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Expectations, impacts, and contradictions of e-scooters from a social exclusion perspective: Reflections from London's rental trial

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ABSTRACT

There are few attempts at introducing new personal transport technologies have made as much noise as the relatively recent appearance of electric scooters (e-scooters) in cities as an on-demand shared mobility service supported by digital platforms. In London, United Kingdom, urban pilots for shared e-scooter services have been met with significant disruptions stemming from issues that range from the pandemic to regulatory uncertainty, recent political shifts, and slow legislative processes. This paper seeks to address gaps in reliable evidence about e-scooters' positive and negative contributions to social and environmental development goals using a qualitative approach grounded in a framework of transport-related social exclusion. The framework comprises of eight dimensions linked with usage of new modes of personal transport technologies: 1) geographic, 2) spatial, 3) from facilities, 4) economics, 5) time-based, 6) physical, 7) fear-based, and 8) discrimination. The paper builds on semi-structured interviews with 27 stakeholders representing diverse organisations in the public, private, and third sectors, and an online survey with over 1000 respondents, including users and non-users of private and shared e-scooters. We interrogate the practices, experiences, and expectations of stakeholders within London's, as well as the United Kingdom's urban micro-mobility landscape. The paper expands on current research efforts that are concerned almost exclusively with the environmental, road traffic safety, and reductionist interpretations of 'inclusion' and 'accessibility', adding depth and nuance to discussions on intersectionality, deprivation, as well as social and cultural values in the planning of on-demand shared mobility services.

1. Introduction

Urban transport ecosystems have remained relatively unchanged since the invention of cars, with little shift in the available modes of transport until the last decade. Consequently, few attempts at introducing new personal transport technologies have generated as much noise as the relatively recent appearance of electric scooters (e-scooters) in cities as an on-demand shared mobility service supported by digital platforms (Knight, 2024; Mao, 2024; Schofield, 2023; Wallgren et al., 2023). The government of United Kingdom (UK) adopted a test-measure-decide policy stance to learn from policy and planning experiences of governments elsewhere; 31 local authorities across England[1] were selected to developed pilots for a diverse series of testbed case studies in order to examine the impacts of different governance, operational, and physical designs on shared e-scooter services (DfT, 2020b). The e-scooter rental trial period ran from July 2020 to November 2021 initially, and was extend for an additional year due to COVID-19 lockdowns and disrupted travel patterns (DfT and Active Travel England, 2024). The trial period was subsequently extended for three more times until May 2026 (*ibid.*). The Department for Transport (DfT) updated its guidance to local authorities in February 2022 to enhance safety measures and has justified the trial extensions on the basis of collecting relevant evidence on usage, safety, environmental impacts and post-pandemic travel patterns, as well as further analyses of embedding e-scooter in British public life (*ibid.*).

E-scooters continue to fall within the statutory definition of a 'motor vehicle', which according to the *Road Traffic Regulation Act 1984* (London Regional Transport Act, 1984) and *Road Traffic Act 1988* (Road Traffic Act, 1988), is "any mechanically propelled vehicle intended or adapted for use on roads" (CPS, 2020). Specifically, given their weight and low speed, e-scooters abide by the same road traffic legislation as motorcycles and mopeds (Brader et al., 2022). E-scooters users are required to hold a full or provisional UK driving licence for categories AM, A or B (which includes entitlement for category Q); a valid full

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[1] The UK comprises of England, Wales, Scotland, and Northern Ireland. All e-scooter rental trials were conducted in English cities and towns.

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licence from a European Union (EU) or European Economic Area (EEA) country; or a valid full licence from another country that entitles them to drive a small vehicle and that they entered the UK within the last 12 months (DfT, 2020b). More importantly, the *Electric Scooter Trials and Traffic Signs (Coronavirus) Regulations and General Directions 2020*, which came into force on 4 July 2020, allowed the usage of shared e-scooters on roads (excluding motorways) and cycle lanes within trial areas (Brader et al., 2022). Shared e-scooters are banned on footways/pavements (*ibid.*). The legal use of private e-scooters is limited to private land, subjected to landowner's permission (*ibid.*). It is estimated that there are 750,000 private e-scooters in use in the UK (Hooker, 2023). Such ban of private e-scooters on public roads and cycle lanes within and beyond official rental trial areas (even though the police and other bodies are unable to fully implement and enforce it), illustrates a quagmire of regulatory uncertainty, slow pace of legislative changes, and rapidly shifting political and public perceptions on the usage of micro-mobility devices, as well as on-demand shared mobility services supported by digital platforms.

Against this backdrop, it comes as no surprise that organisations concerned with urban micro-mobility are calling for reliable evidence about e-scooters' positive and negative contributions to social and environmental development goals (DfT and Active Travel England, 2024). While shared e-scooter trials are being monitored and evaluated in the UK and beyond, with private operators collecting data simultaneously, the evidence and analyses are largely unavailable to the public, limiting the ability of public, private, and third sector actors from determining the effectiveness of local and national policies (Zhang et al., 2024). This also stymies the advancement of comparative policy and regulatory knowledge. Among the most obvious gaps in UK-based literature are evidence on: 1) whether this new type of vehicles and its associated shared mobility services are potential drivers of social (dis) advantages and ex/inclusion, 2) how shared and private e-scooter users' profiles, preferences, and behaviours differ, and 3) how vulnerable groups are affected or perceive the effects of e-scooters on the roads and in public space.

This paper addresses the aforementioned knowledge gaps using a qualitative approach grounded in a framework of transport-related social exclusion (TRSE). The paper builds on semi-structured interviews with 27 stakeholders representing diverse organisations in the public, private, and third sectors, and an online survey with over 1000 respondents, including users and non-users of private and shared e-scooters. We interrogate the practices, experiences, and expectations of stakeholders within London's, as well as the UK's urban micro-mobility landscape through eight dimensions of TRSE that are linked with usage of new modes of personal transport technologies: 1) geographic, 2) spatial, 3) from facilities, 4) economics, 5) time-based, 6) physical, 7) fear-based, and 8) discrimination. The framework departs from the paradigmatic proposal put forward by Church et al. (2000) for the case of London, expanding interpretation of each dimension of TRSE, as well as associated concerns relevant to on-demand mobility and digital/-platform technologies. This study also stands as a counterpoint to current research efforts which are concerned almost exclusively with the environmental impacts of shared e-scooters (de Bortoli and Christoforou, 2020; Echeverría-Su et al., 2023; Gebhardt et al., 2022; Hollingsworth et al., 2019; Moreau et al., 2020); mode substitution in local urban contexts (Gebhardt et al., 2021; Guo and Zhang, 2021; Kazemzadeh and Sprei, 2024; Lee et al., 2021); emerging patterns of e-scooter-related injuries (Bodansky et al., 2022; Singh et al., 2022; Uluk et al., 2022); user satisfaction (Aman et al., 2021a; Askari et al., 2024; Kang et al., 2024; Nikiforiadis et al., 2024); distribution of public space (Bai and Jiao, 2024; Gibson et al., 2022; Tuncer et al., 2020; Zakhem and Smith-Colin, 2021); and reductionist debates about 'inclusion' and 'accessibility', that often overlook discussions on intersectionality, equity, and social and cultural values (Abouelela et al., 2024; Aman et al., 2021b; Frias-Martinez et al., 2021). This paper's arguments align with and expand on current policy concerns and agendas. For example, at the national level, policy paper such as *Future of Mobility: Urban Strategy* (DfT, 2019), as well as guidance *Decarbonising Transport: A Better, Greener Britain* (DfT, 2021a) and *Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure* (DfT, 2022a) seek to facilitate sustainable and inclusive modes of transport to change the way people commute. Similarly, at the urban level, the *Mayor's Transport Strategy* (GLA, 2018, p. 8) sets out policies and proposals using the Healthy Streets Approach to reshape London's transport and planning over the next two decades with the "bold aim for 80 % of all trips in London to be made on foot, by cycle or using public transport by 2041". While these policy strategies are firmly grounded in decarbonisation objectives, urban mobility visions for the future have an implicit critical distributional dimension, requiring targeted evidence-based discussions about the perceived and measurable effects of e-scooters for different social groups. Such discussion can contribute to the definition of private and shared e-scooters' place in future transport plans in London and other cities and towns across the UK.

