Proceedings of 7th Transport Research Arena TRA 2018, April 16-19, 2018, Vienna, Austria

An integrated behavioural model for active transport mode choices

Emmanuelle Dupont[a], Tim De Ceunynck[a], Gert Jan Wijlhuizen[b,*]

[a] *Vias institute, Haachtsesteenweg 1405, 1130 Brussels, Belgium*
[b] *Institute for road safety research SWOV, Bezuidenhoutseweg 62, The Hague 2509 AC, The Netherlands*

Abstract

The current paper describes an integrated behavioural model that includes the main factors that can contribute to a modal shift from motorized to active transport modes. It has been built based on an extensive literature review of existing models from different disciplines, such as psychology, public health, urban planning and behavioural economics. The model accounts for factors shaping behavioural intentions, such as attitudes, social norms and perceived behavioural control, based on an extended version of the Theory of Planned Behaviour'. But the model in this paper also acknowledges the role of non-conscious, automatic influences on behaviour, such as habits. Habits have been consistently identified as a powerful determinant of modal choice.

The developed model is part of the ISAAC project ("Stimulating safe walking and cycling within a multimodal transport environment"). It will be one of the key elements of an interactive checklist and guidelines for urban and regional decision makers and practitioners. This will support them in identifying and implementing the most appropriate measures to create a modal shift towards active transport modes.

Key words: behavioural model; transport mode choice; active travel modes; walking, cycling

* Corresponding author. Tel.: +31703173351
E-mail address: gert.jan.wijlhuizen@swov.nl

1. Introduction

Despite the numerous efforts that have been undertaken to modify travel behaviour over the last decades, the private car remains by far the most preferred transport mode in all European countries. This preference is observed despite increasing public awareness of the role of motorized transport in climate change and of the recognition that adopting active travel modes has important individual (health, costs, time) and social benefits, such as the reduction of traffic congestion and pollution (Tapp et al., 2016). As an example, a recent study showed that cycling (and possibly walking, but this mode was not included in the study) is the only transport mode that creates net benefits to society, while all others generate net costs (Delhaye, et al., 2017).

For CEDR (Conference of European Directors of Roads), these considerations were part of the rationale behind formulating the Transnational road research programme 2015. This programme addresses the importance of User Needs in a Multimodal Context as a general theme. Consequently, the aim of this research programme is to advance national road authorities' understanding of transport users' motives and needs for choosing different transport modes as well as of the impacts of appropriate incentives for a modal shift. Within this programme the ISAAC project ("Stimulating safe walking and cycling within a multimodal transport environment") was initiated in 2016. The ISAAC project aims to provide a checklist and guideline for urban and regional decision makers and practitioners with evidence-based recommendations for realising a modal shift from car to walking and cycling without compromising road safety, social security and road user comfort.
An important part of the work is devoted to behavioural determinants that have been found to affect the choice of a given transport mode by individuals.

In the next section the scope of the ISAAC project will be described. Subsequently the main conclusions are described of a literature review focusing on travel behaviour. The main issue addressed in this section is which behavioural factors generally affect a modal shift from car to walking and cycling, positively and negatively and how these factors mutually relate. An extension of current behavioural models is proposed and a general approach for research to contribute to that extension is described.

2. The scope of the ISAAC project

The CEDR Transnational Road Research Programme 2015 - User Needs in a Multimodal Context - aims at advancing national road authorities' understanding of transport users' motives and needs for choosing different transport modes as well as of the impacts of appropriate incentives for a modal shift. The main reason for this Transnational Road Research Programme is to gain better knowledge and guidance of how to promote multimodality in the transport system.
The scope of the ISAAC project relates to encouraging walking and cycling as sustainable transport modes in urban areas, requiring an urban structure and design that makes walking and cycling convenient, pleasant and, last but not least, safe.

