Editorial
Sustainable Development of Urban Mobility through Active Travel and Public Transport

Katrin Lättman 1,* and Noriko Otsuka 2

1. Department of Occupational Health Science and Psychology, University of Gävle, 80176 Gävle, Sweden
2. ILS Research gGmbH, 44135 Dortmund, Germany; noriko.otsuka@ils-forschung.de
* Correspondence: katrin.lattman@hig.se

1. Introduction

A sustainable development of urban transportation relies on our ability to offer citizens reliant and attractive alternatives to car travel, such as efficient and appealing public transport (PT) services, alongside an urban environment that is stimulating for active travel alternatives, such as walking and cycling. Traditionally, transportation research and planning have focused on optimizing the efficiency of urban transport systems, relying heavily on travel times and costs as the main drivers for making public transport systems attractive to citizens. Active travel modes have only recently been given an apposite focus in urban mobility research, and there is still much to learn about how we can better understand and promote integrated urban and transport planning in order to enhance livable and attractive travel environments that encourage multiple types of sustainable travel behavior. Moreover, when planning and designing active and public transport systems within existing and complex urban environments, we also need to take into consideration the diversity of citizens living in these areas. Thus, a greater focus on the needs and priorities of different travelers is necessary for a successful and all-inclusive sustainable transport system that encourages sustainable travel behavior.

This Special Issue addresses the various aspects of urban mobility development toward a transition to sustainable travel and provides insights from empirical studies in a number of settings in Europe, Asia, and Australia, alongside several wide-ranging reviews. Various modes are represented, including walking and public transport, which are emphasized. The different contributions cover diverse groups of citizens, including older people, commuters, tourists, and schoolchildren.

Our hope is that this Editorial introduction to the Special Issue (S.I.) on “Sustainable development of urban mobility through active travel and public transport” will provide an overview of key insights into recent urban and semi-urban development solutions and innovations, and have the potential to guide the reader into a particular selection of the 12 substantive articles included in the S.I.

2. Summary of the Contributions

During the course of the submission period, we received 17 manuscripts, of which 12 were published after being selected for the peer review process. In total, 40 authors helped in contributing to this Special Issue. Of these, a majority are based in Europe and Asia, namely China, Germany, Ireland, Italy, Japan, Malaysia, Portugal, the UK, Saudi Arabia, and Sweden, and Australian authors are represented as well. Of the publications, four are reviews on diverging topics, and eight are based on empirical data (or mixed design) distributed over quantitative designs (3), qualitative designs (3), and mixed methods (2).

The papers are divided into three core theme areas, which represent different perspectives on the development of urban mobility: micro- and macro-level perspectives on the built environment, planning and stakeholder involvement, and psychological perspectives. These themes are to be viewed as inclusive rather than exclusive, and there exists...
some overlap between them which illuminates the complexity of contemporary urban mobility research.

2.1. Micro- and Macro-Level Perspectives on the Built Environment

Many studies related to urban mobility are concerned with the influence of the built environment on travel mode choice with reference to different spatial scales. Papers in this Special Issue discussed both macro and micro levels of accessibility via active modes and public transport.

The paper by Yuan et al. (contribution 1) presents a new method of walkability assessment for historic cities in the Asian context, using the case of Xi’an, China and Kyoto, Japan. The proposed method combines macro (neighborhood level) and micro (street level) aspects of the built environment to identify factors that can either improve or hinder the walking environment. For the micro-scale assessment, the authors developed the Walkability Evaluation Score (WES) based on the work by Nagata et al. [1], which is a checklist for examining the walkability of historical Asian cities and was used to assess 220 street view images (SVIs). WES includes both objective and perceived walkability indicators at the street level. For objective walkability, the proportion of four street components (sidewalk, vegetation, pedestrian flow, and vehicle traffic) in each SVI was automatically calculated using the image segmentation method based on deep learning. For perceived walkability, six indicators (built environment quality, street design, cleanliness, obstacles, vitality and attractiveness, and traditional streetscapes) were used, and the evaluation of individual SVIs was conducted virtually by trained auditors. Aggregated scores of WES indicators determined the walkability at the micro scale, which were compared with a macro-indicator of the local integration value of street networks at the neighborhood scale, based on Space Syntax. The results revealed contrasting findings between Xi’an and Kyoto, and improvement areas of walkability are suggested for both cities.