The following section provides an overview of the literature of the different dimensions of TRSE and its relevance to existing research on e-scooter. The UK and London's micro-mobility landscape is introduced in Section 3. This is followed by methods in Section 4, and the findings and discussions are presented in Sections 5 and 6 respectively. The paper concludes with Section 7, which also covers methodological limitations and avenues for future research.

2. Literature review: TRSE and e-scooters

More than two decades ago, whilst analysing London's transport system, Church et al. (2000) proposed a theoretical framework for TRSE, outlining seven dimensions found in cities: 1) economic, 2) physical, 3) geographic, 4) time-based, 5) fear-based, 6) spatial, and 7) from facilities. Even though Church's framework remains relevant today, much must be re-assessed. Recent behavioural, technological, and policy changes call for interpreting TRSE dimensions that match the idiosyncrasies of digital and shared micro-mobility alternatives such as e-scooters. This literature review contributes to that effort by proposing an eighth dimension of TRSE — discrimination-based exclusion — while maintaining the analytical breadth of the original framework as much as possible.

Transport investments are critical in boosting economic and social activities in the city (Bastiaanssen et al., 2020). When individuals and social groups do not have sufficient access to employment, education, healthcare, goods, essential services, as well as cultural, leisure, and religious activities, either real or perceived, they may experience challenges participating in society, which in turn, can lead to social isolation and exclusion (Lucas, 2004, 2012).That said, this is context specific. A car-owning retired couple living in a small village might be less impacted by TRSE than young professionals living in fringes of the city, with the latter being prevented from enjoying social and economic activities that are geographically concentrated in the city centre due to the lack of public transport. In Lucas' (2019) review paper, the studies conducted by the Social Exclusion Unit (SEU)[2] between 1997 and 2006, were identified as highly influential in the development of TRSE literature in the UK. The research on TRSE not only established the link between social disadvantages and transport inequalities in UK and across Europe, Sub-Saharan Africa, and Latin America, but it also, through adopting an intersectional approach, identified how some vulnerable and disadvantaged social groups might be impacted by TRSE to a greater extent in terms of less(er) access to social and economic opportunities, which in turn, impacts their health and well-being significantly (Castro et al., 2022; Dharmowijoyo et al., 2020; Haseeb and Mitra, 2023; Luz and Portugal, 2022; Montoya-Robledo and

[2] The SEU was established by the New Labour government in 1997 to drive policy analysis and strategic actions to address social exclusion.

Escovar-Álvarez, 2020). Nevertheless, Yigitcanlar et al. (2019) argued the need for a generalised list of dimensions and indicators for the ideas of TRSE introduced by SEU to be more applicable in different contexts.

The principle of social equity and geographical accessibility have long guided the TRSE research agenda since its conception (Button and Nijkamp, 1997). Within the UK context, accessibility, along with mobility, has been rigorously studied to determine the day-to-day issues facing disadvantaged individuals and social groups. Preston and Rajé (2007) identified an interplay of factors — geographical location, daily needs, and socio-economic characteristics — impact the livelihood of disadvantaged individuals and social groups disproportionately, which may change according to life stages, but have long been analysed separately in research and policy. The early research on TRSE laid foundation for intersectional approach to examine social exclusion in the UK, with many insights remaining relevant for policy and planning today (Lucas, 2019). The TRSE literature has, however, remained largely silent on how new transport technologies and policy innovations will impact social equity and accessibility in urban areas experiencing demographic and spatial changes (*ibid.*). Specifically, what micro-mobility, and in the context of this paper, e-scooters, will bring to society within the context of TRSE. Do micro-mobility and on-demand shared mobility services engender more opportunities for inclusion or exacerbate existing patterns of social exclusion? Are the legislative changes coherent with transport and planning goals? How are attitudes of users and non-users shifting throughout the lengthy process of embedding e-scooters into public life? Such key questions make it difficult for researchers, planners, and policymakers to disregard discussions on e-scooters from a TRSE perspective (Fig. 1).

Geographical exclusion is significant when it comes to micro-mobility vehicles, and it is closely associated with their coverage across the city. Bozzi and Aguilera (2021), for instance, noted that e-scooters are used in downtown areas and universities. When analysing the context of Texas, Aman et al. (2021a) also found that, despite a growth in the number of micro-mobility vehicles in the city, most of the population (80 %) still had little access to them. This is because bikes and e-scooters tend to be more present in central areas, and in this city, this relates to the location of the campus and the targeting of the youth.

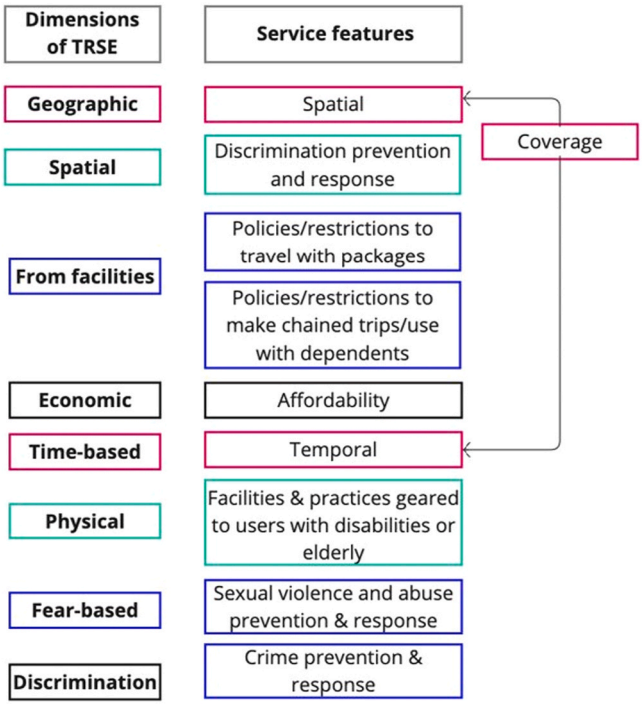

Fig. 1. Eight dimensions of TRSE (Source: Own elaboration).