The starting point for ISAAC is that an increasing number of European countries, regions and cities are in process of promoting walking and cycling. Walking and cycling are regarded as environmentally friendly, healthy and efficient modes of transport for short trips, particularly for short trips in built-up areas and as feeder transport to longer distance public transport. They (including power assisted bicycles and mopeds) also diminish congestion and alleviate parking problems in urban areas.
However, while there are many advantages, there is a serious negative side effect of promoting walking and cycling and that is related to road safety and accident risk. Per definition pedestrians and cyclists (including power assisted bicycles and mopeds) are much more prone to injuries in case of accidents, both in the case of collisions with other road users and in individual accidents (e.g. single vehicle accidents). For example, in 2014 the Netherlands, 32% of the road fatalities and 63% of the serious road injuries was cyclist (De Groot-Mesken et al., 2015). Belgium data show that the risk (per km travelled) for a cyclist to be severely injured or killed in traffic is 23 times higher than that of a car occupant (Martensen, 2014) The main reason is that they do not have the protective 'shell' that occupants of motorised vehicles normally have. In addition, the often large difference in mass, speed and direction between the colliding parties is an important factor for the relatively high injury risk of these vulnerable road users. Consequently, a policy that promotes walking and cycling cannot do without a strict road safety policy that specifically targets the position of vulnerable road users in the transport system. At the same time this road safety policy should take into account (feelings of) social insecurity (e.g. by planning safe, but isolated cycle or foot paths or by requiring pedestrians and cyclists to take longer and hence less comfortable routes).

The ISAAC project aims to provide a checklist and guideline with evidence-based recommendations for realising a modal shift from car to walking and cycling in urban and suburban areas without compromising road safety,

social security and road user comfort. It focuses on short distance trips and/or parts of trips (e.g., feeder transport to public transport) that can reasonably be realised by walking or cycling (including power assisted bicycles and mopeds).

The checklist and guideline will provide regional and urban policy makers with state of the art evidence based knowledge and practical examples of how to promote safe walking and cycling, helping them to answer the following questions:

1. What are the relevant background characteristics of the city (e.g., regarding current travel patterns and modal split, ambitions for the future, road users' motives and barriers for walking and cycling, features of the road network and the road infrastructure)?
2. Based on 1: Which target groups should preferably be encouraged to walk and cycle?
3. Based on 1 and 2: Which tailored (multidisciplinary) intervention strategies are most promising to realise that?
4. Based on 1 to 3: Which safety and security measures are required to accomplish the highest possible level of safety for those who are encouraged to walk and cycle?

The interactive checklist and guideline will be produced as an internet-based tool.

Different factors are involved in the process of enhancing or hindering this intended modal shift. For instance, the features of the road and environment (e.g.: climate, facilities for walking and cycling and traffic safety), the population (e.g.: age distribution) and the prevailing transport or health policy might (co)determine the success of a modal shift to walking and cycling. Within this project we take these issues into account.
An important part of the work is devoted to behavioural determinants that have been found to affect the choice of a given transport mode by individuals. The aim was to identify the types of determinants that have been found to affect the choice of a given transport mode by individuals. Based on a review, a model has been developed to account for the most appropriate elements and showing which factors are more likely to contribute, or to hinder, a modal shift from motorized transport to walking and cycling.
In the next paragraphs the approach and findings and implications will be presented.

3. Behavioural models on travel mode choice

A literature search was conducted, departing from the examination of recent literature reviews, of which the main findings are summarized in this section. Recent and relevant literature reviews have been identified entering "Mode/modal choice", "travel behaviour", "active travel" and "psychological determinants" together with "psychological models", "review", "meta-analyses" as keywords in the on-line "Web Of Science" information service.

In the research on travel behaviour, three "waves" can be distinguished depending on the underlying approach adopted to account for modal choice.

The first wave of modal choice models departed from a strictly rational view, according to which people would deterministically choose the most advantageous transport mode based on a number of characteristics.