Another paper using a case study from Japan is presented by Hayauchi et al. (contribution 2). They looked into the impact of topography on active travel. The implementation of a new public transport service, namely vehicles smaller than buses as additional public transport to steep areas, is discussed with reference to a hillside district in Yokohama. Burden from uphill walking decreases the attractiveness of walking and cycling, while topographical features can be an incentive for some people and residents may be used to steep slopes [2]. Methodologies for incorporating topography into public transport planning are still to be developed. Using travel behavior survey results \( n = 2093 \) in a suburban hillside residential district, a multinominal logit model was developed, and then utility-based accessibilities, including topographical impact on travel mode choice, were calculated in order to explore the improvements made by the new public transport service. This study reveals that the topography had a negative impact on walking and bus egress trips. The model provides utility-based accessibility data for each area in the studied district and enables the assessment of accessibility improvement with the implementation of the new mobility service.

The study by Kopal and Wittowsky (contribution 3) discusses the impact of the built environment characteristics and functionality on individual mobility patterns in order to identify the factors responsible for promoting healthy mobility behavior and improving the quality of life. They conducted a multidisciplinary empirical survey \( n = 500 \) in Essen, Germany. The survey was based on the “Triad” model [3], which included aspects from urban planning, mobility planning, and health sciences. They argued that more integrated approaches to mobility and urban planning and for promoting health are required because the transportation sector is still responsible for the largest share of pollutant emissions; moreover, a car-oriented lifestyle was found to lead to immobility. Their empirical study identified many determinants, ranging from the level of pollutant emissions to infrastructure for promoting active modes, have the potential to improve or impair health. These determinants lead to certain behaviors related to travel patterns. The multiple regression model shows that factors like the satisfaction of walking, the
accessibility to public transport, cycling safety, and the reduction in air pollution contribute to healthy mobility behavior.

The review paper by Zhu et al. (contribution 4) presents a bibliometric analysis on spatial accessibility research from 1999 to 2022 using publications referenced in the Web of Science. The authors unveil a remarkable increase in the number of papers published in the last 23 years (20 in 1999; 1090 in 2022), and spatial accessibility research is expected to grow further with the increased availability of data sources and new methods, tools, and technology. High levels of spatial accessibility via effective public transport systems, cycling and walking facilities, and measures to reduce traffic congestion can improve people’s proximity to their destinations, thus contributing to the reduction in car dependency. The concept of spatial accessibility is also applied for the purpose of creating inclusive environments that enable more equitable participation for everyone [4]. As a future research agenda, the authors emphasize the importance of exploring the ways of incorporating new data sources as well as integrating new analytical methods. Furthermore, the influence of emerging technologies such as autonomous vehicles, shared mobility, and e-commerce on spatial accessibility patterns need to be considered. They point out that these analyses should be carried out at different spatial scales.

Finally, the paper by AlQuthani (contribution 5) emphasizes the importance of improving pedestrian infrastructure from the perspective of both macro and micro levels. According to them, in the Saudi context, while much attention is paid to micro-level interventions on pedestrian infrastructure, macro-level planning solutions are generally lacking. Their research discusses the stakeholder engagement in promoting pedestrian access for children between their homes and schools (see details in the next section).

2.2. Planning and Stakeholder Involvement

Several of the contributing papers addressed the importance of planning and stakeholder involvement for the successful development of sustainable urban mobility.

The study by AlQuthani (contribution 5) contributes to improving policy and planning practices for a sustainable development for schoolchildren commuters in a sprawled city setting in Najran, Saudi Arabia, by providing suggestions that are likely to help improve the children’s accessibility to school by walking rather than using private vehicles. Results show that female children and younger children were less likely to walk to school, and that a lack of pedestrian infrastructure, the presence of family (or hired) drivers, the distance to school, and parental risk perceptions were main influential factors for choosing other alternatives than walking. The authors present a number of suggestions to tackle these barriers to active travel, all related to planning and stakeholder involvement in a setting with a high car dependency. They suggest that increasing the number of schools, or alternatively ensuring a better geographical distribution of schools at all stages, would be beneficial for promoting active travel, as the distance to school appears to play a large part in mode choice (which is similar to findings from case studies in Europe [5]) and is largely related to the proximity-oriented concept of the “15 min city” [6]. As the authors point out, the city of Najran has access to vacant allocated lands for schools, making this a more realistic option for planning than perhaps in many other settings. In addition, AlQuhtani et al. (contribution 5) highlight the option of implementing restrictions or regulations regarding taking children to school by car.

