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Editorial

# Sustainability Issues of Micro and Macro-Scale Changes in Daily and Residential Mobility

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## 1. Introduction

For several decades, changes in travel behavior have been at the heart of transportation research, either to adapt the supply of transportation or to better understand the evolution of travel demand. Recently, an academic perspective called “mobility biographies” has attempted to conceptualize this field of study from an individual-based approach mainly focusing on life courses. Thus, these studies, which analyze the impact of life events such as child birth, residential relocation, etc. on changes in daily mobility behavior over the life course of a person and his or her environment, have experienced a certain resurgence in the last two decades. The methodological, empirical and conceptual aspects of these studies have diversified and expanded, and are being carried out by an increasing number of disciplines.

Initiated in 2003 by Lanzendorf [1] and pursued since then by many authors, as shown for example by Scheiner's recent literature review [2], mobility biographies are essentially based on quantitative approaches [3]. However, qualitative [4] or mixed methods have recently joined this trend, trying to broaden it with more comprehensive contributions. The fertile cross-fertilization of these different approaches and their underlying interdisciplinarity allow us to enrich our understanding of changes and evolution of mobility or immobility behaviors, the latter being a more recent theme [5].

At the conceptual level, there are now a number of variations on these mobility biographies, although it should be noted that their origins lie in the first longitudinal demographic studies [6], which themselves have their theoretical background in the Life-Course Approach developed by the Chicago School in the 1920s. Without wishing to cite all of them, the life-oriented approach is undoubtedly the most recent and offers a wide variety of study subjects and a relatively broad conceptual base that aims to respond to societal issues [7]. Indeed, public policies, when claiming to be evidence-based, should ensure that they develop a cross-sectoral view of the interdisciplinary issues that arise in transport and mobility, as decisions on different life domains such as health, education, energy consumption, etc. are interdependent. The life-oriented approach aims to provide these relationships [8].

This conceptual broadening favors an opening up of the themes addressed in recent years in mobility biographies. The articles dealing with the links between daily mobility and residential mobility are numerous and probably the oldest, notably because of the questions related to LUTI (land use and transport interaction), as shown by the articles

published before 2010, such as Van Ommeren et al. [9], Krizek [10], Bamberg [11], Prillwitz et al. [12] or Carpentier and Gerber [13]. Other contextual themes have been added to these residential relocation issues, such as cohort effects [14,15], the automobile issue [16–18] or quality of life [19]. Other authors have been more interested in socio-demographic aspects related to life cycle events, such as the impact of birth on modal choice [20,21], union or marriage [22] and socioeconomic aspects such as job relocation [23]. Other studies focus on specific periods of life, such as youth through the concept of mobility socialization [24–26] or, to a lesser extent, ageing [4].

## 2. Synopsis of the Contributions

This special issue of *Sustainability* provides an opportunity to study in greater depth the complex relationships between spatial contexts and the various forms of individual mobility and its evolution. The articles published here constitute an original contribution to this theme, whether in terms of the choice of study areas, the time periods chosen or the levels of analysis. Thus, three groups emerge from the seven proposed studies.

The first category includes two papers that offer a deep temporal perspective on the evolution of daily mobility behavior over several decades. They provide an analysis of the progressive deconcentration of employment and the increase in peripheral flows and its impacts on daily mobility, particularly from the point of view of sustainability. Thus, the contributions of Alexis Poulhès and Angèle Brachet (1) and Benjamin Duquet and Cédric Brunelle (2) propose a longitudinal vision of commuting patterns not on the basis of individuals or households, an approach that has been tried and tested in mobility biographies, but on a meso-geographic scale concerning medium-sized cities or metropolises.