The second wave of research acknowledged the influence of subjective factors, such as attitudes and personal preferences, to account for the fact that the option effectively chosen cannot always be considered as the "best" one. The basic tenet in this second research wave was, however, that people's behaviour and choice would be guided mainly by intentions. The first and second waves are regarded as 'Conscious process approaches'.

More recently research (third wave) has pointed out that behaviour is not solely determined by intentions, and that many automatic processes and non-conscious influences are at play in human decision-making; the 'Unconscious/automated process approach'

Below we briefly describe each of the approaches.

Conscious process approaches

Early attempts to model travel behaviour and mode choice were mainly based on a "Rationalist Approach" (De Witte et al., 2013) or on "Utility Theory" (Van de Kaa, 2010). According to this approach, individuals would rationally weigh the costs and benefits (e.g., time and money) associated with various alternatives to choose the option the yields the highest utility. Although this approach is still often applied (see Buehler, 2011, for example), there is a growing recognition of the fact that it is largely insufficient to effectively account for travel behaviour: The growing traffic congestion in many cities is a blatant illustration that people often fail to choose the alternative

with the highest utility.

Based on this conclusion, in a second wave of research, increased interest has been shown for the role played by psychological and social determinants. Different models have been applied to account for the influence of subjective parameters – such as attitudes and personal preferences - on travel mode choice. From their review, De Witte et al. " (2013, p. 340) concluded "It is therefore vital to stress the importance of taking the subjective component into account when studying modal choice decisions.

The Theory of Planned Behaviour (Figure 1) is the model most often mentioned and most often applied to travel behaviour (Panter and Jones, 2010). TPB is based on the central tenet that human behaviour is determined primarily by intentions. Intentions are themselves defined as being shaped by attitudes (the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question – Ajzen, 1991), perceived behavioural control (the belief that one is effectively capable and free to behave in a particular way – Francis et al., 2004) and subjective norms (an individual's perceptions of what "significant others" (friends, relatives) consider to be an appropriate behaviour).

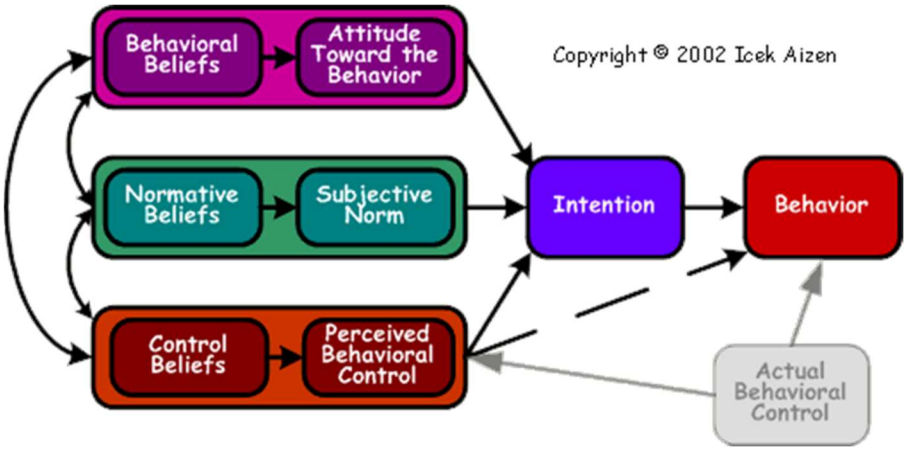

Figure 1: The Theory of Planned Behaviour – Retrieved from http://people.umass.edu/ajzen/tpb.diag.html

The TPB has been extensively applied in a wide variety of research fields (including research focusinc on public health, pro-environmental behaviour). Its ability to predict behaviour has been assessed extensively, and has made the object of meta-analyses. This is an important advantage, as the theory's weak/strong points are relatively well known. Of all socio-psychological models that have been applied to account of modal choice, this is clearly the most integrative one. However it is also clear that it needs be extended in some important ways – for example to integrate components identified on the basis of other theoretical approaches.

