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URGENT: A longitudinal mixed-methods study to examine behaviour change in transport

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Abstract

Achieving more sustainable mobility requires a clearer understanding of how and why people change their travel behaviour. The ERC project URGENT investigates these processes using a unique three-year mixed-method design combining a large Danish panel survey, longitudinal interviews, and app-based mobility diaries. This approach allows us to examine behavioural adaptations triggered by environmental and socio-cultural changes, planned and sudden life events, and technology adoption. The contribution focuses on the study design and first findings. These show that behaviour change varies strongly with contextual factors, and perceived agency. The project aims to advance theory on mobility behaviour change and support the development of more effective interventions for the green transition.

Introduction

Greenhouse gas emissions from transport are barely declining. City residents suffer from local air and noise pollution, while rural populations often depend on cars to meet their mobility needs, disadvantaging those without access to one. Cars also occupy space that could otherwise support recreation or active travel, and motorised traffic poses major safety risks, making road injuries a leading cause of death worldwide (Miner et al., 2024).

More sustainable transport requires a change in mobility behaviour as technological advancements alone are not sufficient (e.g. Schwanen et al., 2011). To identify effective behaviour change measures, the ERC project URGENT aims to understand under what individual and contextual circumstances people change their mobility behaviour and what mental mechanisms are involved in this process. In addition, the project examines the direct and indirect social and environmental effects of changed mobility behaviour.

While qualitative studies are useful to understand the complex processes and effects related to behaviour change and allow for causal interpretations (e.g. Janke & Handy, 2019), most studies are based on retrospective data and subject to different memory biases. By contrast, existing panel survey data is restricted in the included socio-psychological, behavioural or contextual variables and can be subjected to biases due to panel mortality and attrition (Müggenburg, 2021). Generally, existing research approaches that examine behaviour change in transport often either follow a quantitative or qualitative approach, and – depending on involved disciplinary backgrounds – either (over)emphasise individual, spatial or socio-cultural

factors as initiators of behaviour change. Our project aims to overcome these limitations by utilising the synergies of a longitudinal mixed-method approach in an interdisciplinary research team.

Project Objectives

URGENT investigates the process of behaviour change based on a unique longitudinal dataset. Over a 3-year period, data is collected via a large-scale survey combined with case studies based on sub-samples of participants examined by in-depth interviews and app-based diary methods. Based on the case studies, the project examines how people adapt their mobility behaviour in prospect and response to: (1) changes in the socio-cultural and physical environment, (2) planned/anticipated vs. sudden life events and (3) technology adoption. The project examines the socio-psychological and causal processes involved in behaviour change, aims to identify the most relevant initiators of change, and examines rebound and spillover effects.

The project widens the narrow psychological focus on the individual and related theories (e.g. Theory of Planned Behaviour, Theory of Cognitive Dissonance, Goal-Framing Theory) by integrating socio-cultural and spatial perspectives (Mobility Biographies Approach, Mobility Cultures). As a result, the project aims to reveal to what extent behaviour change in transport is a consequence of deliberate decision processes (as assumed in most psychological models), adaptions to changed socio-cultural, spatial, or technical environments and/or changed personal life circumstances. We also aim to reveal under which conditions, and to what extent, behaviour change in one area (e.g. commuting) positively or negatively spills over to other areas of the same (e.g. air/holiday travel) or other behavioural domains (e.g. food consumption). Through the new knowledge, we aim to increase our theoretical understanding of behaviour change in transport and provide a better basis for effective intervention strategies towards the green transition.

Methods

Data

As illustrated in Figure 1, URGENT collects data on four case studies and is based on three data sources:

[1] a bi-annual panel survey covering a 3-year period (7 waves in total);
[2] semi-structured interviews before and after selected life events;
[3] app-based mobility diaries collecting data over a period of approximately 9 months.

Figure 2 illustrates the timeline of all data collections.

Panel Survey

Panel survey participants were recruited by inviting a large, representative sample (n=80,000) from the national Danish register to participate in the study. In the first survey wave, 12,118 participants completed the online questionnaires, and were then re-invited to all subsequent waves. While the drop-out rate was around 50% from wave 1 to wave 2, the response rate has remained relatively stable, subsequently (see Figure 3). Prior to participation, respondents provided informed, written consent. The large sample size allowed for the screening of individuals who expect selected life events and who could then be invited to additionally participate in interviews before and after this transition and to use a diary app in the meantime.

