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Modeling active mobility choices in urban spaces: A preface

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Abstract: This note presents the scope and contents of a special collection in the *Journal of Transport and Land Use*, devoted to the theme of "Modeling Choice Behavior of Cyclists and Pedestrians in Urban Activity Space." The aim of the special issue is to explore the significance of active transport modes—specifically, cycling and walking—in promoting sustainable urban mobility. In the face of increasing urban mobility demands and the pressing need to meet environmental and climate goals, this collection of studies presents new analytical and empirical insights into the factors influencing cycling and pedestrian behaviors. The research highlights the interplay between infrastructural support, socioeconomic conditions, and user perceptions, providing recommendations for policymakers and urban planners. By examining diverse contexts, from university settings to micromobility patterns in urban centers, the findings presented in this special issue highlight the potential of active transport modes to foster healthier lifestyles and reduce reliance on motorized vehicle use.

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1 Scope

Despite many recent disruptions in transportation systems caused, inter alia, by economic crises, pandemics, and war situations, the current mobility development is still on a rising edge (World Bank, 1996; Loo & Tsoi, 2018; Ferdman, 2021). This holds for transport movements at a metropolitan scale (e.g., big cities) and at a national scale (e.g., in emerging economies) (e.g., Hong et al., 2021; Dantsuji et al., 2023). This development risks environmental and climate goals. Several transportation measures have been proposed to mitigate the environmental externalities of uncontrolled transport movements—e.g., imposing road pricing, introducing electric vehicles, implementing advanced logistics, and resorting to digital information and choice tools (e.g., Lindsey & Santos, 2020; Cavallaro et al., 2024). Clearly, the latter technological support tools have been widely accepted in public transport, car mobility, logistics, and aviation policy (e.g., Guerrero-Ibanez et al., 2015; Low et al., 2020; Oladimeji et al., 2023). There is, however, an increasingly important class of transport mode users that has remained under-

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investigated in the search for sustainable transport and mobility—namely, cyclists and pedestrians.

It is noteworthy that in the rich history of transportation science, advanced statistical analysis and modeling of spatial mobility behavior in private transport and transit systems have gained great popularity, with a wealth of quantitative and modeling studies. However, the modeling of spatial movements (e.g., route choice, trip frequency, trip duration, destination choice) of cyclists and pedestrians has not kept the same pace. The same holds for digital support tools for both "active micro-mobility" management and for supporting spatial choices of cyclists and pedestrians (apart from simple apps).

The current neglect of the potentially important category of "green mobility actors" is concerning. In particular, active micro-mobility is increasingly advocated as one of the promising responses to the challenges imposed by the current energy crisis, leaving aside the need for sustainable transport modes. In addition, many "slow motion" transport modes are increasingly advocated as contributors to a healthy (active) lifestyle. Furthermore, in the context of the present discussion on the popular concept of a "15-minute city" (Moreno et al., 2021; Allam et al., 2022; Moreno, 2024), the use of environmentally benign transport modes such as bicycling seems to be a sine qua non. Arguments often used in this setting are also related to the use of bicycles (including e-bikes) as a connecting pre-mode for the use of public transport. Therefore, there is a need to revisit active personal mobility in the context of a digital society against the background of energy scarcity, environmental sustainability, and healthy (active) lifestyles.

2 Research challenges

Active and healthy mobility has, in recent years, become a hot topic in both academic and policy research (e.g., United Nations, 2015; van Wee and Ettema, 2016; European Commission, 2018; Lozzi and Monachino, 2021; Davis et al., 2022). Consequently, there is rising interest in the analytics of "green mobility" (World Health Organization, 2005; Chapman, 2007; Ettema et al., 2011; Eriksson et al., 2013; Melo et al., 2018; European Commission, 2019; Bleviss, 2020; Molina et al., 2020). Therefore, the Journal of Transport and Land Use has published a collection of advanced contributions on the theme of "Modeling Choice Behavior of Cyclists and Pedestrians in Urban Activity Space." This thematic collection contains advanced analytical studies on the merits of seemingly slow-motion transport modes, in particular biking and walking. It also addresses the question of whether active micro-mobility leads to different urban speed performance, more efficient transport achievements, and a higher health situation in urban areas. Furthermore, an unconstrained homo mobilis may generate high environmental costs and risky climate implications. Clearly, active forms of personal mobility are an under-investigated topic in transportation research that has the potential to become a promising solution to spatial mobility externalities, as was also shown during recent corona times. There is a range of new research challenges.