Poulhès and Brachet (1) focus their analysis on medium-sized cities in France and their evolution in terms of modal split commuting and their greenhouse gas emission impacts between 2006 and 2016 using census data. Given the major demographic changes in France and other European countries in recent decades, medium-sized cities can potentially play a buffer role between metropolises, possibly reducing the length of daily commutes by linking the territory and integrating local activities and services, while recognizing that the challenge lies in the cost-effectiveness of public transport systems. The two authors point to mixed results. The carbon footprint has become smaller for residents living in the urban centers of these medium-sized cities, particularly because of the density and diversity of the urban fabric. At the same time, however, the development of service and consumer jobs on the outskirts and edges of cities, where land costs are lower, does not help to reduce the length of trips over time. This last result echoes the conclusions of the article by Duquet and Brunelle (2).

The latter offer a longer time perspective, between 1996 and 2016, on the six major Canadian cities (Toronto, Montreal, Vancouver, Calgary, Quebec City, and Winnipeg) and their subcenters where many jobs have been developed during these decades. Using micro-census data from the same two years and an intermediate year, 2006, and numerous analyses, the two authors study the evolution of commuting between the Central Business Districts CBDs and these sub-centers. It is clear that the rise of subcenters does not favor sustainable transportation, despite the trend toward increasing development of transit-oriented development (TOD) operations or possible changes in behavior in favor of active modes. The car is still predominantly used, and planning operations (as well as policy measures) need to be radical in favor of more environmentally friendly public transport. As in the example of French medium-sized cities, it is in the urban centers of CBDs that the cumulative distance of trips decreases, as does the use of the car, in contrast to the subcenters, where both phenomena increase. These contrasts are due in particular to residential densification policies in the CBDs, as well as a search for functional mix and massive investment in public transport infrastructure to improve their accessibility. This is obvious, for example, in a TOD operation in Montreal following the development of a new hospital at the intersection of a regional railway station and a subway station [27].

The second category of papers has a much shorter temporal depth, with three contributions that address changes in mobility behavior either immediately, over the course of a day, or over the course of a month. These three contributions thus address the issue of short- and medium-term changes in behavior, that of Thamires Ferreira Schubert, Elisa Henning and Simone Becker Lopes (3), that of Xiaoning Liu, Linjie Gao, Anning Ni and Nan Ye (4), and that of Yixiao Li, Zhaoxin Dai, Lining Zhu and Xiaoli Liu (5).

Through a stated preference survey, Schubert et al. (3) aim to unpack potential changes in mobility behavior once conditions for change, especially in transportation infrastructure, are considered. The field of study is the agglomeration of Joinville (Brazil) where the survey was conducted between November 2018 and January 2019, among 511 students of Santa Catarina State University. These students use the bus more than they did in 2010 (previous survey), even though they consider the public transportation system to be inefficient. Nevertheless, many of them use cars, due in part to the presence of free parking. The results of the stated preference survey provide some interesting insights. Many students are willing to change their mode of transportation from car to sustainable transportation. However, they insist that it is not enough to improve only public transport infrastructure or safe bicycle access, but also to curb the accessibility of the car, either by cost (e.g., by enforcing paid parking) or by access time. Raising young people's awareness of sustainable mobility thus seems to bear fruit, at least in terms of intentions. However, their concretization through new behaviors depends on certain conditions, notably transport infrastructures, the distribution of activity places in the metropolitan space and people's activity programs, which change rapidly for young people and their commitments.

The papers by Lu et al. (4) and Li et al. (5) provide another view of behavioral changes by analyzing them over short periods of time, the day and/or the month. Thus, based on a 2015 smartphone survey of 312 individuals in Shanghai, China, Lu et al. selected 152 of them who reported changing their mode of transport at least once over a period of seven consecutive days. Representing half of the workforce, this result already highlights possible variations in mode use that should also be considered within mobility change measures. To go further, the authors first control for modal choice prior to mode switching, and find that those most open to switching are surprisingly car users, a finding that more or less contradicts the literature. In order to improve the modal split in favor of sustainable modes, it is no longer necessary to play on the cost of public transport, as Shanghai residents are no longer sensitive to it. On the other hand, young, unmarried people are more open to change to sustainable modes, if at least the infrastructure effectively meets the needs of regular travel. This generational finding for young, unmarried people reinforces the need to consider key events as a means of leveraging behavior change.

