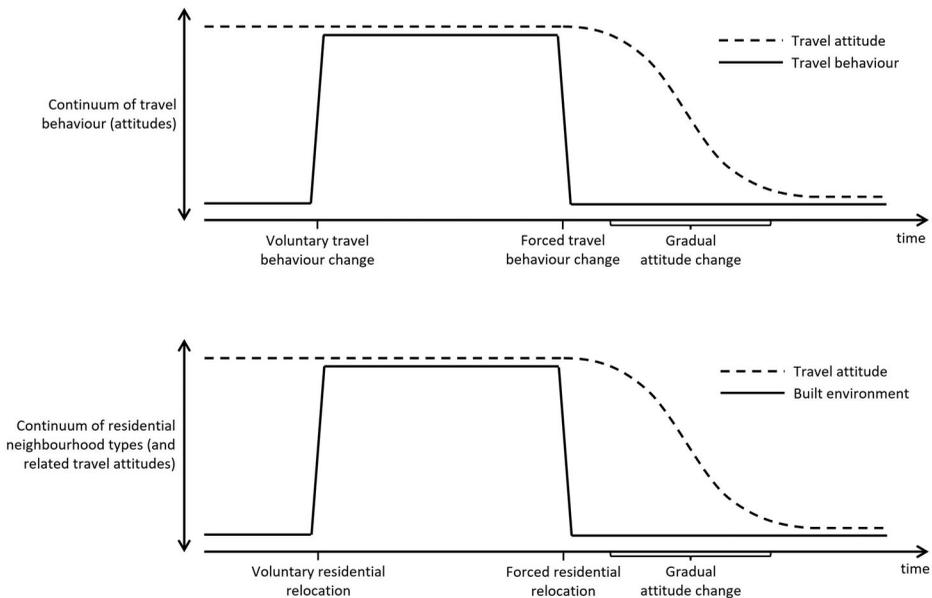
In sum, five relationships seem present between travel attitudes, travel behaviour, and the built environment; one of the built environment on travel behaviour,<sup>2</sup> and four relations created by the interdependencies between (i) travel attitudes and the built environment, and (ii) travel attitudes and travel behaviour (Figure 1, top). These five links can explain certain behaviour, i.e. the residential location choice and travel behaviour (e.g. travel mode choice), but also changes in attitudes caused by the built environment and travel behaviour. Travel behaviour is affected by travel attitudes both directly and indirectly, through the residential location choice, while the built environment exerts both a direct and indirect effect (through travel behaviour) on travel attitudes (Figure 1, bottom). Disregarding effects of the built environment and travel behaviour on travel attitudes could result in an underestimation of the effect of the built environment on travel behaviour. The built environment can stimulate the use of certain travel modes while also improving attitudes towards these modes, while mode frequency and attitudes can positively reinforce each other. For instance, moving to an urban neighbourhood may stimulate active travel directly (e.g. due to short distances), but also indirectly through improved attitudes towards active travel. As a result, land use policies promoting higher densities and mixtures may still play an important role in achieving sustainable travel, despite (residential self-selection) studies indicating that the influence of the built environment on travel behaviour is limited and mainly explained by travel attitudes (e.g. Bagley & Mokhtarian, 2002; Kitamura et al., 1997).

The question now is: Which effects are in force in which situation? It can be assumed that the effects of attitudes on behaviour are not gradually, but happen at one point in time, i.e. when a choice has to be made. For instance, travel attitudes will only impact the residential location choice (and hence the residents' built environment) in case of a residential relocation. These attitudes will also mainly affect travel behaviour when people have to make travel-related choices. Since people often take the same travel mode for certain types of trips (i.e. habitual mode choice), attitudes will probably only influence travel behaviour in case of a change in the travel context. This context change can be the result of many elements, including a change in the location of residence or job, the availability of new transport options (e.g. buying a car, new metro/light rail services), or events making the use of certain modes infeasible (e.g. the COVID-19 pandemic making public transport use undesired, or having children making life without a car impractical). Studies have indicated that a context change has the ability to break habits and can make people reconsider their behaviour so choices will be based on attitudes again (e.g. Verplanken, Walker, Davis, & Jurasek, 2008). Attitudes will mainly affect behaviour in case of high levels of freedom of choice. High-income households, for instance, will mostly have a free choice of where to live and how to travel, likely resulting in a chosen residential neighbourhood and travel patterns in line with travel attitudes.

