Leverhulme Doctoral Scholarships Programme for Interdisciplinary Resilience Studies (PIRS)

University of Southampton

RECRUITMENT CYCLE for studentships starting: October 2025 (Cohort 2)

SUPERVISORY TEAM

Primary Supervisor	Dr. Dawn-Marie Walker
School & Faculty:	Health Sciences, FELS
Email:	Dawn-marie.walker@soton.ac.uk
Co-Supervisor	Dr. Edilson Arruda
School & Faculty:	Southampton Business School, FoSS
Email:	e.f.arruda@southampton.ac.uk

STUDENTSHIP PROJECT TITLE

Reviewing Impacts of Demographics and E-scooters on Health and the Environment (RIDE).

OVERVIEW

E-scooters pose a significant public health risk and may increase health inequalities. This study will critically evaluate e-scooter usage, linking user data with health, environmental, demographic, and economic factors. Synthesising qualitative insights and quantitative models, it aims to contrast user patterns with industry claims, mapping e-scooter hubs against deprivation indices.

SUMMARY

This project will provide a comprehensive evaluation of e-scooter usage, critically examining its impacts on health, the environment, and equity. Employing diverse methods, this research aims to determine the true benefits and harms of e-scooter use beyond industry claims.

The interdisciplinary approach integrates expertise in transport systems, public health, health inequalities, urban planning, and operational research. Supervised by experts

embedded in the Centre for Operational Research, Management Science and Information Systems (CORMSIS), and Health Sciences, the student will gain experience across these disciplines. The student will also be supported to collaborate with stakeholders in the local authorities to ensure practical co-designed solutions.

Methods

- Data-Driven Insights: Data-Driven Insights: Mapping e-scooter hub locations against demographic and deprivation indices to assess deployment strategies' influence on use and health inequalities.
- Operational Research Modelling: Co-develop tools for better resource allocation and planning, addressing logistical constraints, mitigating negative impacts, promoting sustainable travel, and evaluating carbon footprints.
- Health Impact Analysis: Evaluate e-scooter's role in reducing physical activity and exacerbating health disparities, particularly in vulnerable populations, through utilising public health data, ethnographic and qualitative methods to explore user motivations, perceptions of health and environmental impacts, and socio-economic links to e-scooter adoption.

Impact

The findings will be of significant interest to stakeholders interested in urban mobility, health equity, and sustainability. By offering a critical evaluation of e-scooter systems, this project has the potential to inform policies and reshape micro-mobility integration in urban environments, fostering more equitable, healthy, sustainable, and resilient systems.

PROJECT CONCEPT

An electric scooter (e-scooter) is a powered vehicle designed to accommodate one person. Riders must have a driving licence. Insurance is provided by the rental companies, and scooters have a maximum speed 15.5 mph [1]. It is currently illegal to ride a private e-scooter on public land, only rented e-scooters can be used on roads, and cycle lanes (not pavements). In 2020, the Department for Transport introduced regulations for local authorities to provide rental scooters "To support a 'green' restart of local travel and help mitigate reduced public transport capacity…" 22 local authorities applied to take part in the trial, and through procurement, obtained an e-scooter operator [2]. However, although e-scooters produce zero emissions when being ridden, there is a carbon footprint through their manufacture, provider's vehicle for e-scooter collection and re-distribution, charging, and disposing old batteries and scooters which results in a negative environmental impact 26% higher per passenger mile than that of a car or bus [3]. In addition, the net environmental impact of e-scooters might be negative as they tend to replace active travel [1].

As e-scooters do not rely on the rider's energy, they are not regarded as active travel, and therefore may also have a negative impact on health [1]. Solent Transport reports that Southampton had 1,500 scooters in 2023, with 200 parking hubs. Riders were 2/3

male, and 70% were under 35. The average trip distance was 3.4 km (i.e. a 35-minute walk). They argued that scooters replaced 37% of car/taxi rides. However, of the remainder of the trips, 44% replaced walking, 9% cycling, i.e. 53% active travel, and 17% public transport [4]. A US study looked at e-scooter usage and physical activity. They found that users spent 82% of their ride in none/light activity, compared to walking where 43% of the time was moderate. Furthermore, they found the average trip was 1.6km and found no statistical difference in the length of trip between e-scooter, walking or cycling. Unsurprisingly, those without access to a car were more active when scooters were removed [5].

The Department of Transport surveyed e-scooter users [1]. When asked what mode of travel riders would have used instead of their last e-scooter trip, 40% said walking. With over half of the e-scooter journeys replacing walking or cycling, their use led to a reduction in physical exercise which has a consequential negative health impact. Furthermore, although car ownership was not asked, users on low incomes (< £21,000 pa) were more likely to report being regular users (26%), compared to 15% of those earning > £41,000 pa [1]. Due to logistics and economics, e-scooter companies concentrate distribution in denser, more walkable and bikeable areas with higher potential demand [5]. However, in the UK it is densified in areas with higher levels of deprivation [4], which are usually ethnically diverse. They found that ethnic minority groups (27%) were more likely to report being regular users of e-scooters compared to white users (17%). Additionally, user rates of 27% are significantly higher than the 12% currently from ethnic minority groups. Furthermore, given that the data shows that e-scooters are primarily replacing walking, we can hypothesise that e-scooters contributes to further increasing health inequalities.