The Norm Activation Model ("NAM", Schwartz, 1977), as the name indicates, focuses strongly on normative influences and feelings of moral obligation. These are also considered important determinants in the TPB, yet the way they are defined in each theoretical approaches is not identical. The emphasis that the NAM model places on personal norms as a feeling of moral obligation has been found to be important in several studies and will consequently be integrated here. The TPB and the NAM approach of behaviour stress the importance of different types of norms (others' evaluation in the case of TPB and one's personal conception of right/wrong in the case of NAM).

The TPB model assumes that our behaviour is determined mainly by our intentions. Yet, a growing body of evidence from the cognitive sciences indicates that our decisions do not always result from a conscious evaluation, and that our intentions often fail to determine our behaviour. Actually, fast, automatic and non-conscious processes happen to determine a good deal of the choices that we make on a daily basis. "Behavioural economics" - a field of research integrating knowledge from the neurosciences and from economy to better understand human decision making - has provided countless illustrations of the role of these "fast" processes in human decision-making.

Unconscious/automated process approach

According to the third and most recent wave of behavioural research, modal choice is actually determined for a considerable part by habits (De Witte et al., 2013; Willis et al., 2013, Schwanen et al., 2012; Yalachkov et al., 2014). A habitual behaviour is a behaviour that is repetitively displayed in a stable context. With time, the mere presence of characteristics of the context ("contextual cues") appears sufficient for the behaviour to be elicited in an automatic way. Because of their automatic nature habitual behaviours are unlikely to be questioned or evaluated by the individuals, and these cannot be expected to give much consideration to possibly suitable alternatives. Habitual use of a travel mode increases the chance that this mode will be chosen again in the future; and for a variety of travel purposes. Behaviours that are repeatedly performed in a stable context tend to become automatic and habitual. Travel behaviour is for a large part repetitive (commuting to work, purchases at the grocery stores, getting the children from and to school). Put differently, transport mode choice habits can "cut" conscious decision making aspects such as intentions and attitudes and can be directly elicited from context (Friedrichsmeier et al., 2013).

Performing a specific behaviour can affect the attitudes towards that behaviour, as indicated in the Self-Perception Theory (Bem, 1967; 1972) and Cognitive Dissonance Theory (Festinger, 1962). If people repeatedly perform a specific behaviour, their attitudes towards that behaviour will become more favourable in order to achieve cognitive consonance (a state in which behaviour and attitudes are in line with each other). One could therefore say that there is a "feedback loop" from behaviour to attitudes. However, external justification for performing the behaviour that is dissonant with the person's attitudes might prevent attitudes from changing in line with the actual behaviour. This could be the case for example, when using strong financial incentives for walking or cycling might lead people to walk or cycle while still maintaining a negative attitude towards walking and cycling and come back to behaviours in line with their attitudes once the incentive is withdrawn.

It is now clear that a fully rational view of mode choice is insufficient to account for actual travel mode choice. The proposed model (Figure 2) therefore integrates the main behavioural components of the different waves mentioned above. It consequently rests on the idea that there are two main types of influences on modal choice:

The first one is a conscious – albeit not entirely "rational" - assessment of the behaviour to be performed and of the various alternatives available that will shape the individual's *intentions* to adopt that behaviour – or not. The factors affecting behavioural intentions (such as personal attitudes towards the various choice options, one's perception of what is the appropriate choice to be made are included in the model (Figure 2) on the basis of the Theory of Planned Behaviour (TPB, Ajzen, 1988; 1991).
The second reflects the impact of automatic and non-conscious processes, that can intervene and weaken – or even interrupt – the relationship between intentions and behaviour, as a result of habitual mode choice for example.

In addition to the behavioural components of the model also social- demographic-, and safety and security factors are part of the model. These factors are included as context that can enhance the actual behaviour or encourage behaviour change related to modal choice. Examples of social- demographic factors are: age distribution of citizens, educational level, climate and hilliness. Safety and security factors include: criminality, traffic safety figures and feelings of safety.