The paper by Corr et al. (contribution 6) addresses a common issue related to the reallocation of road space in favor of sustainable travel modes, namely difficulties in reaching a general acceptance and empowering individual behavior change—particularly in smaller towns and cities. Through a systematic formative approach involving shared learning and co-creation techniques, a number of stakeholders formulated a Theory of Change in order to address cycling issues related to school travel and reduce car dependency in Kilkenny, Ireland. By collecting and analyzing data from stakeholders (n = 42) and the public (n = 420) through co-creating processes, including interviews, focus groups, workshops, and surveys, local challenges (objectives) and solutions (interventions) were identified. Among
other techniques, stock and flow analyses were used for guiding the development of each intervention to ensure that the intervention design thoroughly considered contextual elements and resources. The authors thoroughly explain the participatory systems approach used for creating the Theory of Change and reflect on its usefulness as a framework for reducing car dependency, stimulating a modal shift toward more sustainable modes in smaller towns and cities. The authors emphasize the cruciality of the early involvement of key stakeholders and the public, and in using a platform to inform participants and to create a shared vision from the start. This ready-to-use framework could be a plausible way forward for other planners and key stakeholders in similar settings to create better sustainable mobility plans.

Another study drawing on qualitative data by Quentin et al. (contribution 7) looks into the issue of a persistent dominance of individual automobility in Germany, with reference to the case of the Rhine-Main region. Based on a practice-theoretical approach [7] and considering built environments, transport infrastructures, vehicles, and road users as part of the spatial–material arrangements, the authors conducted analyses of urban and transport planning documents, as well as 14 interviews with urban and transport planners. The paper addressed the question of how local and regional planning can promote a transition to a sustainable transport system through a comprehensive study of the planning practices involved in shaping the way in which the transport system can transition beyond infrastructural and technological changes. The authors focused on strategies and approaches toward the development of the transport of spatial–material arrangements, as well as identifying objectives and guiding principles related to normative aims and assumptions, aspects of integrated action, skills, and competences in visioning, and the moderation and translation of complex relations in spatial settings. By showing links between these elements, the paper identifies two overarching transport planning practices: (1) the expansion of sustainable transport networks for public transport provision, cycling, and shared mobility; and (2) the redistribution of road space by allocating more space for walking and cycling and less for parking space.

The review paper by Prior Filipe et al. (contribution 8) identifies the needs of relevant transportation stakeholders as the key to the successful design, implementation, and adoption of more sustainable mobility practices. To determine the areas of focus in a stakeholder-led design of a transportation system and the investment priorities for future transport systems, the paper carries out a systematic literature review of 39 publications reporting on surveys, focus groups, interviews, and workshops (a 15-year time frame of 2007–2022) based on a grounded theory approach. Thirteen transportation indicators were clustered into six dimensions (accessibility, governance, mobility design, economy, infrastructure, and sustainability) in response to stakeholders’ requirements for the transportation system. The results show that “mobility design” (service characteristics; assisting features such as real-time information and fleet composition) is highly considered by stakeholders. Overall, a transport system that meets the needs of stakeholders should focus on various factors such as being accessible, flexible, and reliable; is supported by policy and dedicated infrastructure; is multimodal and integrated into one mobility service; and is economically and environmentally sustainable.

