

## Designing interventions to support shifts from cars to active travel modes: A brief scoping review and narrative synthesis



Reducing private care travel in favour of active travel modes (e.g., walking or cycling for transport) is one of the most pressing needs for improving planetary and human health (Patz and Siri, 2021). An array of benefits exist when shifting from cars to active modes, including reduced emissions, lower noise pollution, improved safety, increased physical activity and associated health benefits, and supporting social networks and cohesion (Hosking et al., 2011). A plethora of evidence exists for associations across the ecological model (particularly built environments (Smith et al., 2017) and to a lesser extent psychological characteristics (Hoffmann et al., 2017)) and active travel modes. However, there is little specific direction to inform interventions, particularly with regards to car user profiles and identification of individual characteristics related specifically to car use and the choice to shift away from cars to alternative transport modes.

The purpose of this short report is to provide a brief overview of research focused on understanding individual factors and profiles associated with car use and travel mode shifts.

### METHODS

A scoping review was undertaken in Scopus and PubMed in September 2019. A combination of keywords for travel mode (e.g., “transport mode,” “active travel”), individual characteristics (e.g., “socio-demographic factors,” profiles, characteristics) and decision-making (e.g., choice, “mode shift,” “behaviour change”) were used to identify relevant studies. Bibliographies of relevant articles were also screened. Data were extracted into a study-specific form and described narratively.

## RESULTS

### Use of theory in understanding car travel

The Theory of Planned Behaviour (TPB) was the most common theory used to explore decision-making around car/transport mode use. The literature and theoretical framework presented in Klöckner & Friedrichsmeier (2011) captured the complexity observed in the literature including habitual processes, perceived behavioural control (PBC), TPB, the norm-activation model, intentions, attitudes, social norms, and note their previous work in developing the Comprehensive Action Determination Model (encompassing intentional, habitual, and normative processes, and situational influences). Klöckner & Friedrichsmeier (2011) provided evidence for the importance of considering both situational (e.g., car availability and weather) and personal factors in understanding car use/travel mode choice. Lanzini and Khan's (2017) meta-analysis found that intentions (using the TPB) were the main antecedents of behavior change, followed by habits and past use. Their findings also showed that environmental variables were associated with intentions but only played a small role in actual travel behaviours. Interestingly, in the work of Von Borgstede et al. (2013), changing away from car use was recognized as being a "high cost behavior," in the context of environmental attitudes. The authors suggested that while psychological factors (i.e., pro-environmental attitudes) are important factors, these are "not sufficient for behavioural changes, especially in the case of changing high-cost behaviours," and instead greater incentives are necessary. Ecological approaches to understanding behaviour change were also apparent, for

example "environmental consciousness" (Diamantopoulos et al., 2003) and "ecological consciousness" (Ellis and Thompson, 1997).

### Profiling traveller characteristics

In terms of characteristics associated with transport mode choice and shifts, a number of studies profiled transport users (Anable, 2005; Hunecke et al., 2010; Prillwitz and Barr, 2011). Others examined the role of 'identity' (Heinen, 2016; Whitmarsh and O'Neill, 2010), and some included transport mode use as part of understanding broader ecological/environmental attitudes and behaviours (Diamantopoulos et al., 2003; Whitmarsh and O'Neill, 2010). Jansson et al. (2010) generated three factors from a large adult survey in relation to willingness to curtail car use (biospheric values, ascription of responsibility, personal norms). Fully adjusted models showed willingness to curtail was positively associated with biospheric values, ascription of responsibility, and personal norms.

Anable (2005) investigated transport mode switching potential using the TPB and cluster analysis with 666 adults in the UK. Findings showed six different psychographic groups (malcontented motorists, complacent car addicts, die hard drivers, aspiring environmentalists, car-less crusaders, and reluctant riders), and that the same transport behavior can occur for different reasons, and that the "same attitudes can lead to different behaviours". Overall, the authors concluded "socio-demographic factors had little bearing on the travel profiles of the segments, suggesting that attitudes largely cut across personal characteristics."

Prillwitz and Barr (2011) undertook 10 focus groups and surveyed over 1500 people in South-west England to develop a 'mobility style' framework. Four clusters were generated: persistent car users, frequent car users, constrained public transport users, and consistent green travelers. The highest rates of environmentally friendly transport were in the consistent green travelers group, who were younger, had the highest proportion of households without children, and had the highest percentage of Green voters. Heinen (2016) used a range of statements to determine self-reported identities in relation to transport mode use. With relation to car use, those who were "family oriented" were less likely to use a car sometimes, and those who were "car drivers" were more likely to use a car sometimes or always, and were less likely to report intention to decrease car use, and more likely to report intention to increase car use. Those who were "career-oriented" were also more likely to report intention to increase car use.

### **Psychological factors**

Findings from Hunecke et al. (2010) suggest that psychological factors may override socio-demographic factors associated with travel modes. Their research compared attitude-based target groups with geographic and socio-demographic clustering and found the attitude-based groupings performed better in understanding car use than the other two approaches. Diamantopoulos (2003) suggested "an accurate profile of the green consumer cannot be constructed without attention to all aspects of the environmental consciousness construct" (i.e., not by socio-demographics alone).