Opposite effects, of behaviour on attitudes, are likely to occur when choices are not free. A suburban resident with a preference for cycling, for instance, may not be able to cycle (due to long distances) and may be forced to drive, whereby car attitudes may gradually improve to justify its use or because of unexpected convenience of its use.<sup>3</sup> Consequently, the effects of the built environment and travel behaviour on attitudes are likely to be more gradual compared to opposite effects. People will steadily change their attitudes, so they become more in line with the chosen residential neighbourhood

and/or chosen ways of travelling. Of course, when attitudes keep changing in line with made choices, attitudes will become consistent with the neighbourhood and its related travel, and will no longer change. It can be argued that an inconsistency between travel attitudes and the built environment/travel behaviour is only a temporary situation, which diminishes once attitudes become in line with the residential neighbourhood and the travel patterns it stimulates (e.g. De Vos, Ettema, & Witlox, 2018).<sup>4</sup>

Figure 2 demonstrates how attitudes and behaviour may evolve over time. In order to make behaviour in line with attitudes, people may try to change their behaviour so it will match their attitudes. For instance, a person with a positive stance towards car use may decide to buy a car enabling him/her to drive. Similarly, this person may also decide to relocate to a suburban-style neighbourhood where driving is convenient (e.g. low levels of congestion, ample parking). These decisions to buy a car and relocate are voluntary and based on attitudes. In other words, they were the result of a free choice and this person was able to select the preferred travel mode and residential neighbourhood. However, this may not always be the case. Due to certain life events, a person may be forced to relocate to an undesired residential neighbourhood. For instance, a household having children may decide to relocate to a suburban-style neighbourhood, because of larger-sized dwellings (with garden) which are unaffordable in urban neighbourhoods, despite having preferences for urban neighbourhoods and active travel. These people may see a gradual change in attitudes, so they become better in line with their choice of moving to the suburbs. These improved attitudes towards suburban life may be regarded as a way of justifying their choices. The move to a low-density neighbourhood and having children may also have forced this household to buy and use a car. After experiencing the convenience of travelling by car (with children) and partly to justify



**Figure 2.** Hypothesised evolution in travel attitudes and travel behaviour (top), and travel attitudes and residential location (bottom).

the purchase and use of the car, the parents may experience improved attitudes towards driving. In sum, people will try to make changes to their residential location and travel behaviour in case these do not match with their attitudes. On the other hand, when people are forced to live in an undesired neighbourhood and/or travel in an undesired way, attitudes are likely to evolve in order to become in line with the neighbourhood and/or travel patterns.

Since the relationships between travel attitudes, travel behaviour and the built environment may be more complex than commonly assumed, future studies will need advanced methodologies to disentangle these relationships in a clear way. A potential method that could provide researchers with valuable insights into the rate of changes in travel attitudes and related behaviour, and the causality between travel attitudes, travel behaviour and the built environment, is the longitudinal structural equations modelling approach, allowing multiple directions of causality and measurement at multiple points in time. In particular, a random intercept cross-lagged panel model – an approach rapidly gaining popularity in social sciences – is ideally suited to explore bidirectional relationships over time at the within-person level, i.e. the level where psychological processes actually take place.<sup>5</sup> Olde Kalter, La Paix Puello, and Geurs (2021), for instance, applied this methodology to analyse the reciprocal effects between mode preference and mode use frequency using three waves from the Netherlands mobility panel, and found that changes in mode use have stronger effects on changes in mode preferences than vice versa. However, this approach has not yet been used to measure within-person bidirectional relationships between travel attitudes, travel behaviour and the built environment. As an alternative for large-scale panel data with multiple annual waves, a natural experiment approach could be applied focusing, for instance, on a new residential neighbourhood or a new metro/railway line. Studies could then analyse how travel attitudes influenced the choice of moving to that neighbourhood and using the new public transport services, respectively, and how this behaviour gradually changed attitudes afterwards (by using surveys at multiple times, e.g. one survey at the neighbourhood/transport service completion and two follow-up surveys at later moments).

## Notes

1. It should be noted that also older studies (such as Dobson et al. (1978) and Reibstein et al. (1980)) mention these theories. However, studies from the 1990s and early 2000s have mainly focused on the theory of planned behaviour.
2. Numerous studies have found that car mode share and distance travelled by car are considerably lower for people living in compact, mixed-use neighbourhoods compared to people living in suburban-style neighbourhoods with relatively low levels of density and diversity (see, e.g., Ewing and Cervero (2010) for an overview).
3. Similarly, some studies have shown that residents living in an undesired neighbourhood may adjust their residential preferences to the chosen residential neighbourhood, e.g., by lowering aspirations or appreciating the chosen neighbourhood (e.g., Cao & Wang, 2016).
4. It is possible, however, that the attitude towards a mode forced to use will not improve (e.g., when its use is not considered enjoyable or convenient) and a stable situation of dissonance between attitude and behaviour occurs. For instance, public transport users are often found to have relatively negative attitudes towards its use (De Vos, 2018; Kroesen et al., 2017), and are therefore often referred to as ‘captive transit users’.