They also highlighted that in these areas there is less racial/ethnic diversity, since minorities tend to be housed in peripheral territories. Yet, while black residents have less access to both bikes and e-scooters in the region, Asians have a slightly better degree of accessibility. Furthermore, e-scooters are also a popular mode of transport among tourists. The concentration of tourists can therefore impact the availability of e-scooters and other shared personal mobility devices at popular destinations. Maas et al. (2021), based on an analysis of shared bicycles, concluded that service providers should target tourists as they have the highest likelihood of using new and innovative modes of transport for short trips across the city. In turn, with proper maintenance of the shared mobility infrastructure and collaboration with local businesses and institutions to enhance coverage, service quality, and subscription policies, more e-scooter bays can then spread across the city (*ibid.*)

When considering e-scooters from the TRSE perspective, the **spatial dimension** includes discussions about parking, quality of public roads and cycle lanes, and coverage of charging docks, which influence mode preference and spatio-temporal usage patterns. Sanders et al. (2020) found that users of e-scooters, including potential users, were constantly concerned with the fact that there is not enough space to ride safely. Reck and Axhausen (2021) and Reck et al. (2022) identified several factors crucial to the choice and usage of e-scooters, including road precipitation, elevation, wind speed, and access distance. The introduction and consolidation of vehicle technologies also require infrastructural improvements before potential users are actually presented with more micro-mobility options (Fazio et al., 2021). Bozzi and Aguilera (2021), on the other hand, argued that when e-scooters are introduced into the city's transport system, the infrastructural improvements necessary for fleet rollout have the potential to positively impact the pedestrian and cycling infrastructure too. The DfT (2020a), (2021b) published two reports on public attitudes and perceptions of e-scooter use and found the most common physical barriers/spatial obstacles to include potholes, discontinuous and narrow cycle lanes, forcing users to ride them on pavements (which is prohibited under current laws) and presenting additional safety risk to pedestrians. While older adults and persons with disabilities may benefit from e-scooter use, albeit modified with assistive technologies, they may continue to find physical barriers in the built environment that are challenging to overcome. For instance, Pettersson et al. (2016) reported 29 % of older research participants experiencing physical barriers and spatial obstacles in their day-to-day e-scooter use. Boglietti et al. (2021) noted that micro-mobility devices themselves can become spatial obstacles and contribute to the competition for public space in the city, disproportionately blocking persons with disabilities from access.

There are few studies that have paid particular attention to **exclusion from facilities** when analysing the introduction of e-scooters. Sanders et al. (2020) found young adult users of e-scooters experienced difficulties in transporting others and carrying packages whilst riding the vehicle, and such practical barriers that made them less prone to use e-scooters. Campisi et al. (2021) noted that gendered norms on fashion and divisions of reproductive labour in the household may lead rise to physical restrictions, excluding women and gender minorities from e-scooter infrastructure. An earlier study by Pettersson et al. (2016), however, argued that the use of micro-mobility devices and on-demand shared mobility services may increase individuals' ability to perform daily activities, especially when inclusive design is adapted. Aarhaug et al. (2023) examined the relationship between e-scooters and public transport in Norway and found that e-scooters tend to fill in the gaps in the transport system and offer services on routes that were not previously well catered for. Additionally, 20 % of the trips examined were made integrating e-scooters with public transport modes (*ibid.*). The limited research on the subject matter suggest that e-scooter have the potential to increase individuals' ability to participate in social and economic activities and access essential services and facilities if the transport system and policies are well-integrated and inclusive to the diverse mobility needs of different groups of users.

The **economic dimension** encompasses the extent to which shared e-scooters are affordable and whether they can increase localised access to employment, education, and other livelihood opportunities. Shared e-scooters are a preferred mode of micro-mobility for highly educated urban residents (Christoforou et al., 2021), although their preference of riding such vehicles is centred around leisure purposes and not economic ones (Bozzi and Aguilera, 2021). For Scholl et al. (2022), shared e-scooters are currently unaffordable for low-income individuals unless their pricing structure and physical integration into the city's transport infrastructure are enhanced to improve the first- and last-mile experiences of vulnerable and disadvantage social groups. The Economist (2022) reported promising results for the e-scooter rental trials in Southern England: residents who substituted private vehicle trips with shared e-scooter optimise their expenses up to four times compared to when they were to make the same trip by taxi. According to Abouelela et al. (2024), policymakers should reconsider the economic exclusion of residents and develop incentives to encourage the development of new business models to attract new users and shift the broader transport strategy away from the dominant car culture.

As for **time-based exclusion**, proponents of e-scooters rely on a straightforward narrative of micro-mobility as mode substitution for walking. Bozzi and Aguilera (2021) noted that e-scooters are particularly useful in urban areas as they cover trips that are too short for motorised transport and too long for walking. Further, the trips made on e-scooters peaked in afternoons and weekends, indicating that they are mostly used for leisure purposes (*ibid.*). Boglietti et al. (2021) found that existing research indicated the usefulness of e-scooters for shorter trips that averaged 1.2–2.7 km or 10–16 minutes. This was later corroborated by Nikiforiadis et al. (2023) in the study of students' perceptions towards e-scooters where e-scooters are preferred only when the travel time by other alternatives is much longer. Such nuance insights disrupt the straightforward narrative surrounding micro-mobility. The temporal dimension of e-scooter use is also influenced by weather. Noland (2021) found e-scooter use to be less impacted by bad weather than other modes of micro-mobility such as electric pedal assisted bicycles. Kimpton et al. (2022) found that 32 % of e-scooters trips occurred under wet weather conditions compared to 28 % of bicycle trips as e-scooter users can wear more protective all-weather clothing without limiting their ability and comfort in pedalling. Nonetheless, the prevalence of using micro-mobility devices is significantly influenced by established cultural and social norms pertaining to commuting and engaging in outdoor activities during rainy conditions (*ibid.*).

There is some degree of competition between micro-mobility and active travel modes, each with implications for public health and well-being. For instance, a study in Tempe, Arizona, collected surveys from university staff and found that 25 % of e-scooter users would have opted for a car if such micro-mobility option was not available while 65 % of e-scooter users would have opted for a bicycle or walked instead (Sanders et al., 2020). Wang et al. (2023) claimed that e-scooters use replaced walking more than any other mode of transport. The **physical dimension** of social exclusion is closely related to physical proximity and accessibility as respondents are found to be not willing to walk more than 200 m to a shared e-scooter docking station (Reck et al., 2022). Further, e-scooter use requires individuals to maintain a standing position and steady body equilibrium, excluding persons with obesity, mobility impairments, or more broadly, individuals who perceive themselves less capable of manoeuvring the e-scooter and navigate the built environment safely. Several studies observed young adults (usually male) to be more inclined to try e-scooters (Bozzi and Aguilera, 2021; Christoforou et al., 2021; Nikiforiadis et al., 2021). The adaptation of micro-mobility devices and associated technologies to meet the diverse mobility needs of older adults and persons with disabilities is rarely discussed as a feasible opportunity for greater inclusion in urban transport. Pettersson et al. (2016) found 76 % of e-scooter participants, used between 66 and 88 years old, to be very satisfied with their micro-mobility device with 87 % participants using the e-scooter several times a week. The participants also reported an increase in their quality of life (*ibid.*). Such promising evidence of e-scooter use indicate opportunities for the design and planning of age-inclusive transport, given that the intersection between age and capabilities has long been examined by TRSE literature (Fields et al., 2019). The report *Public Attitudes to the Use of E-Scooters in the UK* found older adults to be concerned with the age-appropriateness and safety risks associated to e-scooter use (DfT, 2020a).