### *Perceived behavioural control*

The importance of improving perceived behavioural control (PBC) was identified for some, but not all groups (e.g., to support change in 'Malcontented Motorists,' but irrelevant for 'Die Hard Drivers;' while 'Car-less Crusaders' had significantly stronger perceptions of PBC than other groups (Anable, 2005)). In a study of over 3000 students, PBC was significantly related to car use (Klößner and Friedrichsmeier, 2011). PBC was not related to car use in Donald et al.'s (2014) study of 927 adults.

### *Identity*

How people self-identified was significantly related to transport mode use in expected directions, but also to intention to change level of car use – specifically people who identified as "car drivers" had significantly greater intent to increase car use and significantly lower intent to decrease car use (Heinen, 2016). Those identifying as "career-oriented" were significantly more likely to have intentions to increase car use (Heinen, 2016). Having a pro-environmental identity was associated with increased pro-environmental behaviours (including regarding car use) (Whitmarsh and O'Neill, 2010).

### *Habit, attitudes, and intentions*

Car use habits were significantly related to variation in car use in a large sample of students (Klößner and Friedrichsmeier, 2011) and adults (Donald et al., 2014). Habits and past use were related to travel mode choice in Lanzini and Khan's (2017) meta-analysis.

Intention was one of three factors associated with car use, and the sole factor associated with public transport use in adults (Donald et al., 2014). Attitudes towards e-bike use was a significant predictor of e-bike use in Norwegian adults (Simsekoglu and Klockner, 2019). Intentions were the main antecedents of travel mode choice in Lanzini and Khan's (2017) meta-analysis, and were related to car use in adults (Donald et al., 2014). Willingness to curtail car use was negatively associated with car habit strength in a large study of adults (Jansson et al., 2010).

### **Socio-demographic factors**

#### *Age*

Age was the most consistent socio-demographic factor associated with car use. Younger people were more likely to be willing to curtail car use (Jansson et al., 2010), to be profiled as "aspiring environmentalists" (Anable, 2005) or "consistent green travellers" (Prillwitz and Barr, 2011). Younger people were also more likely to be willing to reduce car use (Whitmarsh and O'Neill, 2010), and had higher environmental attitude scale scores (Diamantopoulos et al., 2003) than their older peers. It was suggested that to some extent younger people (and older people) may be more limited in their travel choice by situational factors (Anable, 2005; Prillwitz and Barr, 2011). Middle age groups were more likely to be profiled as persistent or frequent car users (Prillwitz and Barr, 2011).

#### *Gender and family structure*

There was some evidence to suggest women undertake substantially more environmentally-oriented behaviours in the "private sphere" (including

driving less) compared to men (Hunter et al., 2004). A review of literature showed women had higher environmental attitudes scale scores than men (Diamantopoulos et al., 2003). Differential findings were by family structure, with Prillwitz and Barr's study finding 'Committed Green Travellers' had the highest proportion of households without children (Prillwitz and Barr, 2011), while Whitmarsh & O'Neill (2010) reported having higher number of children in the household was significantly related to having an increased pro-environmental behavior score.



## DISCUSSION

The aim of this brief review was to provide an overview of research focused on measurement and understanding of individual factors and profiles associated with car use and travel mode shifts to help inform intervention development. Literature identified revealed that psychological and socio-demographic relationships with car use and shifting away from car use are complex. These findings align with previous research whereby theories such as TPB and PBC were commonplace, and additional factors such as social norms, habitual processes, identity, and the complex interplay between situational factors (e.g., trip purpose, car availability) and personal factors was important to consider (Hoffmann et al., 2017). Identity may moderate the relationship between PBC and intentions and behaviours, thus strategies for forming car-free identity profiles are warranted.



Interventions such as car free days (within the context of an otherwise supportive environment for alternative transport options) may provide important opportunities to disrupt habits (Bamberg et al., 2003). Likewise, opportunities to intervene at key stages across the life course (e.g., moving home or workplace) and across different trip purposes may be worthwhile (Ramos et al., 2020). Such interventions may benefit from targeted and evidence-based marketing to current car user groups (e.g., “complacent car users,” or “die hard drivers,” who are more likely to be middle aged and male). Incentivisation may also be an important strategy to consider, to reduce perceptions of shifting from car use as being a “high cost behaviour” (von Borgstede et al., 2013). Workplace initiatives such as allowing glide time, work from home days, and financial incentives for reducing car use may be worthwhile. Supporting those who are already maintaining or working towards reducing car use is also important to ensure sustained behavior change and equitable transport access and choice. Supportive transport systems that include affordable, regular, and accessible public transport and transport infrastructure to support active travel modes are fundamental to achieve this (Smith et al., 2017). Encouraging and celebrating pro-environmental behaviours and identity formation across the life course could enhance the impact of these macro-level strategies. Overall, habits, intentions, and identity all play an important role in understanding car use and willingness to shift away from car use. Changing these factors requires comprehensive and targeted evidence-based approaches, across an ecological framework.

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