The gender-data gap in e-micromobility research

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SUMMARY

There is a historic 'gender-data gap' in transportation research, which has led to a male-bias in the design, experience and development of the transport industry. Electric micromobility is still a relatively new mode of transportation which offers an opportunity to study the mode from a gender balanced perspective, preventing a gender data gap and reducing biases. A literature review was conducted to review the sampling of participants across 296 studies into e-micromobility. The findings suggest that the male-bias in data collection has persisted into this new domain. The impact that this has on this area will be considered alongside providing areas for future research.

KEYWORDS

Transportation, e-micromobility, gender-data gap, literature review

Introduction

The 'gender-data gap' refers to the lack of data on how females use, interact with and experience the world in contrast to males. This has led to a significant male bias across many domains, including transportation (e.g. Pooley, 2016). The extent of this bias is only beginning to be realised and overcoming it requires clear and balanced data sampling and research processes. This is an area where human factors can make a significant contribution (Parnell et al, 2024). As a relatively new mode of transportation, electric micromobility (e-micromobility) offers the opportunity to overcome previous biases evident in the development and integration of more established transport modes, to ensure they are inclusive and equitable. E-micromobility including electric bikes (e-bikes) electric scooters (e-scooters) offer personal forms of transport for short to medium distance trips, often in urban environments. They can provide an alternative to private vehicle trips, and they can enable better access to public transport. The aim of this work is to present a literature review of the studies that have captured human participant data on e-micromobility use to determine if a gender-data gap is present in the initial decade of research into e-micromobility. The focus of this review was on e-bikes and e-scooters. There are, however, questions on the safety and utility of these transport modes with respect to the efficacy of the broader road transport networks. This is particularly true of e-scooters which were rolled out as part of a government trial in the UK (and other countries globally) in 2020 which is now due to conclude in May 2026. This review therefore aims to provide a timely overview of how gender has been considered in the research that has been conducted to date.

Method

A literature review was conducted on Web of Science and Scopus to obtain articles that have been published on e-scooter and e-bike use involving human users. Web of Science was chosen due to the engineering and human factors basis of the review, however, when considering gender, more

social science-based papers may be evident using platforms, such as Scopus. The search terms entered into Scopus and Web of Science were as follows: ((ALL=(Electric)) AND ALL=(scooter OR bike OR micromobility)) AND ALL=(User OR Sample OR participant). A filter for papers in the last 10 years was also applied to capture recent work in this area.

A total of 668 results were returned in Web of Science and 570 in Scopus. These results were then reviewed and refined following the process documented in Moher et al., (2009). The titles and the abstracts of the papers returned from both platforms were initially reviewed against a set of inclusion/exclusion criteria. To be included within the review the paper must explicitly focus on e-scooters, e-bikes or both, papers that focused on electric mopeds, electric motorbikes, mobility scooters or electric vehicles were removed. Papers that did not clearly include a human participatory element were also removed, including literature review papers and theoretical based papers as well as those that focused on the energy supply and functionality of e-micromobility rather than their use by end-users. Papers that focused on car drivers' perspectives of e-micromobility users were also removed as the review was focused on user behaviour of e-micromobility. Full papers that could not be accessed or that were not written in English were also removed. Applying these criteria to the titles and abstracts led to 319 papers being excluded from Web of Science and 312 being removed from Scopus. After removing duplicates from the two platforms 416 papers remained for further review. When reviewing the full papers, the scope and methods of the paper became clearer which meant that a further 120 papers were excluded as they were not relevant to the purpose of this review. This led to a final 296 papers which were included within the review.

Preliminary Findings

The number of papers published in the field of e-micromobility has drastically increased in the last 4 years, with 67.57% (n=200) of the papers being published since the start of 2020. The number of females and males sampled within each paper was reviewed to determine how balanced the samples were. An equal sample was considered to be in the range of 45%-55% split of males to females. Table 1 shows that studies with a male majority were the most common across those studying e-bikes, e-scooters and those studying more than one type of modality. This suggests that there is more data on male use of e-micromobility, evidencing a gender-data gap. A full review of the findings related to gender and the source of this data gap are underway. Initial results suggest that there are some gender differences in emicromobility use (134 papers reported some influence of gender on their findings), yet the role that it plays is not yet clear as the findings were variable and sometimes conflicting. Reviewing the papers with respect to gender factors evidenced across other, more established, transport modes (Parnell et al, 2022) has identified key areas that e-micromobility research should focus on in order to review the broader gender implications of its use. For example, there is a lack of research into travelling with dependants using e-micromobility, the influence of time of day and the ergonomic design of shared platforms for different user types. There was also a lack of non-binary gender data, with only 25 studies collecting or reporting on gender categories other than males and females.

Table 1. Table showing the gender split of studies for each of the e-micromobility modes

Modality studied	**Sample composition**			
	Equal sample n(%)	**Male Majority n(%)**	**Female Majority n(%)**	**Unclear sample n(%)**
E-bike	22 (16.42)	57 (42.53)	26 (19.40)	29 (21.64)
E-scooter	10 (12.99)	45 (58.44)	6 (7.79)	16 (20.78)
Multiple	12 (14.11)	44 (51.76)	8 (9.41)	21 (24.71)
Total	**44 (14.38)**	**146 (49.32)**	**40 (13.51)**	**66 (22.30)**

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