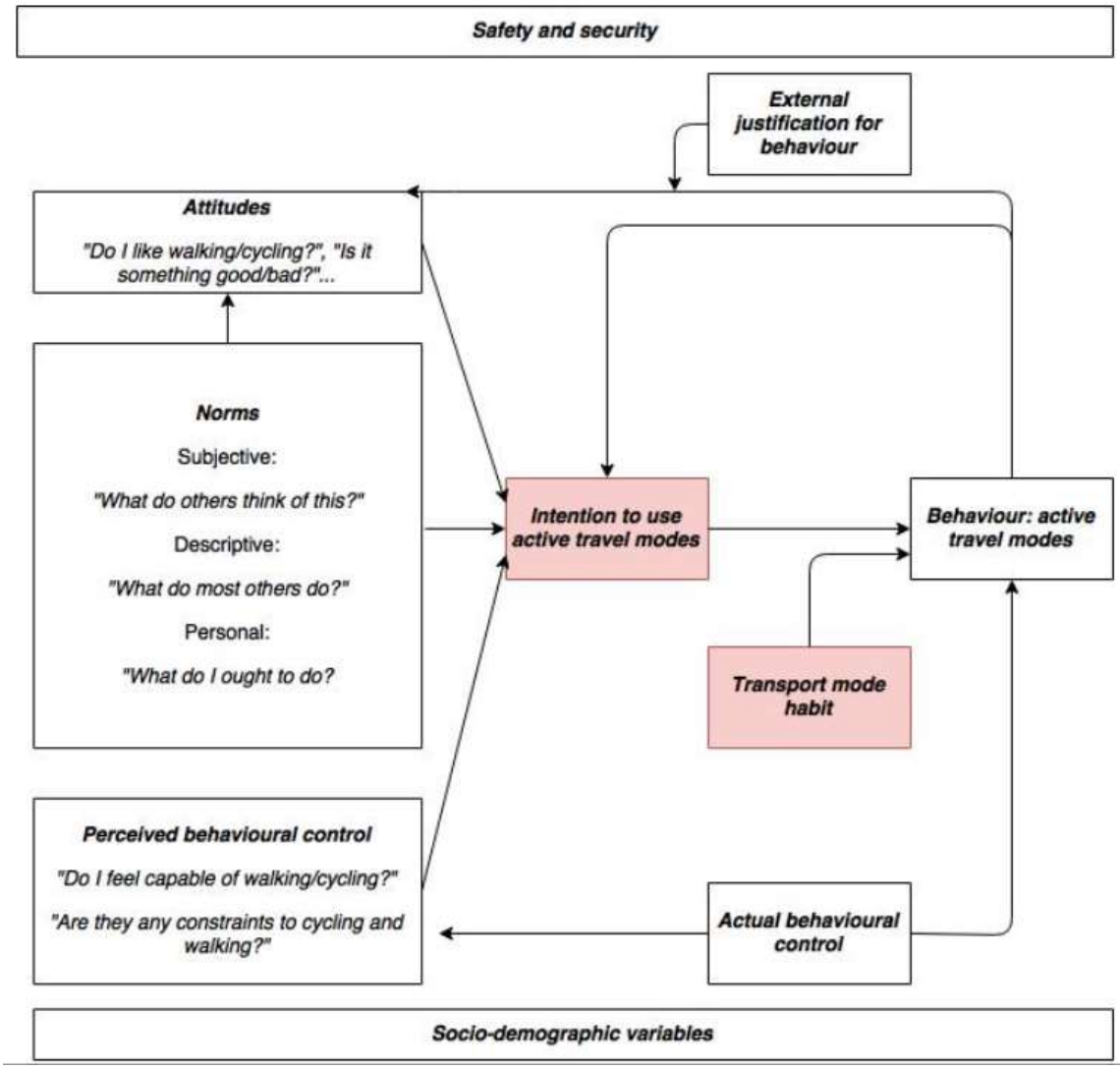

Figure 2: Behavioural model accounting for travel mode choice.