The panel survey collects information on mode choice for regular trips, psychological constructs related to mode choice, travel satisfaction, well-being, environmental attitudes and behaviour, demographics (including infrastructure, vehicle ownership and membership for mobility services) and life events (e.g. recent involvement in road crashes). The survey contents remained largely the same apart from the addition of a question on parking space transformation in wave 4 and the possibility to better elaborate on answers based on open text from wave 4 onwards. In addition, wave one included some questions on travel socialisation (e.g. where people grew up and which travel modes they used to get to school).

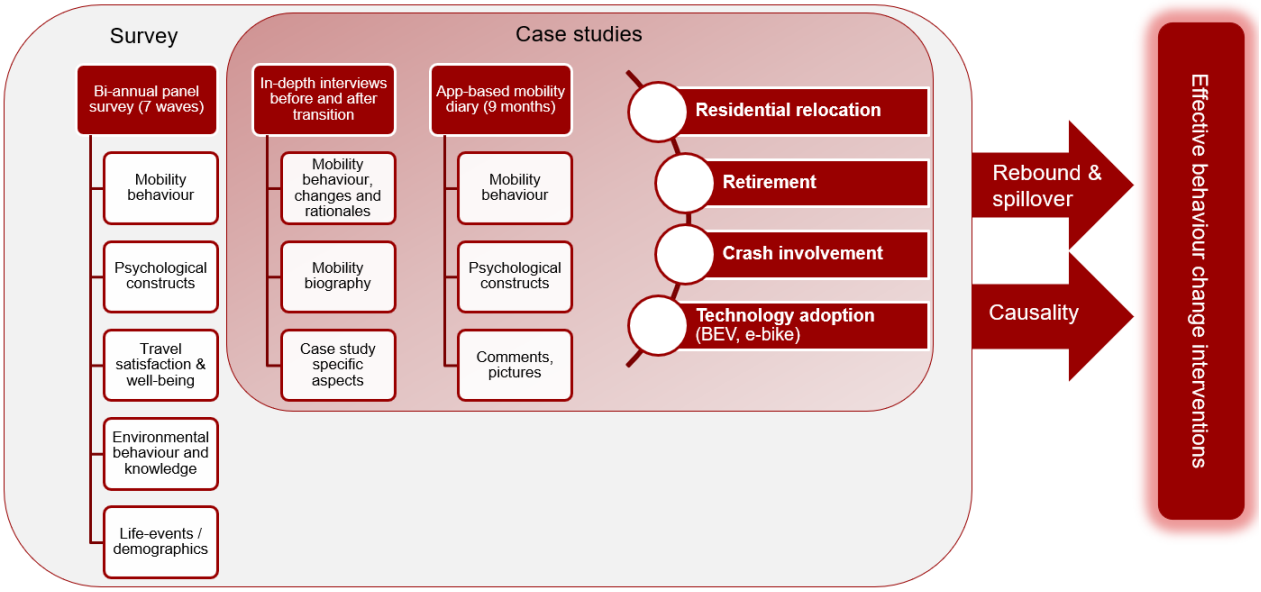

Figure 1: Research approach and data sources

Interviews

The semi-structured interviews focused on four life events: [1] Residential relocation; [2] Retirement; [3] Crash involvement; and [4] Electric vehicle adoption. These four sub-groups were selected to be able to explore the process of behaviour modifications related to changes in the social and physical environment [1, 2]; planned/anticipated vs. sudden life events [1-3]; and technology adoption and related rebound and spillover effects [4]. The content of the interviews focussed on the current mobility behaviour, recent as well as anticipated changes and related rationales; b) aspects related to the specific event/transition. The first interviews additionally included a retrospective part on important events in the personal mobility biography and travel socialisation (Haustein et al., 2009; Van Acker et al., 2019) to better understand current mobility behaviour. The second interview also explored why a planned transition eventually had not happened (e.g. why a car purchase intention had been changed or a relocation postponed) including the mobility-related consequences hereof. In total, 87 qualitative interviews before, and 83 interviews after a life event have been conducted, transcribed and analysed.