Fear is a sentiment which can drive travel behaviour, especially among vulnerable and disadvantaged social groups, and may lead to social exclusion. The limited literature of e-scooter and perceptions of fear and/or safety presents several entry points for further research and reflections. First, e-scooters are still largely perceived as unsafe and unstable vehicles. Karlsen et al. (2023) asserted that fear and uncertainty engender perceptions of unsafe usage, discouraging potential users from making a trip on e-scooters. The report *Perceptions of Current and Future E-Scooter Use in the UK* found 53 % of respondents concerned with the safeness of e-scooter use, with 41 % and 35 % of respondents considering it unsafe for pedestrians and riders respectively (DfT, 2021b). Negative associations of e-scooter safety are most widespread in London due to higher incidents of e-scooter used irresponsibly and the uneven availability of infrastructure across the city to support safe use (DfT, 2020a). Heightened coverage of London's on-demand shared mobility service on national media may have also shaped public perceptions (Gecsoyler, 2024; The Financial Times, 2024; Topham, 2023). Women in general perceive more safety and infrastructural constraints when cycling or riding on a e-scooter, and they also expressed more worries about falling from vehicles or injuring others (Chandia-Poblete et al., 2021; Sanders et al., 2020). Additionally, the preference to travel with company or fear of riding unaccompanied (Campisi et al., 2021), is also associated with older adult populations (Fields et al., 2019).

The **discrimination dimension** of TRSE is associated with individuals and particular social groups experiencing stigma, bigotry, and prejudice due to age, gender, race/ethnicity, and class (Scholl et al., 2022). For example, in Bogotá, Colombia, immigrants from Venezuela do not use ride-hailing services due discrimination from local drivers (Oviedo et al., 2022). At the same time, rail-hailing service operators do not provide sufficient services in areas that are perceived to have higher levels of crime and/or associated with low-income communities (*ibid.*). While there is not enough research on the subject matter, some of the aforementioned evidence might apply to e-scooters. UK-based climate action charity Possible (2021) made freedom of information requests, and the data demonstrated that black e-scooter riders in London were three times more likely to be stopped for e-scooter offences by the Metropolitan Police, and near twice as likely to face potential prosecution than white riders. Respondents across numerous age cohorts also expressed that micro-mobility may not be appropriate for them; many potential e-scooter users are discouraged by the possibility of being mocked by their peers for opting a 'childish' mode of transport (DfT, 2020a). Anke et al. (2024) examined in-group favouritism and out-group discrimination, and found e-scooter riders might shift their behaviour once they are become a separate/distinct road user group when the transport infrastructure is upgraded to accommodate micro-mobility devices and not just bicycles. We expect moderate coexistence between e-scooter riders and other road users and pedestrians until major overhaul in legislative and regulatory frameworks.

Against this backdrop, a framework of TRSE is valuable for understanding inclusion from an intersectional approach, while taking into considerations legislative, economic, cultural, and psychosocial factors. We also recognise that not all eight dimensions of TRSE hold equal weight; economic (i.e., affordability) and geographic (i.e., spatial coverage) conditions pose as dominant barriers when determining whether individuals and social groups are include/excluded from accessing transport. Fear-based factors and discrimination add to the dynamic complexities shaping experiences of social exclusion. Such a comprehensive approach aims to better inform the development of

subsequent policies and plans for e-scooters use, and contribute greater depth and nuance to future discussions on TRSE within the context of micro-mobility and on-demand shared mobility services.

3. Context: UK — a late newcomer in the e-scooters' scene

E-scooter rental trials began in July 2020 trials (DfT and Active Travel England, 2024). The introduction of *Electric Scooter Trials and Traffic Signs (Coronavirus) Regulations and General Directions 2020* and *Traffic Signs (Coronavirus) (Amendment) (England) Regulations 2021* remove or relax requirements for rental e-scooters being used on roads (excluding motorways) and in cycle lanes within defined trial areas (Brader et al., 2022). While the trials were open to local authorities in England, Scotland, and Wales, only 32 English local authorities took part and as of January 2024, there were 22 English regions participating in the e-scooter rental trials (DfT and Active Travel England, 2024). Majority of the powers to regulate e-scooter use are vested in the Secretary of State and therefore e-scooter is a reserved issue (not a devolved matter) in which the UK Parliament, rather than the Scottish nor Welsh Parliaments, can legislate (Minnis, 2022). That said, it would be misleading to presume that local authorities in Scotland and Wales were not interested in participating in the trials. There are currently multiple legislative and regulative barriers involved. For instance, road signs are a devolved matter; extending the e-scooter trials to Scotland and Wales would first require Scottish and Welsh ministers to amend the *Traffic Signs Regulations and General Directions 2016* (Department for Transport, 2016; The Scottish Parliament, 2022; Welsh Parliament, 2022).

During an interview in May 2024, Cabinet Secretary for Transport, Fiona Hyslop, discussed the "inevitability" about legal use of e-scooters in Scotland (Dalton, 2024). Hyslop noted that the deadline set by the DfT in 2020 for local authorities to register their interest to participate in the rental trials were done without consultation and advanced notice to the Scottish Parliament (*ibid.*). There was therefore insufficient time given for the relevant legislative changes to be made to ensure that the appropriate resources are being deployed to conduct a rental trial during the pandemic (*ibid.*). On the other hand, the Nextbike scheme which was introduced in 2018 in Cardiff and the Vale of Glamorgan, Wales, was scrapped in January 2024 due to vandalism and theft despite it being UK's most successful shared bicycle scheme in terms of usage (Grey and Local Democracy Reporting Service, 2023). Local authorities were reported to be exploring the viability of a shared e-scooter scheme as a replacement for Nextbike (Gogarty, 2024).

E-scooters were introduced by the government of UK for its potential to cut carbon emissions, reduce dependency on private vehicles, relieve public transport systems, reduce road congestion, guarantee greater equality of access to opportunities, enhance air quality, provide a wider consumer choice, and fill in the existing transport gaps, especially for first- and last-mile trips (Parliament. House of Commons, 2020). The purpose of the e-scooter rental trials was therefore to assess the benefits, costs, public perceptions, and efficacy of legislation. An interim report by the Greater Manchester Combined Authority further noted the potential of e-scooters to reduce TRSE and alleviate the financial stress of car ownership (Kane, 2022). There is insufficient data to establish whether the implementation of e-scooters rental trials across the UK, concentrated in affluent and urban local authorities, have exacerbate existing patterns of exclusion.

The key minimum technical requirements for shared e-scooters in the rental trials are: 1) fitted with an electric motor with a maximum continuous power rating of 500 W and is not fitted with pedals that are capable of propelling the vehicle, 2) designed to carry no more than one person, 3) maximum speed not exceeding 15.5mph, 4) has two wheels, 5) has a mass including the battery not exceeding 55 kg, 6) has means of directional control via the use of handlebars that are mechanically linked to the steered wheel, and 7) has means of controlling the speed via hand controls and a power control that defaults to the 'off' position (DfT and Active Travel England, 2024). These technical requirements differ significantly from electric mobility scooters designed for persons with disabilities to use on footways/pavements, which are 'invalid carriages' and defined in the *Chronically Sick and Disabled Persons Act 1970* (Local Authority Social Services Act, 1970) as "a vehicle, whether mechanically propelled or not, constructed or adapted for the carriage of one person, being a person suffering from some physical defect or disability" (DfT, 2022b, p. 69). Class 2 and 3 mobility scooters have a maximum speed of 4mph and 8mph respectively, a mass not exceeding 150 kg (or 200 kg if any equipment needs to be attached to it), and require the user to meet the minimum eyesight requirements but not a valid driving license unless they intend to drive on the road (DfT, 2015).

