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How can we close the gender data gap in Transportation Research?

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Abstract

This article is a call to action for Human Factors and Transport Researchers to create a fairer society, by closing the gender data gap. The need for gender equitable research outcomes is put forward, and practical steps to further this goal are provided to ensure gender is considered at all stages of the research lifecycle. The journey of a voluntary task force from a transport research group in the UK is described. Insights following a review of their own research practice is provided, describing the challenges to, and opportunities for, closing the gender data gap. The need for greater guidance and emphasis on equity within research teams is recognized, and examples of how researchers at different stages of their career can make a difference are provided.

Keywords: Gender Equity; Transportation Research; Research Design; Data Gap;

1 Introduction

Working in research is a privilege – the pursuit of new knowledge can lead to ground-breaking outcomes that have the potential to change the world. Human Factors Research puts the human experience at the heart of research outcomes, shaping the lives of people at individual, team, organisational and inter-organisational levels. Working in the Transportation Research Group (TRG) at the University of Southampton, our focus is to secure safe and sustainable transport system for the UK and the world. As an interdisciplinary team of Human Factors and Transport researchers, we understand how important it is to consider how technology interacts with users, operators, policy makers and structures in society. For our work to realise greatest positive impact, we recognise the need to truly understand those affected by the outcomes of our research. Inequalities in society are complex and manifold with the existing paradigm often maintained by structures and systems inherited from outdated historical views of roles in society. To achieve transport equity an analytical intersectional lens needs to be used on the sector as a whole (Hill Collins, 2009; Roll & Hubbard-Mattix, 2019). Research remits that serve the existing paradigm can maintain the status quo unless attention is paid to who is currently unserved. Central to this, is ensuring that the data we collect and the way we analyse it, properly represents and serves those who have traditionally been overlooked. One key area given little attention in transportation research is whether its outcomes are gender equitable, resulting in a gender data gap. Gender may be defined as a variety of socially constructed roles, behaviours and identities. It influences how people perceive themselves and each other and how they behave and interact with society. This differs from a concept of a person's sex that may be determined by an array of physical and biological factors. (Heidari et al.,2006). In this paper we will use the term ‘gender data gap’ rather than ‘sex and gender data gap’ although many examples relate to both social roles and physical and biological factors. Similarly for flow of the narrative, the terms ‘male and female’ or ‘men and women’ will be used throughout and reflect differences between ‘men/males and women/females’.

The gender data gap describes how women are historically and frequently under-represented in the data used in design, engineering, transport and research in general (Duchene, 2011; Temin & Roca, 2016; Criado-Perez, 2019; Small et al., 2020). This

matters because the global population has a roughly 50:50 split between males and females (United Nations, 2019), so the scale of the potential inequalities is considerable. Differences exist between males and females not only in their physical bodies but also between men and women in social norms and expectations. Therefore, data heavily biased towards men are likely to misrepresent the needs, and fail to capture insights and opportunities, specific to women. At best, this can inconvenience a woman going through a day in a world designed from male-biased data. At worst, designs, decisions and policy based on male biased data can result in risks to safety, health, serious injury and increased chance of death (Linder et al, 2011; Criado-Perez, 2019; O'Brien & Allen 2019; Forman et al., 2019). Ultimately, unless data is only being used to understand or serve the needs of a specific gender, gender-biased samples will be inadequate for its target audience, and less effective or potentially counter-productive at reaching the desired goals (Roberts, 2016; Curran et al, 2019).

But is it really that bad? We think it is. Currently in the UK, Europe and USA, safety ratings on cars are all derived using crash-test dummies based on male bodies. As such, women are 73% more likely to suffer serious injury and 17% more likely to be killed than men in a road traffic collision (Forman et al., 2019). Women also have a higher risk of Pulmonary Embolism after air travel, thought to be due to the compression from seats designed around the dimensions of men (Lapostolle et al., 2009). Urban transport infrastructure, has basically been made by men, for men and in the UK were primarily designed around the car (Tyers & Leonard, 2020). Research does not consider the reality of women's lives, who are more likely to walk or use public transport then men (Gill, 2018), and globally undertake 75% of unpaid care work (Criado-Perez,2019). Women are more likely to trip chain to fulfil domestic and caring roles but transport solutions do not focus on supporting these travel patterns. Equitable practice can benefit not just those under-represented but society in general. In Sweden, a change in priorities for snow clearing from roads to pavements, yielded major economic and productivity benefits, as the health cost relating to injuries from falls by (predominantly female) pedestrians dropped significantly (Criado-Perez,2019).