4. Discussion and further development

The important implication of this is that it is only to the extent that a travel behaviour/mode choice is not habitual yet – or when the habit implemented is being disrupted – that the behaviour is most likely to be submitted to conscious evaluation and that information about alternative choices is likely to be most effective. Habit discontinuity is expected to increase the salience of the information relevant for the behaviour, and to make individuals more attentive and deliberate (Verplanken and Wood; 2006).

Habit disruptions can occur naturally, as a result of life-events (births, new job appointments, moving to a new living area, retirement…). Research has shown that changes in travel mode are more frequent in these life-events periods (Bamberg, 2006; Behrens and Del Mistro, 2006; Chatterjee, et al.; 2013). Other studies suggest that habit disruptions can also be introduced, by means of context alterations such as alterations of the physical environment (temporary closure of roads to cars, withdrawal of parking spaces; Garcia-Serra et al., 2015), by economic incentives; or by inducing a deliberate process prior to the enactment of the behaviour, for example by planning a new travel behaviour and/or deliberately evaluating one's own travel behaviour (Eriksson et al., 2008).

Research has shown that when habitual car use is "disrupted" by some intervention, those who are most prone to shift to other transport modes (among which active modes such as walking and cycling) are those with strong pro-environmental personal norms (Eriksson, 2008; Verplanken et al., 2008). Personal norms have been defined as a sense of moral obligation to take pro-environmental action (Schwartz, 1977). The extent to which individuals develop personal norms of course depends on their awareness of - and sensitivity towards – environmental issues. However, personal norms have also been found to be a more direct predictor of actual pro-environmental behaviour

than adherence to general ecological worldviews or values (Jimenez-Sanchez & Lafuente, 2008; Jansson et al., 2015).

Taken together, these findings suggest that frequent and regular car use does not necessarily reflect a strong personal valuation of this transport mode. In a large survey research, Tapp et al. (2016), observed that 38% of the UK respondents reported that they were contemplating cycling for short journeys, and 21% agreed they'd actually made plans to take up cycling. However a similar survey conducted 3 years later failed to show any evidence of significant increase in the level of cycling in the population. Such an "intention-behaviour gap" is likely to be accounted for – at least partly – by the strength of car-use habits.

However, perceived or actual barriers to using alternative transport modes (for example never having learned to use a bike, lack of time, of energy, complexity and length of the travels to be made) might also explain why individuals fail to adapt their travel behaviour to their intentions. These barriers are to a certain extent determined by the individuals' living situation (children, employment status). In all cases, if a shift to active transport modes is to be encouraged, it is important to obtain more information about these barriers in order to develop differentiated intervention strategies.

This paper has focused heavily on the influence of psychological and subjective determinants on peoples' transport behaviour and mode choices. This focus does not imply, however, that objective conditions and the environment do not affect the likelihood of a shift towards active transport modes. Efforts to make the environment inviting, safe and convenient for walking and cycling certainly cannot be considered useless, on the contrary. The findings we reviewed here suggest that infrastructure adaptations alone are likely to be insufficient for eliciting a real behaviour change in terms of transport modes, as long as the role of subjective and psychological factors will be ignored. This has some important implications that need to be taken into account when designing interventions to promote active transport modes.

Taking this powerful role of habits into account has many important implications for developing interventions aimed at promoting active transport modes. For example, any intervention (even a "purely" infrastructural one) would deserve being accompanied by some form of habit disruption (for example: designing car-free zones, invitations to use the bike painted on the roads in the vicinities of new bicycle lanes). Another important implication is that interventions focusing directly on travel behaviour should address repetitive and habitual behaviour in the first place, as it appears that "habitual" transport modes tend to be used more often and in a variety of travel contexts. From this perspective, interventions addressing commuting behaviour are likely to be more successful than occasional actions like organising "car-free days" on a weekend day once a year.