The DfT's setting of only guidance for local authorities (DfT and Active Travel England, 2024), and not full and clear regulations on shared e-scooter use, has received criticism. Then Government Spokesperson for Transport in the House of Lords, Charlotte Vere, condemned the lack of reference to e-scooters in the newly published 17th edition of the Highway Code, and warned the government that, due to its legislative and regulative inefficacies, the UK is "not leading but lagging behind the rest of the world" on micro-mobility (HL Deb, 2022). There is tension as to whether 'heavier' guidance, regulations, and rules such as mandatory in-person training and compulsory helmet use would make e-scooter use safer, and by extension, a more popular and acceptable mode of micro-mobility to meet the sustainability objectives although it also throws up wider questions of helmet use and training for pedal cycles. There is also apprehension from local authorities as to whether shared e-scooters trials would be able to stand the competition from existing shared bicycles schemes given that both modes of transport are complementary, and users are unlikely to switch between them to complete a trip (Kane, 2022). Furthermore, local authorities participating in the rental trials are responsible for identifying suitable area(s) of trial operation and parking zone(s), determining the number of e-scooters, collecting and analysing of usage data, and working with private sector operators to protect of user data. This requires significant funds, as well as institutional and technical capacities, limiting the viability of smaller and/or cash-strapped local authorities across UK from participating in the rental trials, as evidenced by the fact that the largest trials ran in London, Bristol, Liverpool, Nottingham, and Birmingham (DfT and Active Travel England, 2024).

London has been at the forefront of transport innovations (congestion charges and parking reform) since the turn of the century. Ten local authorities (Table 1 and Fig. 2) are currently participating in the e-scooter rental trials through two authorised operators, Lime and Voi (TfL, 2024). Dutch firm, Dott, was one of the three authorised operators approved by the Transport for London (TfL) in 2020. It announced its decision to cease operation in the city and withdraw its nearly 2000 e-scooter fleet on 18 March 2024, to be refurbished for European markets (Taylor, 2024). Dott had previously ceased its shared electric bicycle services in September 2023, citing high costs and poor regulation in London's micro-mobility market (Mendel, 2023).

The e-scooter rental trials in London are subjected to stricter TfL regulations when compared to other participating UK regions. This includes lowering the maximum speed to 12.5mph (instead of 15.5mph nationally), designating specific 'no-go' and 'go-slow' zones in participating boroughs, mandatory in-app safety training, and requiring front and rear lights on e-scooters to be on throughout any rental (TfL, 2024). The TfL also continually review and publish a comprehensive equality impact assessment (EqIA) on the e-scooter trial (TfL, 2022).

4. Methodology

This research adopts a qualitative approach, utilising two primary research methods: semi-structured interviews and an online survey. This study design is useful for facilitating the emergence of distinct datasets, which can subsequently be triangulated and analysed against the framework on TRSE. Importantly, while surveys are typically associated with quantitative methodologies, in this research, the survey is treated

Table 1
Participating London boroughs and trial period joined (Source: TfL, 2022).

London borough	Trial period 1	Trial period 2	Trial period 3	Trial period 4	Trial period 5 (Present)
Camden					
City of London[3]					
City of Westminster					
Ealing					
Hammersmith and Fulham					
Kensington and Chelsea					
Lambeth					
Richmond upon Thames					
Southwark					
Tower Hamlets					

[3]The City of London holds county status and has its own mayor, government, and police force. Greater London, often referred to simply as 'London', consists of 32 boroughs and the City of London.

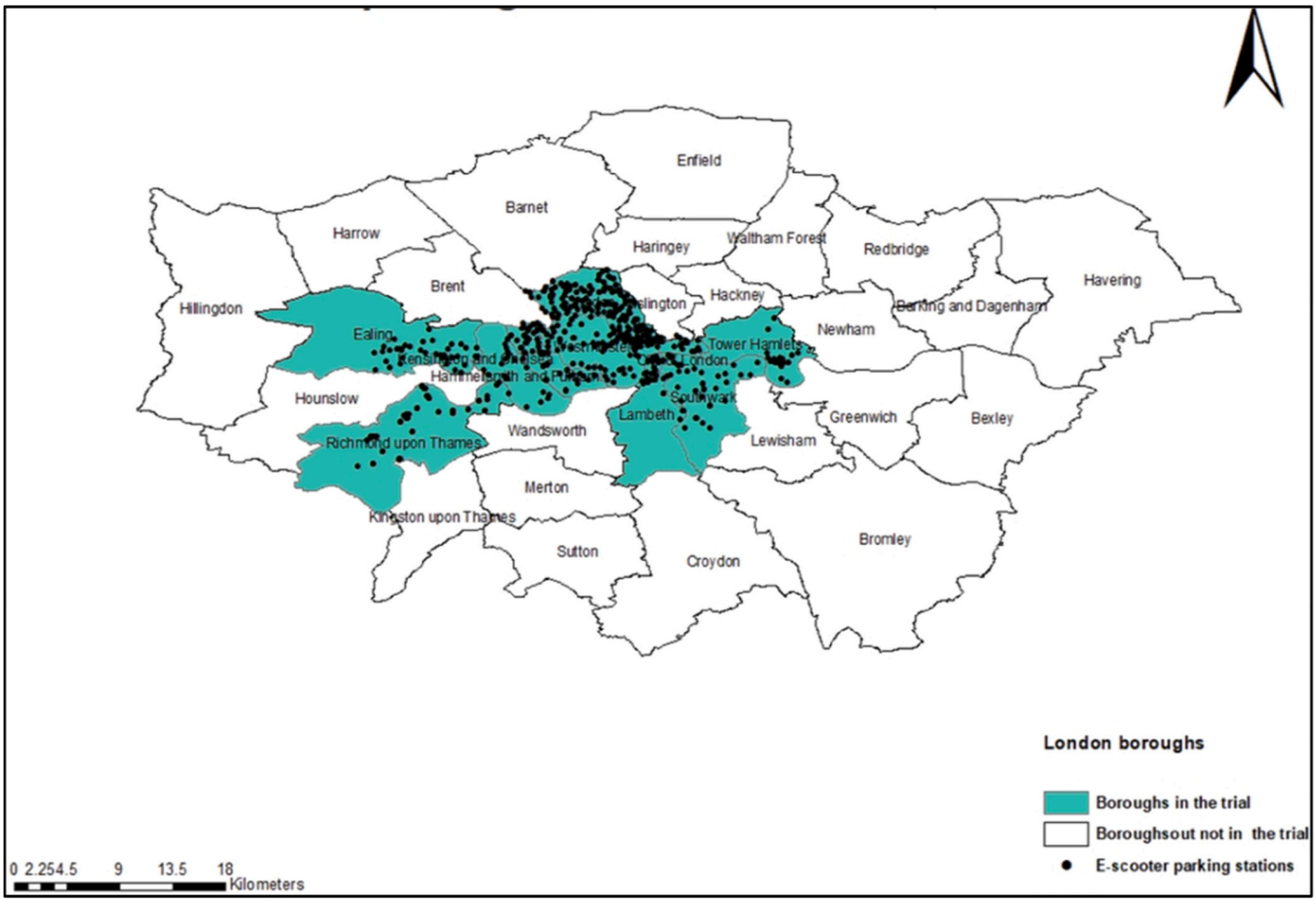

Fig. 2. Participating boroughs and parking stations, June 2022 (Source: Own elaboration).

as a structured interview. Despite its clear inclination towards the quantitative end of the scale (Baker and Edwards, 2012), the collected data from the survey contributes to constructing a detailed profile of e-scooter users and non-users in a descriptive manner. Interviews have been deployed in micro-mobility research for multiple purposes: construct users' profiles (Christoforou et al., 2021), explore safety perception (Cicchino et al., 2021), obtain users' and non-users' experiences and perceptions (Edel et al., 2021), capture insights from key urban planners and built environment practitioners (Field and Jon, 2021), and determine the vision of local government and politicians (Jasper, 2022).