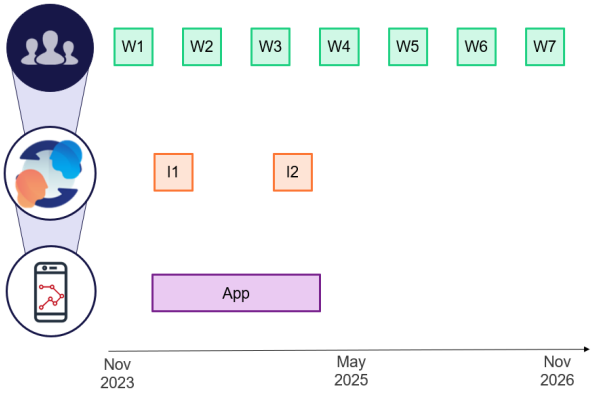

Figure 2: Research approach and data sources

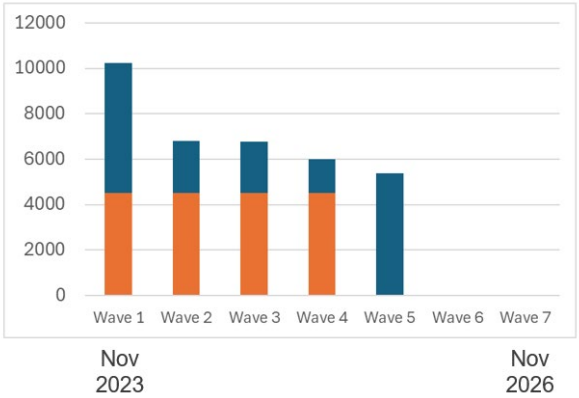

Figure 3: Samples size wave 1-5
Note: Orange are participants that participated in all waves (approx. 4,500); for wave 5 not determined yet)

Mobility Diary App

The SESAMO app (Mobidot) passively tracked transport mode, trip duration, purpose, and daily activities from February 2024 to February 2025 of around study 100 participants for up to nine months per participant.

Initial analyses show that about half of all trips were conducted by car. Car and public transport use remained relatively stable, while bicycle use showed more seasonal variation, and all modes declined around Christmas and New Year.

In addition to the passive tracking, a short biweekly questionnaire assessed the perceived pleasantness and ease of travel by each mode, as well as overall travel satisfaction. All items were simplified single-item measures to minimise participant burden and reduce dropout.

Analyses of the app data will reveal in which order and to what extent mode-specific attitudes, travel satisfaction and mobility behaviour change over time and in relation to specific life events. The app data can also be used to assess the accuracy of the self-reported survey and interview data.

Preliminary Results

Residential relocation

- Mobility culture (Stolze et al., 2025) played a relevant role for behaviour change, in particular local social norms, that is the perception about the behaviour of people in one's neighourhood (Stolze et al., 2026a).
- Other than expected, moving voluntariness did not predict later (mis)alignment of travel attitude and behaviour, but links to different well-being outcomes (Stolze et al., 2026b).
- Movers start with various criteria, but identify only a few priorities later on which frequently compete with their travel preferences. Those priorities often stem from other life events, both expected and unexpected ones (Stolze & Haustein, 2026).

Retirement

- Economic and health conditions influence the decision to retire: this could be an opportunity for promoting active travel and providing (cheap) public transport tickets before retirement.
- Retirement is perceived as its own independent life chapter: About pursuing dreams, keeping a high level of activity, and enjoying freedom.
- For some, the first retirement year functions as a "gap year," often involving long-distance travel while still physically able.
- Continued car reliance is linked to anticipating future mobility needs in old age, with this awareness increasing as retirement approaches (Holst et al., 2026).

Crash involvement

- Behaviour changes after a crash depend on how much room for action participants felt they had during the event.
- Feeling responsible for the crash (linked to perceived room for action) often led to more prosocial driving aimed at preventing harm to others.
- Experiencing the crash as beyond one's control tended to result in self-protective behaviour and feelings of powerlessness (Heiberg et al., 2026).

Electric vehicle adoption

- At the individual level, there is mixed evidence for behaviour change in transport choices and other domains after the adoption of electric cars and e-bikes (Ojeda-Diaz et al., 2026a).
- After adoption, increased car use is not exclusive to electric vehicle adopters; individuals adopting new internal combustion engine vehicles (ICEV) show a similar increase (Ojeda-Díaz et al., 2026b).
- In the long run, BEV users exhibit reinforced pro-environmental norms and intentions (even though they face more difficulty translating into behaviours), whereas ICEV users show more car-centric patterns and lower environmental concern (Ojeda-Diaz et al., 2026c).

- The understanding of the adoption outcomes (often a lack of changes or changes not related to the BEV itself) can be interpreted in terms of social representations based on existing collective knowledge of cars and BEVs in society (Hestbech et al., 2026).

Outlook

While the analyses of the qualitative interviews of the case studies are almost completed, the app data still needs to be analysed and the survey data has so far only been utilized for case studies 1 and 4 and the data collection on waves 6 and 7 are still pending. After finalizing the case study related analysis, our research will turn to the complete survey and app data to better understand the behaviour change process in the context of various life events, psychological, social and spatial factors. One goal will be to examine the most important factors that trigger changes to more or less sustainable lifestyles over time. In addition, we will explore the role of psychological well-being as an outcome or driver of behaviour change.

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