This article is a call to action for researchers to consider the gender data gap in their research practice and in doing so will enable us to develop a fairer and safer society for the future. It describes the journey of a voluntary task-force set up in our own research group to respond to that call, with the aim of encouraging other research groups to do the same.

2 What can we do to close the gender data gap?

Criado-Perez (2019) argues the seemingly simple answer to close the data gap is nothing more than good research practice. If the outcomes and recommendations of the research are going to apply to men and women, researchers should take a representative data sample of the target population and ensure the data are analysed accordingly. When writing and submitting research proposals, the research design should allow enough participants for the data to be split by gender to identify where differences exist. Data analysis and reporting should be split by gender to explore differences, even if not expected. Understanding where this is not a gender difference is just as important,

providing confidence that a 'one size fits all' solution is truly gender equitable. If research has not been split by gender, reports should caveat that more analysis is needed to understand potential gender effects. If you are using gender biased data, then report clearly that the results may not hold for other genders, so should be generalised with care. However, it takes more than just statistics, to meaningfully understand gender differences and truly close the gender data gap. Data that accurately reflect women's lives is also needed (Azcona & Valero, 2018). Whilst this article is focused on the gender data gap, the principles hold true for any underserved group. Collecting and analysing gender disaggregated data can be a first step in creating transport systems which effectively serve all members of their community (O'Brien & Allen, 2019).
Our reflections as a research group recognised that simple principles are not always simple to put into practice. Without understanding its importance, and when under time pressure, gender balancing can be seen as a 'nice to have' rather than a 'must have' and be neglected when participant recruitment gets difficult. The focus becomes skewed towards 'getting things finished and quota sampling (e.g. a 50/50 split between men and women) can turn into convenience sampling (anyone meeting the basic inclusion criteria). In some industries, it can be challenging to recruit female participants; TRG conducts research in aviation, automotive, rail and maritime domains, which are heavily male dominated (EESC, 2015). This affords limited access to women when conducting research based on job roles. For this kind of barrier, extra time to achieve gender-balanced data samples and analysis accounting for gender (as well as the core research focus), is just not factored into research proposals or even considered necessary by research facilitators in the industries under investigation. Gaining funding is highly competitive creating pressure to offer a clear message and an attractive return on investment proposition. The historic nature of the gender data gap means there often is insufficient supporting evidence to argue that addressing gender is an essential research characteristic (Temin & Roca, 2016; Criado-Perez, 2019). Many research projects, particularly in transportation, are with industry or government partners. Stakeholders are often co-funding research linked to shorter term strategic goals. In male dominated industries, to serve the needs of a predominately male work force, with male biased data, could be defended as a pragmatic use of hard-won and scarcely available funding. Even as a female researcher, it can be difficult to see the bias of the culture you are part of. In the Engineering and Transport domains, senior management and decision-makers are predominantly male (Blickenstaff, 2006; Strachan et al, 2018). This can lead to the research lifecycle being driven by a perspective that may not reflect the values of a diverse society. Whilst researchers of all genders may be committed to fair research outcomes, gender might not be prioritised because they hold a perspective that fits the norm of their environment. Ultimately, first-hand experience of how gender may affect research focus or design, will be lacking without greater representation of women at senior levels (Blickenstaff, 2006). Diversity in the work force is a complex topic that needs addressing and will take time, however it is possible to take action now to close the gender data gap so transport research outcomes foster social change by serving the intended audience, rather than the existing audience.

3 What are we doing about it?

Nine TRG researchers (including, PhD students, Research Technicians, Research Fellows and Academics) got together to work out how we could make a difference in

our corner of the world. One of our first activities was to review our own research practice to better understand the challenges and opportunities to close the gender data gap, and make women visible in transport research. Our group has greater than the typical 12.37% representation found in this domain (Neave et al., 2018) resulting in women typically being involved at the research proposal stage (though the Principal Investigator was male on all but one of the projects we reviewed).