Twenty-seven interviews were conducted over a five-month period,

from April to August 2022, with stakeholders from the public, private, and third sectors (Table 2). Interviewees were recruited through a network of contacts established at the research's outset and were initially approached during a workshop, which held at the commencement of research project. Some workshop participants approached did not want to participate in the interviews; the participation recruitment rate through the workshop was 60 %. The objective of the semi-structured interviews was to capture a broad spectrum of perspectives regarding the operation of e-scooters, aiming to stimulate debate on this new mode of micro-mobility (refer to Annex 1 for the interview questions). By actively combating biases towards particular viewpoints in favour or opposition of the rental trial, this approach enabled gaining deeper insights into TRSE. Each interview lasted approximately one hour, and the priority was rooted in quality (not quantity). Hence, the goal of thematic saturation, considering heterogeneity does not contribute to saturation(Ashmore et al., 2020), the interviews were conducted as a process of data generation rather than an objective end point in reaching a specific number of interviewees (Baker and Edwards, 2012). Each interview was conducted by the primary researcher and a research assistant. Videotelephony software, Zoom, was used and only two interviews were held in-person. All interviews were recorded after obtained informed consent from the interviewees and then transcribed manually by the research team.

The online survey was conducted using Maptionnaire, an open-access software accessible through a link to construct a detailed profile of e-scooter users and non-users, including their personal characteristics (age, gender, education level, household profile, and car ownership status), usage patterns, and attitudes towards micro-mobility. The link was disseminated among UK residents through personal and professional connections of organisations and researchers involved in the project. A total of 1,0006 respondents participated in the survey. A critical function of the survey was to uncover the frequency of e-scooters use, for both private and shared ones, as well as the incentives and constraints associated using e-scooters, including regulation, environmental impacts, and safety issues. The survey also went beyond capturing users' and non-users' experience by incorporating several hypothetical scenarios to determine the respondent's likelihood of using e-scooters.

4.1. Data analysis

The transcribe data from the semi-structured interviews and survey were organised and analysed according to the eight dimensions of the framework on TRSE using deductive and thematic analysis approaches. In a deductive approach, reliance is placed on existing theory rather than themes emerging directly from the data (Fugard and Potts, 2019). Similarly, thematic analysis follows a structure of themes and sub-themes, allowing for the identification of complex interrelationships, such as overlapping or complicating themes (*ibid.*). This data analysis method was chosen because it *"involves drawing connections at a deeper level, where two fragments of text using different words can be seen to be related at the level of meaning or a common phenomenon"* (*ibid.*, p. 4). Some dimensions of TRSE encompassing various sub-themes. For instance, the spatial dimension of TRSE considers issues of access, regulations, and zoning. In addition, a descriptive analysis was used to organise and summarise survey data, but it was not employed for making predictions (Onwuegbuzie and Combs, 2015).

Data validation was achieved through triangulation of data from semi-structured interviews and survey. This facilitated the construction of a coherent discussion for themes, as demonstrated in the findings section. Additionally, nearing the end of the research period, a second workshop was conducted as part of the data validation process and share with stakeholders the project findings, as well as interrogate the research team's interpretations of the participants' meanings.

Table 2
List of Interviewees and their professional affiliations (Source: Authors).

Sector	Interviewee
National Government	8, 14, 18, 21, 25
Local Government	17, 22, 23, 26, 27
Private Sector/Operator	4, 13, 24
Private Sector/Consultant	3
Charity/Non-Governmental Organisation	2, 7, 10, 11, 12, 15, 19, 20
Research and Technology Organisation	5, 6, 16
Academia	1, 9

5. Findings

This section presents key research findings and are structured according to the eight dimensions of TRSE.

5.1. Geographical exclusion — 'the trials are only conducted in certain areas of the country' […and the city, and the borough]

> "Everybody has the right to travel, everybody needs to travel […] transport should be for everybody, and it really bugs me that it is not" (Interviewee 8)

Issues of geographical exclusion are related to concerns about the unequal coverage of the trials across UK and the inadequate availability of parking bays within designated areas. When asked about the geographical dimension, interviewees pointed out that the trials tend to concentrate in areas with larger financial capacity and a better provision of transport infrastructure. As such, they are not considered to be "*serving a purpose of extending that kind of geographic availability to regions and areas that are further from existing transport networks"* (Interviewee 6). Similarly, an official from a local authority asserted that *"there is not an even distribution of transport provision, and when it comes to public transport, [where one half of the city] is much better served than the [other half] […] I think that is something our department is very aware of"* (Interviewee 26). This is particularly evident in cities like London, where the ten participating boroughs are mostly located in Inner London and well-served by the existing TfL infrastructure, contrasting with the insufficient public transport coverage in some parts of Outer London (Fig. 2).

Within participating boroughs, the inadequacy of coverage relates to the concentration of parking bays in areas closer to facilities in contrast to acute unavailability in more residential areas, further from existing transport facilities (Fig. 3). Notably, the inadequate and unequal distribution of infrastructure is not just an obstacle for users. When it comes to considering the constraints for operating in different boroughs across London, a transport official working at the city level regarded the maldistribution of charging infrastructure and parking bays as *"…a hugely crucial factor in determining how successful the trial is in that area, because the more bays you have, the more areas you can park in, the more kind of attractive and convenient the mode of transport is"* (Interviewee 27). Consequently, the absence of adequate charging infrastructure and parking bays could deter operators from expanding their services into peripheral areas within operating boroughs. This aspect underscores the importance of addressing not only the coverage of e-scooter trials but also the provision of essential supporting infrastructure, such as charging stations, to ensure equitable access to micromobility options across different geographical areas. Local authorities have attempted to tackle this issue by adopting a free-floating modality. However, when interviewed, officials from Newcastle upon Tyne, a city in Northern England, highlighted *"we were fairly sure that a free-floating model probably was not the answer in the longer term"* (Interviewee 23). In other words, free-floating modality may contribute to more equal coverage within operating areas, but it raises some other concerns that will be discussed in the spatial, fear, and physical sub-sections of the findings.