5. With cross-sectional data, only between-person correlations can be measured, while panel data allows researchers to also estimate within-person relationships over time. A random intercept cross-lagged panel model enables to disentangle between-person and within-person effects (Hamaker, Kuiper, & Grasman, 2015).

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## ORCID

Jonas De Vos  <http://orcid.org/0000-0003-4919-2157>

## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Bagley, M. N., & Mokhtarian, P. L. (2002). The impact of residential neighborhood type on travel behavior: A structural equations modeling approach. *The Annals of Regional Science*, 36(2), 279–297.
- Bamberg, S., Ajzen, I., & Schmidt, P. (2003). Choice of travel mode in the theory of planned behavior: The roles of past behavior, habit, and reasoned action. *Basic and Applied Social Psychology*, 25(3), 175–187.
- Cao, X., Mokhtarian, P. L., & Handy, S. L. (2009). Examining the impacts of residential self-selection on travel behaviour: A focus on empirical findings. *Transport Reviews*, 29(3), 359–395.
- Cao, X., & Wang, D. (2016). Environmental correlates of residential satisfaction: An exploration of mismatched neighborhood characteristics in the twin cities. *Landscape and Urban Planning*, 150, 26–35.
- De Vos, J. (2018). Do people travel with their preferred travel mode? Analysing the extent of travel mode dissonance and its effect on travel satisfaction. *Transportation Research Part A: Policy and Practice*, 117, 261–274.
- De Vos, J., Cheng, L., & Witlox, F. (2021). Do changes in the residential location lead to changes in travel attitudes? A structural equation modeling approach. *Transportation*, 48(4), 2011–2034.
- De Vos, J., Ettema, D., & Witlox, F. (2018). Changing travel behaviour and attitudes following a residential relocation. *Journal of Transport Geography*, 73, 131–147.
- Dobson, R., Dunbar, F., Smith, C. J., Reibstein, D., & Lovelock, C. (1978). Structural models for the analysis of traveler attitude-behavior relationships. *Transportation*, 7(4), 351–363.
- Ewing, R., & Cervero, R. (2010). Travel and the built environment. A meta-analysis. *Journal of the American Planning Association*, 76(3), 265–294.
- Festinger, L. (1957). *Theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, 20(1), 102–116.
- Handy, S. L., Cao, X., & Mokhtarian, P. L. (2005). Correlation or causality between the built environment and travel behavior? Evidence from northern California. *Transportation Research Part D: Transport and Environment*, 10(6), 427–444.
- Heider, F. (1958). *The psychology of interpersonal relations*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kitamura, R., Mokhtarian, P. L., & Laidet, L. (1997). A micro-analysis of land use and travel in five neighborhoods in the San Francisco Bay area. *Transportation*, 24(2), 125–158.
- Kroesen, M., Handy, S., & Chorus, C. (2017). Do attitudes cause behavior or vice versa? An alternative conceptualization of the attitude-behavior relationship in travel behavior modeling. *Transportation Research Part A: Policy and Practice*, 101, 190–202.

- Lin, T., Wang, D., & Guan, X. (2017). The built environment, travel attitude, and travel behaviour: Residential self-selection or residential determination? *Journal of Transport Geography*, 65, 111–122.
- McCarthy, L., Delbosc, A., Kroesen, M., & de Haas, M. (2021). Travel attitudes or behaviours: Which one changes when they conflict? *Transportation*, Published online: doi:10.1007/s11116-021-10236-x
- Olde Kalter, M. J., La Paix Puello, L., & Geurs, K. T. (2021). Exploring the relationship between life events, mode preferences and mode use of young adults: A 3-year cross-lagged panel analysis in the Netherlands. *Travel Behaviour and Society*, 24, 195–204.
- Reibstein, D. J., Lovelock, C. H., & Dobson, R. P. (1980). The direction of causality between perceptions, affect, and behavior: An application to travel behavior. *Journal of Consumer Research*, 6 (4), 370–376.
- Schwanen, T., & Mokhtarian, P. L. (2005). What affects commute mode choice, neighbourhood physical structure or preferences toward neighborhoods? *Journal of Transport Geography*, 13(1), 83–99.
- van Wee, B., De Vos, J., & Maat, K. (2019). Impacts of the built environment and travel behaviour on attitudes: Theories underpinning the reverse causality hypothesis. *Journal of Transport Geography*, 80, 102540.
- Verplanken, B., Walker, I., Davis, A., & Jurasek, M. (2008). Context change and travel mode choice: Combining the habit discontinuity and self-activation hypotheses. *Journal of Environmental Psychology*, 28(2), 121–127.