The fifth contribution, by Li et al., focuses on the evolution of e-bike usage patterns and citizens' spatial and temporal mobility characteristics between May and July 2018 in the central area of Tengzhou City (China) on real-time extracted GPS track points. It is very interesting to note that the variations in their use depend on both weather conditions (less use in bad weather for example), but also on daily rhythms [28], showing a possible monitoring of day or night activities over 24 h, making the monitoring of these e-bikes a good indicator of space-time activity fragmentation [29,30]. Indeed, depending on the districts and the distribution of the offer, the patterns that emerge do not offer the same spatio-temporal uniformity.

Finally, the last two contributions discuss relatively more classical evolutionary contexts of biographical mobility linked to key events in individual/life courses. Jooseok Oh's contribution is based on residential mobility and the repercussions on quality of life (6), while the contribution of François Sprumont, Ali Benam and Francesco Viti is based on a systematic literature review of the impacts of workplace relocation (7).

Using a retrospective survey, Oh (6) aims to measure changes in perceived quality of life between the former main residence and the current one located either in Seoul or in the metropolitan outskirts of Gyeong-in, South Korea. The author finds, without any real

surprise, the push and pull factors that are now relatively well established in the literature with respect to residential choices.

On the one hand, the presence of high densities in the urban center, which certainly lead to a welcome presence of amenities and diversity of supply, also lead to segregation-promoting real estate prices, as well as noise nuisance and air pollution. On the other hand, public transport infrastructures are lacking in the periphery, but becoming the owner of a spacious dwelling will somehow compensate for this possible lack, and thus will not impact the perceived level of quality of life. Decisions made by residents often seem to be informed, and an approach based on preferences and lifestyles could be a very good complement.

The contribution of Sprumont et al. (7) provides a systematic review of 33 articles analyzing the relocation (voluntary or involuntary) of the workplace, whether from the center to the periphery of cities or vice versa, from the 1960s to the present. This type of relocation undoubtedly leads to a potential change in mobility behavior, whether in terms of transportation modes or mobility patterns more generally. The changes observed are relatively disparate, sometimes favoring sustainable transport, sometimes the opposite. Trends are difficult to capture over time, both because of modal choice inertia and moreover because of changes in accessibility between old and new workplaces. The authors go even further in the analysis by confronting this bibliographic meta-analysis with an original case study, namely the relocation of the University of Luxembourg. Using four time series surveys before and after the move (2012, 2014, 2016 and 2020), the results are relatively encouraging due to a slight increase in active modes (from 9% to 12% between the four dates), essentially at the expense of car use (51% to 47%). However, car ownership among university staff increased during this period, from 66% to 76%. It appears that stakeholder involvement (at the company and host region level) is crucial to encourage changes in virtuous behavior. This is especially true since the case study shows that it is not a matter of planning a mode of transportation for a given population, as this university population is positioned in different life cycles and in important moments of transition.

Through these seven contributions, in this Special Issue, it has been possible to gather theoretical, methodological and empirical works on the changes in mobility behavior, whether daily, labor or residential, by more particularly studying the relationships that may exist between them and that might lead to changing sustainable mobility and quality of life. Depending on the context of the study, the implications for behavior change may be influenced by structural phenomena (a move), seasonal phenomena (unpredictable weather), or more recently by extreme situations such as Covid-19 [31]. Under these conditions, despite the constant desire to improve the conceptual frameworks of mobility biographies in particular [2], or of changes in mobility behavior in general, this Special Issue clearly demonstrates that there is still a long way to go to understand the full complexity of behavioral change.

### 3. List of Contributions in this Special Issue

1. Poulhès, A.; Brachet, A. Does Revitalizing the Center of Mid-Sized French Cities Reduce GHG Emissions from Commuting? *Sustainability* 2021, 13, 1851. <https://doi.org/10.3390/su13041851>. (accessed on 29 March 2021)
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