When compared with the survey results, shared e-scooters riders replied that the main constraints for not using the service were due to

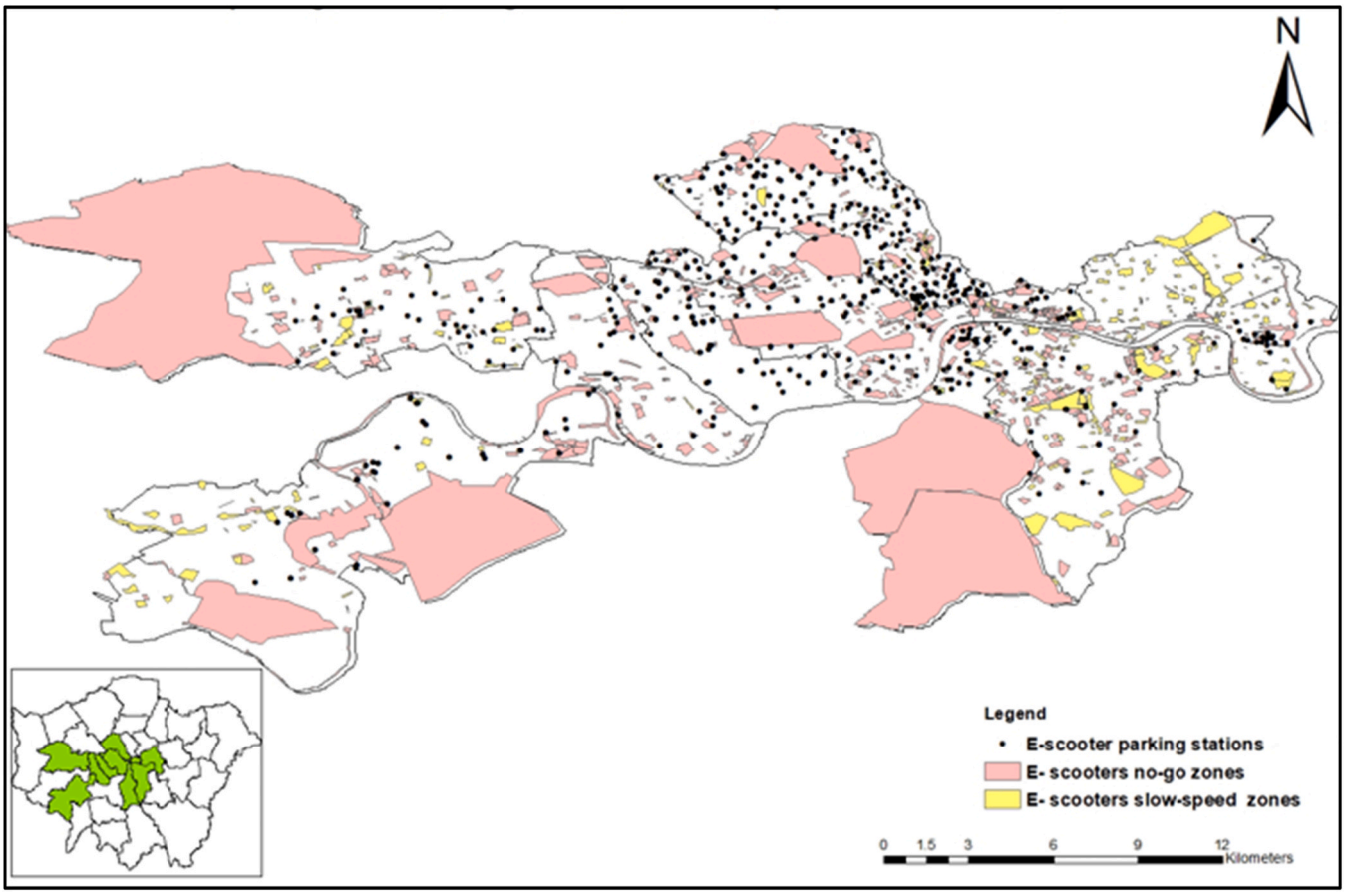

Fig. 3. 'No-go' and 'go-slow' zones in participating boroughs, June 2022 (Source: Own elaboration).

not finding an e-scooter (53 %) and not finding a parking bay nearby (39 %). Whilst these results support the concerns about the coverage limitations in participating boroughs, the availability of private ones is ubiquitous, despite being illegal. This evidence talks to the limited availability of rental e-scooters in peripheral areas which, in turn, may exacerbate existing inequalities in transportation access. Against an unequal and inadequate coverage of e-scooters trials across and within different English local authorities, questions remain regarding how equally these probationary schemes are extending transport-related opportunities to social groups that live in peripheral areas.

5.2. Spatial exclusion — 'an issue of conflicting space interactions'

Spatial exclusion is closely related to accessibility, overlapping with some elements of availability identified in the previous section. Particularly, it manifests in the form of conflicting space interactions between users and non-users, inadequate infrastructure provision across cities, and in the form of the politics of space, which includes issues of environmental sustainability. There are regulations set up within the operating borough controlling the use of space, such as no-go and/or go-slow areas. Space control also refers to the technological capacity of operators to create virtual geographical boundaries through geofencing mechanisms.

Considering that shared e-scooters are motor vehicles, regulation determines they should go on roads, together with cars and buses. According to TfL (2022) *"driving vehicles on pavements is generally an offence; this applies at all times to all types of e-scooters and powered transporters"*. Interestingly, the use of the adjective 'generally' talks to some of the gaps engendered by the uncertainty of regulations highlighted by several interviewees. While e-scooters should officially be used on roads, given the uncertainty of regulations, interviews exposed that there needs to be a clearer position for e-scooters within the transport hierarchy. Placing e-scooters as well as docking spots out of pavements seems to be a consensus among interviewees. For many, *"the exclusion in this context is the impact that the illegal use of e-scooters on footways has on pedestrians […] that is the element of exclusion that I am thinking of, how it excludes pedestrians from a pedestrian space"* (Interviewee 10). Yet, the qualitative analysis reveals that placing e-scooters with cars, buses, and trucks presents a series of risks for e-scooter users, and, therefore, many interviewees asserted that e-scooters should go on specific lanes together with bicycles. This is what some interviewees referred to as *"micromobility and cycle lanes"*.

These conflicting space interactions also refer to parking bays taking and/or blocking pedestrians' space. Given that boroughs make the decision of space allocation for parking bays, not all areas would allocate e-scooters bays on pavements. When it comes to adopting a free-floating modality, however, officials from a local council in the north of England referred to this decision as a challenging situation since users tend to *"abandon e-scooters after they end the ride and do not park [them] in a very good spot […] blocking footpaths. And this is something we are looking to tackle pretty quickly"* (Interviewees 23). This points towards clashing impressions and feelings regarding the re-distribution of urban space. As such, when legalised, questions arise: Where should e-scooters go, and where should they park? Spatial exclusion, however, relates not only to the redistribution of urban space but also to the conditions of that space. Evidence from the survey is critical for substantiating this aspect — 61 % of respondents concur that infrastructure across the city is not suited for e-scooters. Accordingly, as highlighted in the previous section, whilst the lack of infrastructure is a concern at the city scale, this dimension is aggravated when comparing more and less affluent areas.

Another barrier discussed by interviewees in terms of spatial exclusion relates to the uncertainty placed by the introduction of 'no-go' and/

or 'go-slow' zones, set up by operating boroughs as well as geofencing tools devised by operators (Fig. 3). As stated by TfL (2022) *"participating boroughs have designated no-go areas where e-scooters cannot be ridden. There are also go-slow areas where the speed of e-scooters will be reduced to 8mph"*. While these measures aim to enhance safety for e-scooter users and non-users, interviewees raised concerns about their impact on travel practices and the challenges of navigating administrative barriers within participating boroughs. Moreover, the use of geofencing mechanisms adds another layer of uncertainty for users, as highlighted by an interviewee from academia who noted, *"[…] because these schemes have been installed for certain boroughs [London], if you leave those boroughs, you do not have access because of geofencing"* (Interviewee 1). In the context of uncertain regulations, nearly half of shared e-scooter users (47 %) expressed confidence in understanding the road rules that apply to e-scooters, adding to the complexity of the situation which clearly contrast with the concerns expressed by interviewees. This highlights the identification of complex interrelationships, such as overlapping, contrasting, or complicating themes when using thematic analysis and different data sources (Fugard and Potts, 2019).