Aim

To provide a comprehensive evaluation of the use of e-scooters, including surveys to evaluate the usage and perception of e-scooter riders in connection with health and the environment, as well as the links between usage and demographic and economic factors. These will be contrasted with the marketing of scooter companies and will give a critical evaluation of e-scooter usage, and its impact on health and the environment.

Objectives

1. Assess the environmental impact of e-scooter systems.
2. Evaluate health implications, focusing on physical activity and health disparities.
3. Examine demographic and economic factors influencing e-scooter use.
4. Compare user behaviour and perceptions against industry marketing claims.
5. Develop recommendations for equitable, healthy, and sustainable e-scooter policies.

Methods

The project will focus on the complex interaction between health and environmental issues, whereby the empirical findings will be underpinned to a comprehensive literature review.

To provide a more comprehensive evaluation, we will use quantitative modelling and geo-referenced maps to overlay scooter stations with demographic maps and deprivation indices. This approach will accurately estimate the effect of e-scooters on health and the environment, as well as its contribution to health inequalities. Additionally, we will develop a modelling framework to evaluate and mitigate the negative impact of e-scooter usage in active travel models, to help us develop strategies towards more sustainable e-scooter travel. For example, revise the locations of e-scooter stations to increase the amount of walking by increasing the space between stations.

The project is highly interdisciplinary. The quantitative component, led by Edilson, includes developing operational research models for resource allocation and planning whilst considering logistical constraints. It includes interacting with stakeholders (users and local authorities) to explore incentives and barriers for use, collect feedback and co-design a modelling approach that addresses their needs and concerns to produce a comprehensive evaluation of the logistics and practical issues concerning e-scooter planning in an urban area. The qualitative component led by Dawn-Marie, will involve interviews, ethnography, and surveys to evaluate the perceptions of e-scooter users to ensure that results are equitable, person centred, and will not compound health inequality.

Wider Implications

This project has significant implications for urban, health, and environmental policies:
• Policy Development: Evidence-based recommendations will inform regulations, ensuring e-scooters contribute positively to urban sustainability.
• Health Equity: Insights will enable targeted interventions to reduce disparities in health outcomes linked to e-scooter usage.
• Sustainability: Understanding lifecycle impacts will improve e-scooters' environmental efficiency.
• Urban Planning: Findings will ensure that the integration of e-scooters into urban environments, are balanced with sustainability, health, and accessibility.

Impact

Although e-scooters are common in our cities, and recommended by government, there has been no research that provides a balanced and critical perspective on their role in cities, in terms of our environment, and health. The outcomes will benefit policymakers, stakeholders, and communities by fostering more sustainable, equitable, and health-promoting micro-mobility strategies.

Please explain how this project represents a contribution to interdisciplinary resilience studies.

This project embodies interdisciplinary research by integrating transport systems, public health, operational research, and urban planning to evaluate the multifaceted impacts of e-scooter usage. Resilience studies emphasize understanding and enhancing systems' capacity to adapt and thrive amidst challenges. This research directly addresses these principles through its focus on urban mobility, health equity, and environmental sustainability.

By overlaying e-scooter hub data with demographic and deprivation indices, the project identifies vulnerabilities in urban systems and evaluates how deployment strategies can mitigate or exacerbate inequities. The integration of public health and ethnographic methods assesses e-scooters' influence on physical activity and health disparities, ensuring that human-centered considerations inform technical and policy solutions. Operational research modelling provides quantitative tools to optimize resource allocation and minimize environmental impacts, directly supporting resilient urban infrastructure planning.

Collaboration with stakeholders, including local authorities and communities, fosters co-designed, practical solutions that are context-specific and adaptable. This approach ensures the research not only critiques existing systems but also contributes actionable recommendations to enhance sustainability, equity, and accessibility in micro-mobility systems.

The interdisciplinary nature of this project bridges theoretical and applied resilience studies, providing insights relevant to diverse fields. By addressing the interconnected challenges of health, environment, and equity, this research advances the broader resilience agenda, equipping policymakers and urban planners with evidence-based strategies to navigate the complexities of modern urban mobility systems.

Please list and describe any specific/additional technical training or support to undertake and successfully deliver this project. *Note that students recruited into this programme will undertake a bespoke training curriculum. Students and their supervisory teams will also identify generic skills gaps to address through training courses offered by the University's Doctoral College.*

None required. All expertise is provided by supervisors.

References

1. Department of Transport, National evaluation of e-scooter trials report. 2022.
2. Department of Transport, E-scooter trials: guidance for local authorities and rental operators. 2024.

3. Hollingsworth, J., et al., Are e-scooters polluters? The environmental impacts of shared dockless electric scooters. Environ. Res. Lett. , 2019. 14(8).
4. Solent Transport, E-Scooter Trial Factsheet. 2022.
5. Sanders, R.L., et al., Insights from a pilot investigating the impacts of shared E-scooter use on physical activity using a single-case design methodology. Journal of Transport & Health, 2022. 25: p. 101379.