Another review by Dos Santos et al. (contribution 9) focuses on commuters to industrial estates rather than school children or the general public. The results from 32 included papers show that different strategies adopted by companies (by locating near public transport, promoting active modes, supplying shared mobility, limiting parking, parking fees) increase the use of sustainable mobility options among their workers. Therefore, the authors express an urgency for decision makers and planners in developing specific sustainable mobility management plans oriented toward companies and industries. They emphasize that merely constituting a small part of a general urban mobility plan is insufficient since commuting trips are a great part of all daily travel trips and are also a large part of daily travel for individuals who either commute or do not, as well as those who do not have the opportunity to work from home.
Finally, Al Rashid et al. (contribution 10) showed that an important factor for implementing measures toward improving experiences and the use of public transport for vulnerable groups such as older people is collaboration and communication between planners, public transport providers, and national and local authorities. Thus, besides looking into psychological barriers (see details in the next section), the authors also explored national and local policy documents for transport planning and strategies and their content regarding the needs and perspectives of the older population. Their findings show that only four out of fourteen documents mentioned the older population (or any other marginalized or vulnerable groups). Moreover, neither of these four documents stated increased the use nor ease of use of public transport by older people as a desirable goal. Follow-up interviews with professionals (four policymakers) confirmed the authors’ findings that older people’s public transport use is not a prioritized area of research at all.

2.3. Psychological Perspectives

Four papers in this Special Issue address psychological perspectives on the sustainable development of urban mobility by exploring impacts of the environment and psychosocial factors on pedestrians and public transport experiences, behavior, and health outcomes.

The first contribution, Al Rashid et al. (contribution 10), used a mixed-method approach by interviewing (n = 11) and surveying (n = 319) older people to look into psychosocial barriers and enablers to travel by public transport in Lahore, Pakistan. The findings reveal that good social support, peer acceptance, positive emotions, and behavioral control regarding public transport are important ingredients for increased use and acceptance, and the authors suggested both soft and hard measures for overcoming the current perceived barriers and to motivate public transport use. Soft measures include increased awareness toward public transport, providing social support, as well as activating social norms that are supportive toward public transport. Hard measures include more conventional developments such as improvements of public transport stops and vehicles as well as targeting walking infrastructure and providing specialized services for older adults. One main conclusion the authors drew from this paper was that, not only do older people face difficulties in using public transport due to psychosocial barriers, but these are also currently neglected in public transportation planning in Pakistan, as mentioned in the previous section.

The second contribution to insights into psychological perspectives is by Jamei et al. (contribution 11) in Australia. Their systematic review highlights the importance of including individual perceptions in both the evaluation and planning of sustainable transport systems. They concentrated on the concept of perceived accessibility and its function as a complement to conventional spatial accessibility measures. The authors systematically reviewed the concept and current understanding of perceived accessibility. Although the concept has been around since the 1970s [8], it is only in recent years that perceived accessibility has developed in both research and practice. Besides comparing perceived and conventional objective accessibility, their paper also reviewed methods used for evaluating perceived accessibility and highlighted the importance of these evaluations in order to determine “where efforts are working or failing to develop lessons for the sustainability agenda” (p. 18). Another insight from Jamei et al.’s (contribution 11) paper considers key influencing factors of perceived accessibility. Perceived safety and service quality have consistently emerged as important influencing factors of perceived accessibility, whereas regarding other factors, in particular sociodemographic attributes, the results are inconclusive. The authors conclude that more research is needed to establish reliable associations between sociodemographic attributes and perceived accessibility. Finally, the authors emphasize a major barrier to increasing perceptions of accessibility in terms of the incongruent understanding of the concept between policymakers and end-users. In order to overcome this, they propose that a clearer communication is necessary and that the users (and their perceptions) should be the core of sustainable transportation planning.
Another review whose findings stress on the importance of safety was conducted by Sundling and Jakobsson (contribution 12). This paper reviewed the literature pertaining to the importance of urban environments for short-term experiences and/or the long-term psychological health of pedestrians. By systematically reviewing 63 publications, the authors found a number of important micro-scale characteristics, which they then divided into themes: gray, green, blue, and white areas; weather; temporalities; topography; person factors; and safety. Their results show that the interaction between environmental characteristics and health appears to be different for different groups of individuals. Although perceived safety emerged as an important factor, safety appears to be even more important for women and older people, whereas men and younger people are affected by walkability and the distance to destinations to a greater extent. Based on the circumplex model of human affect [9]—which builds on negative and positive dimensions, and activation/deactivation—the authors further conclude that both positively activating and deactivating areas are necessary for an ideal urban environment, as long as these characteristics are perceived as positive. Negatively activating or deactivating environments can, on the other hand, be damaging to pedestrians’ psychological health. The authors’ main conclusion is that we should not ignore the psychological impacts of the environment on pedestrians, but rather preserve and multiply features which have a general positive impact on enhancing short-term experiences of walking and health.