In terms of primary target group, another logical implication of these findings is that people who do not have developed strong travel habits are likely to be impacted more by the interventions. This of course concerns children and the youths, but also all people encountering important changes in their life circumstances (job change, residential relocation) – all circumstances in which new habits need to be developed.

Further development

The ISAAC tool will be based on available knowledge and documents. It will just point at the relevant aspects, the relevant actions, the general principles, the aspects that should not be forgotten. Whenever possible links will be provided to concrete examples, further reading and the detailed implementation guidelines. The ISAAC development process will apply the following step-wise approach.

The following steps are included in the development of the tool. Establishing a City profile including some basic characteristics of the city (related to e.g. size, current modal split, available facilities, climate, etc.). Based on the profile, the cities will be classified into a limited number of city types (e.g. five types). These city types should make a distinction between cities in a way that they connect as much as possible to tailor made interventions.

Subsequently, a checklist will be developed to identify the level of support (political, public, business) for actions to promote walking and cycling.

Finally, a technical guide will be developed including general background information about mode choice and the factors that affect that for different types of road users. This should also include appropriate (road)safety measures. Within the technical guide also the issue of influencing the behaviour of road users is considered to be very important. Therefore the behavioural model is developed more elaborately within the project.

Further research is prepared with the aim of assessing the psychological basis of intentions to shift to active transport modes. A survey study will be conducted in order to identify population subgroups that differ most on

the basis of psychological determinants of travel mode shift: attitudes, social and personal norms, perceived behavioural control, and strength of habitual car use.

This will allow further validation of the behavioural model developed (Figure 2) on the one hand, but also to better identify population subgroups that might be considered as "primary targets" for actions and measures aimed at encouraging a shift towards active transport modes.

The research questions to be addressed are:

1. Among the factors identified in the literature, which ones can be considered as determinants of variations in the intentions to shift from car use to active travel modes?
2. Are there different groups of persons having common determinants of variations in the intentions?
3. What are the obstacles that they (persons within and between groups) respectively perceive to this modal shift?
4. What are the interests for various motorized personal mobility devices and their perceived (dis)advantages (usefulness, practicality, safety, costs)?
5. How do the groups differ in terms of living environment and situation/ current habitual use of mobility modality?.

The following overall approach will be used. The data will be gathered by means of an on-line survey (based on a representative panel), targeting the population of four large cities selected from the 4 countries represented in the ISAAC consortium (The Netherlands; Belgium; Norway; and Germany). The selection of cities will be made in collaboration with – and on advice of – POLIS, given their close contacts with European cities, and knowledge of the level of support to walking and cycling endorsed by the cities members of the POLIS network. The survey questions will cover the components of the Theory of Planned Behaviour (TPB, Ajzen, 1988; 1991). However, this framework will be extended in two important ways; first, by integrating the concept of habitual car use, and second, in the way the concept of "norms" is defined.Cluster analysis methods will be used to identify homogeneous groups among the respondents, based on combinations of the variables assessed in the questionnaire.

Given the emphasis on psychological determinants, priority will be given to cities which are homogeneous on a series of environmental variables that appear to be related to transport mode choices (e.g.: high population density, good access to public transports, mixed land use).

Acknowledgements

This project received funding from the Conference of European Directors of Roads (CEDR).

5. References

Ajzen, I., 1988. Attitudes, Personality, and Behavior. Open University Press, Milton Keynes.

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Decision Processes, 50, 179–211.

Bamberg, S., 2006. Is a residential relocation a good opportunity to change people's travel behavior? Results from a theory-driven intervention study. Environment and Behavior, 38 (6), 820–840

Behrens, R. and Del Mistro, R. (2006) Shocking habits: methodological issues in analysing changing personal travel behaviour over time. Paper presented at the 11th international conference on Travel Behaviour Research, Kyoto, Japan.

Bem, D. J., 1967. Self-Perception: An alternative interpretation of cognitive dissonance phenomena. Psychological Review, 74, 183-200.

Bem, D. J., 1972. Self-perception theory. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology (Vol. 6, pp. 1-62). New-York: Academic Press.