We see nowadays, in general, an intensive use of digital support tools for mobility choices and analyses, but the use of advanced tools for supporting active personal mobility is still lagging behind. Together with the insufficient use of digital research tools for investigating active spatial mobility, it is evident that there is much potential for focusing attention on advanced quantitative analysis of the behavior of cyclists and pedestrians (e.g., crowd-sourced data), in terms of both motives or perceptions and actual choices (and implications thereof). In this setting, the convenience, flexibility, financial costs, speed, environmental impact, safety, and physical and mental health aspects of cyclists and pedestrians can be put in the broader context of a multi-modal mobile society. Modern digital tools (e.g., cellphone data, GPS data, mobility sensors, cameras, social media information) will be instrumental in developing new research trajectories and generating novel insights.

Specific research challenges and tasks presented in this special issue:

- Generate new analytical and empirical knowledge on the potential role of active personal mobility in a mobile society (in particular, urban areas).
- Develop advanced modeling and quantitative studies on the complex behavior and attitude of cyclists and pedestrians in the multi-faceted urban fabric.
- Study the contribution of active personal mobility to climate-neutral cities, circular cities, sustainable cities, or 15-minute cities in the context of urban land use.
- Present modern, often digitally oriented studies on active personal mobility that offer a clear scope for enhancing future quality of life in the urban activity space.
- Emphasize, in particular, the close interface between “slow modes of transport” and spatial land use (including nature) as a source for enhancing quality of life in urban areas.
- These research issues are concisely presented in the next section.

3 Overview

The previously mentioned science mission has ultimately led to a carefully reviewed and selected collection of eight articles. These articles are thematically described here, according to four complementary perspectives.

The first thematic issue relates to **cycling mobility in an urban context**. Two studies focus on this research and policy issue:

- Bircu, Cavallaro, Pozzer and Nocera’s (2024) study evaluates the bike-friendliness of Venice, Italy, focusing on how a newly constructed bicycle and pedestrian infrastructure can alleviate pressure on public transport and cars. Despite its potential, the analysis reveals issues such as inadequate bike parking that need addressing for cycling to become a competitive commuting option.
- Kourtit, Nijkamp, Osth and Türk (2024) investigate how health concerns during the COVID-19 pandemic influenced cyclists’ route and destination choices, using a real-time dataset (so-called Snifferbike data) from Utrecht. The findings highlight the significant positive impact of cycling in green areas on cyclists’ well-being and choice behavior.

The next research concern is the **broader context of cyclists’ decisions**, such as the role of public transport or route convenience. Two studies in the list of relevant publications are:

- Kilani, Bennaya, and Zerguini’s (2024) analysis indicates that improvements in public transport, such as dedicated lanes and higher frequencies, can make buses more attractive. The study shows that bicycles can either substitute for or complement public transport, depending on station accessibility.
- van Nijen, Ulak, Veenstra, and Geurs (2024) develop a novel VCSLX model to analyze the factors influencing cyclists’ route choices, revealing that characteristics of adjacent route segments significantly affect decisions, thereby identifying potential bottlenecks for cyclists.

Another research question is the role of information on objective and subjective aspects of the drivers of the behavior of cyclists. The following two studies are included here:

- Arias Molinares, Talavera-García, Romanillos-Arroyo, and García-Palomares (2024) develop a journey planner for micromobility in Madrid, analyzing shared mobility services flow and identifying areas of concentrated usage to improve infrastructure and user safety.
- Zhang and Hu (2024) employ a XGBoost algorithm to assess the combined impacts of objective and perceived factors on cycling distance in Shenzhen. It identifies critical thresholds and the relative importance of various factors, such as population density and perceived safety, for encouraging longer cycling distances.

Finally, two interesting cycling studies are presented that focus specifically on the **mobility of students** as prominent users of bicycles. The two articles addressing this issue are:

- Cunha and Cadima's (2024) study explores the influences of social behavior, socioeconomics, and spatial factors on active mobility patterns among university students, emphasizing the importance of housing options and access to public transport for promoting cycling and walking.
- Havet and Bouzouina (2024) utilize data from the MobiCampus-UdL project to analyze the determinants of bicycle use among the university community in Lyon, highlighting the significance of accessibility to shared bike stations and the need for policies that support increased availability and resource allocation for cycling.

The eight articles in this special collection of JTLU illustrate the complex, intrinsic choices and environmental factors affecting the behavior of cyclists. They showcase the wealth of research opportunities and difficulties in the new analytics of active mobility and innovative methodologies for individual mobility. It is also noteworthy that one theme is underpresented in the current collection of "slow mobility" studies—namely, walkability. There is certainly much scope for intensive research on the concept and context of walkability, especially as pedestrianization becomes a new policy challenge in modern urban planning. A subsequent intensive research effort on walkability is certainly warranted.

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