Finally, the review by Dos Santos et al. (contribution 9) on commuters to industrial estates (introduced in the previous section) points out the necessity for companies to be encouraged to stimulate and promote behavioral change through researching their employees to find out their mobility behavior and the possible ways forward for a change to more sustainable modes, for instance, by addressing subjective norms in terms of social pressure within companies toward traveling in a more environmentally friendly manner, or by addressing habits and attitudes through behavioral incentives such as subsidies for more environmentally friendly modes, or by implementing healthy work routines and lifestyles for employees. The authors further emphasize the need for companies to “promote” more studies looking into factors that may have an effect on stimulating a modal change.

In summary, these four papers indicate that psychological perspectives are important to consider for both marginalized groups and the general population when it comes to barriers to and enablers for active travel behavior (public transport and walking). Although research on psychosocial factors has increased in recent years, it is evident that these influential factors are yet to be acknowledged, understood, and incorporated by practitioners and policymakers. It is critical to facilitate clearer communication around the meanings and potential benefits of including concepts like social norms, perceived accessibility, and health outcomes in sustainable urban planning and evaluation.

3. Conclusions and Recommendations

This collection of studies contributes valuable insights into the complex interplay of urban environments, transportation systems, planning policies, stakeholder involvement, and psychological factors in promoting sustainable urban mobility. The contributions explore diverse aspects of urban mobility: emphasizing the need for improved walkability, ease of cycling, and public transport in cities; addressing the impact of topography and urban sprawl on active travel; and identifying factors influencing individual mobility patterns. The papers underscore the crucial role of stakeholder involvement in sustainable urban planning, advocating for inclusive transportation systems, and emphasizing the importance of psychological perspectives in understanding barriers and enablers to public transport use and active travel. Overall, the findings stress the multidimensional nature of sustainable mobility, integrating infrastructure improvements and spatial planning, stakeholder engagement, and a nuanced understanding of psychological factors.

Based on the findings and suggestions in the papers included in this Special Issue, we conclude by suggesting a number of avenues for future research engagement:
• Further develop methodologies for incorporating geographical features such as topography and spatial settings into public transport planning, especially in hilly or steep areas, to enhance the accessibility and attractiveness of sustainable travel options.

• Conduct longitudinal studies to track changes in mobility behavior over time, considering the impact of evolving urban infrastructure, policies, and psychological factors on sustainable travel choices. In addition to the intervention by policies, infrastructure projects, and awareness raising campaigns, active travel can be influenced by weather and climate conditions.

• Develop inclusive models for stakeholder engagement in urban planning, particularly focusing on methodologies that enable the consideration of the needs of marginalized or vulnerable groups in the decision-making process.

• Investigate the long-term impact of specific company policies—such as promoting active modes, limiting parking space, or providing shared mobility options and relevant facilities such as changing rooms and shower rooms in the office—on supporting sustainable commuting behaviors among employees.

• Explore the relationship between perceived safety and various environmental design elements such as traffic lights and traffic speed limit, considering the psychological impact on different demographic groups, including women, older individuals, and younger populations.

• Conduct a comparative analysis of spatial accessibility models, incorporating different transportation modes and urban settings in different cultural contexts, to identify the most effective strategies for reducing car dependency and promoting sustainable travel.

• Evaluate the effectiveness of policy interventions aimed at improving pedestrian infrastructure, considering both macro and micro levels, and explore the long-term policy implications and concrete project opportunities for encouraging active travel.

• Investigate psychosocial factors influencing modal shifts in travel preferences, particularly focusing on the role of social support, positive emotions, and behavioral control in fostering acceptance of sustainable travel options.

• Investigate the intersection of spatial accessibility and social equity, considering how improvements in transportation infrastructure and the distribution of emerging mobility services can contribute to more equitable participation and accessibility for diverse demographic groups.

As a final note, we would like to underline that the contributions in this Special Issue highlight several important findings from research across the globe, as well as issues that need to be addressed in further research collaborations, which allows for guiding readers into new research on the discovered and suggested topics.

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List of Contributions:


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