We found the priority assigned to collecting gender-balanced data varied by the project's focus. Those relating to road safety (e.g. automated driving, cycling and pedestrian safety), had a greater focus on the individual and, in one project, a mandate to be inclusive, so balanced data samples were more typical. This may partly be because the diversity of road users is easier to picture. For projects relating to team performance in male-dominated industries (such as maritime and aviation), we found it more challenging to achieve gender-balanced samples due to lack of access to females, and greater difficulties for female participation due to childcare responsibilities. Sometimes, the physical design of studies, using standardised equipment, was a barrier to recruiting females. One study with a height minimum effectively prevented participation of willing women for safety reasons but had minimal impact on recruiting naturally taller men.

When reporting data we found that the type of analysis seemed to prompt different consideration of gender. For traditional statistical analysis of data, recognition of unbalanced samples was frequently reported well as a limitation of the study. However, where analysis was split by gender but no significant differences found, this was reported but rarely emphasised in the conclusion as journal papers tend to favour research outcomes that focus on significant differences. Highlighting these 'null results' would promote genuine one size fits all opportunities. For qualitative analysis dealing with smaller samples or using a case study approach, and with analyses that modelled data at a team level, the way research insights were described differed considerably. Some focused on themes, others on team performance, or team roles (rather than individuals). How best to report potential gender bias was not clear and as a result was usually not considered.

We went on to consider one simple action we could do within our own research practice to help close the gender data gap. At the proposal stage these included making a commitment to ask for enough money and resources to collect and analyse data by gender, as well as actively writing proposals focused on closing the gender data gap in transportation. At the data collection stage, a positive outcome of the COVID restrictions created opportunities to improve gender balance. For example, online data collection activities and greater flexibility in work hours due to mandated working from home, made it easier for females to participate. Accounting for this type of flexibility into future data collection design could improve gender balanced data from male dominated domains. In data analysis, a female researcher who had used the participant observation method (where data is collected on your own experience), was prompted to recognise that her conclusions would need to be checked to see if they also held for men. For reporting qualitative data, a commitment was made to actively discuss how applicable the results were for men and women by considering key gender differences in the domain.

We recognised that one reason gender equity was not prioritised, was due to a lack of prompts and guidance within our internal systems and standard research practice. Using the Sex and Gender Equity in Research (SAGAR) guidelines (Heidari, Babor, De

Castro, Tort, & Curno, 2016) as our foundation, we aimed to construct research guidelines to inform the inclusion of gender within our transportation research. They provide a clear and useful process diagram outlining where to consider gender within the write-up and publication of research, but do not address the early stages of research conception. Their initial question, 'Are sex and gender relevant to the topic of study?', triggered our own questions; 'how do we know if it is relevant or not?', 'when is it not relevant', 'how do we justify it not being relevant'. Additionally, the 'EU gender in research toolkit' sets out a checklist for including gender from the initial research idea phase through the proposal, research and dissemination phases (Yellow Window, 2018a). Their review of gender relevance within transportation research highlighted key gender related factors; Family and Community Roles, Labour Market, Perceived Safety, Ergonometric Standards, User Behaviour and Urban structures. We are currently using these high-level factors to understand how the various features of different transport modes in our research group relate to gender differences. For example, concerning the 'Labour Market', women are more likely to work part time jobs (Devine & Foley, 2020) and commute shorter distances (Department for Transport, 2020). Therefore peak travel hours with increased travel options and the peak/off peak prices may not apply to them so readily. The 'Perceived Safety' of different transport modes differs across genders, with women feeling less safe using public transport at night (Lynch & Atkins, 1988). The consideration of ergonometric standards in relation to the height and placement of handrails on buses is another more physical example. We are finding these factors offer real value in helping us reflect on the 'gender dimension' in different domains. Our aim is to develop a taxonomy that can be used by researchers to identify gender relevance from the conception of their research and account for it throughout the research process.

4 How can I make a difference in my own research group?

It is clear there are many challenges without straightforward solutions, but whatever stage of research you are involved in and at every level of your career, you can make a difference. As a PhD student, you can consider gender from the outset of your research. As a Research Technician or Research Fellow, you can be a champion for equitable data collection, analysis, and reporting. As a Supervisor, Lecturer or Professor you can role model and create a culture where gender is considered at every stage of the research process. By actively considering and taking steps to close the data gap, you are contributing to evidence that will start to make the case for gendered analysis, for decades to come. This in turn will help designers, engineers and policy makers create a world where both women and men can thrive. We urge researchers to create a new standard within their own research groups, but also to have the courage to promote gendered data analysis to research produced by others, in their own team, during meetings, and at conferences. The small steps we all take now to consider the impact on all under-represented groups, will compound to create a fairer world for everyone.

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