Buehler, R., 2011. Determinants of transport mode choice: a comparison of Germany and the USA. Journal of Transport Geography, 19, 644-657.

Chatterjee, K., Sherwin, H., and Jain, J., 2013. Triggers for changes in cycling: the role of life events and modifications to the external environment. Journal of Transport Geography, 30, 183–193.

Delhaye, E., De Ceuster, G., Vanhove, F., and Maerivoet, S., 2017. Internalisering van externe kosten van transport in Vlaanderen: actualisering 2016. Study conducted by Transport & Mobility Leuven on the authority of Flanders Environment Agency.

De Witte, A., Hollevoet, J., Dobruszkes, F., Hubert, M., Macharis, C., 2013. Linking modal choice to motility: A comprehensive review. Transportation Research Part A, 49, 329-341.

Eriksson, L., Garvill, J., and Nordlund, A., 2008. Interrupting habitual car use: The importance of car habit strength and moral motivation for personal car use reduction. Transportation Research Part F, 11, 10-23.

Festinger, L., 1962. "Cognitive dissonance". Scientific American, 207, 93-107.

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., Kaner, E. F. S., Smith, L., Bonetti, D., 2004. Constructing questionnaires based on the theory of planned behaviour. A manual for health services researchers. Centre for Health Services Research, Newcastle: UK.

Friedrichsmeier, T., Matthies, E., and Klöckner, C. A., 2013. Explaining stability in travel mode choice: An empirical comparison of two concepts of habit. Transportation Research Part F, 16, 1-13.

Garcia-Sierra, M.; van den Bergh, J., and Miralles-Guasch, C., 2015. Behavioural economics, travel behaviour and environmental-transport policy. Transportation Research Part D, 41, 288-305.

Jansson, J., and Dorrepaal, E., 2015. Personal norms for dealing with climate change: Results from a survey using moral foundations theory. Sustainable development, 23, 381-395.

Jimenez-Sanchez, M., and Lafuente, R., 2008. Defining and measuring environmental consciousness. Revista Internacional de Sociología, 68, 735-755.

Groot-Mesken, J. de, et al., 2015. Monitor Beleidsimpuls Verkeersveiligheid 2015. R-2015-20. SWOV, Den Haag.

Martensen, H., 2014. Analysis of the risk of serious or fatal injuries in traffic according to age and mode of transport. Belgian Road Safety Institute, Brussels, 2014-R-11S-EN.

Panter, J. R., and Jones, A., 2010. Attitudes and the environment as determinants of active travel in adults: What do and don't we know? Journal of Physical Activity and Health, 7, 551-561.

Schwanen, T., Banister, D., and Anable, J., 2012. Rethinking habits and their role in behaviour change: The case of low-carbon mobility. Journal of Transport Geography, 24, 522-532.

Schwartz S. H., 1977. Normative influence on altruism. In: Berkowitz L, ed. Advances in Experimental Social Psychology. New York: Academic Press; 221–279

Tapp, A., Davis, A., Nancarrow, C., and Jones, S., 2016. Great Britains adluts' opinions on cycling: Implications for policy. Transportation Research Part A, 89, 14-28.

Van de Kaa, E. J., 2010. Prospect Theory and choice behaviour strategies: Review and synthesis of concepts from social and transport sciences. European Journal of Transport Infrastructure Research, 10 (4), 299-329.

Verplanken, B., & Wood, W., 2006. Interventions to Break and Create Consumer Habits. Journal of Public Policy & Marketing, 25(1), 90-103.

Willis, D. P., Manaugh, K., and El-Geneidy, A., 2013. Cycling under influence: Summarizing the influence of perceptions, attitudes, habits, and social environments on cycling for transportation. International Journal of Sustainable Transportation, 9, 565-579.

Yalachkov, Y., Naumer, M. J., and Plyushteva, A., 2014. The compulsive habit of cars. Trends in Cognitive Sciences, 18(5), 227-228.