5.3. Economic exclusion – '…an alternative for those who can afford it'

When it comes to economic exclusion, issues of affordability need to be rendered against the divide between private and shared e-scooters, but also against other forms of mobility. Considering e-scooters (private and shared) are mainly designed for short trips, discussions about them being more expensive than other active mobility modes, like cycling and/or walking, are straightforward. More puzzling answers and perceptions emerge when discussing e-scooters (private and shared) costs against other modes of transportation and between each other. According to many interviewees, private e-scooters represent an alternative solution for those who cannot afford a car (especially in London), or public transport. In the words of an interviewee from the charity sector:

> "[…] the potential for e-scooters as an independent form of transport is attractive particularly for people who can buy an e-scooter for sort of 300, 400, 500 pounds, which is not affordable for everyone, but compared to a car […] petrol is expensive, insurance is expensive, parking is expensive, parking permits are expensive […] basically, to run a car is a quite a serious expense […]" (Interviewee 14)

When consulted about the cost of private e-scooters, 55 % of shared e-scooter users and 43 % of non-users consider them expensive. In contrast, only 12 % of private users find it costly to buy a private e-scooter. Answers about the cost of shared e-scooters are less contrasting. 36 % of shared e-scooter users and 54 % of private riders find rental schemes expensive. Additionally, as many as 78 % of users (private and shared scheme users) and 51 % of non-users replied that they would be very likely to use shared schemes instead of public transport if fares were cheaper. However, while only 29 % of shared e-scooters users considered the fare prices a constraint for using them, 71 % of them replied that the cost was never a restriction. Even though the fare prices do not seem to be a major constraint for shared e-scooters users, the affordability barrier is a relevant aspect of making this mode of transport more inclusive. Different passes and schemes have been put in place by

	Dott	**Lime**	**Voi**
Price	£1 to start a journey + 15p/minute	£1 to start a journey + 16p/minute	£1 to start a journey + 15p/minute
Promotion	Two 20 minutes free rides	Two free rides during elections + discount codes + Lime Prime free for one month	One free ride for 15 minutes
Voucher	Yes, discount codes exist	Yes, discount codes for reduced price or free ride	Yes, discount codes exist
Ride Passes	Unlock for one month: £1.99 2 Ride Pass (30 minutes free ride): £3.99 £1 per Ride Pass (30 minutes): £8.99 24 hour unlimited (30 minutes free per ride): £9.99	1 hour = £7.99 (unlimited) 24 hours = £12.99 (unlimited rides for 90 minutes) 3 days = £27.99 (90 minutes) *Can book a vehicle *Enjoy £0 unlocking fees and unlimited rides	Go All day: £9.99 (only 120 minutes overall), but welcome offer is reduced to £7.99; Go Summer (£2.99 per month)
Benefits	Share a code with friends and after their first ride, both get one free ride	Give £4 ride credit and received £4 in return (when inviting a friend) plus free Lime Prime (£8.99) for one month	50% off 5 rides you and your friend; earned rewards are valid for 30 days' rewards include one unlock free, 10 minutes free or 5% off your next ride
Social Programmes	Yes (HC2 certificate, DID card, Disabled Persons railcard), 50%	Yes (SNAP, Medicaid, subsidised housing, reduced-rate utility bill, etc.)	Yes (National Bus Pass/Railcard for older people, disabled people, 18+ student Oyster card, etc.), 50% for six months
Payment	Apple Pay, Credit card, PayPal	Apple Pay, Credit card, PayPal	Apple Pay, Credit card
App Ranking	4.6/5 (Google Play)	4.8/5 (Google Play)	4.1/5 (Google Play)

Fig. 4. Passes and subsidies set up by operators in London, July 2022 (Source: Own elaboration).

operators to overcome this obstacle (Fig. 4).

Designed as a *"business model"* (Interviewee 15*)*, shared e-scooters schemes must ultimately be profitable for operators. As such, questions remain as to whether, especially in the context of austerity reforms, the public budget should be allocated to subsidise e-scooters schemes to make them more affordable for larger groups of society. Financial sustainability is also an aspect to consider for boroughs implementing the schemes. Hindered by an environment of uncertain regulations along with the economic burden placed by operating the schemes, local authorities, especially those in lower-income boroughs, see few incentives to participate in the trials. At the city level, they are also aware of the constraints faced by local authorities when invited to take part in the trials.

> "All boroughs are taking part in the trial under the same contract, so it is very similar in each borough that it is set up… And then it is also around financial sustainability now, which is a huge, huge thing for local authorities. So just making sure that there is the right funding available to be able to put these things in place, it takes time, it takes money, and infrastructure." (Interviewee 27)

The latter talks about the relevance of confronting affordability concerns in conjunction with coverage, discussed in the geographical dimension. As highlighted, concerns were raised regarding the disparity in availability between central and peripheral boroughs, with the latter having fewer resources to support trial implementation. In addition to budgetary aspects, operators may perceive these areas as offering fewer incentives and posing greater risks for operation. This aspect of financial sustainability also encompasses mode shifts and the purpose of e-scooter trips, which will be explored in the following section.

5.4. Exclusion from facilities — *'e-scooters are a lot more flexible, they can be folded under people's desks'*

This dimension analyses the extent to which e-scooters enhance users' capacity of accessing opportunities, engaging with daily life activities and/or reaching local facilities across cities. At its core, this dimension highlights e-scooters' *"potential to really open access (to transport) and make people's travel a lot more flexible"* (Interviewee 5), while suggesting untapped opportunities for further enhancement if rental scheme parking bays are strategically located near specific facilities. For instance, placing rental e-scooter parking bays near public transportation hubs, offices, shopping centres, and other frequented destinations would streamline access and usage, thereby saving users time and effort. This proximity could foster greater adoption of e-scooters as a transportation mode, potentially reducing reliance on personal vehicles or less sustainable options. In discussing the broader context of micromobility, an operator emphasized that e-scooters should be integrated into a comprehensive transportation strategy rather than viewed as a standalone solution: *"I'll say is that we often see micromobility as a piece of the puzzle, along with public transport […] rather than thinking that we're offering some sort of silver bullet that's going to solve all equity, environment, sustainability issues"* (Interviewee 4). This approach suggests that e-scooters, along with public transport initiatives and other measures, collectively address transportation challenges more effectively.

This optimism, however, needs to be tempered with caution as since the capacity of reaching facilities is closely related to the coverage constraints discussed in the geographical dimension. As previously discussed, the main constraints for not using shared e-scooters relate to issues of coverage, with 53 % considering that the primary constraint was due to not finding an e-scooter and 39 % due to an inexistence of parking bays where they started their trips. In contrast, 25 % responded that the main reason for using a shared e-scooter was for reaching a public transport station, and 20 % for reaching their destinations from a public transport station.

Additionally, a discussion about exclusion from facilities needs to consider the divide between private and shared e-scooters. Evidence from the survey exposes that private and shared e-scooters are often used for different purposes, respond to distinct usage frequencies, and replace different modes of transport. As Fig. 5(a) details, private e-scooters users chose work and shopping as the main purposes of their last trip. Instead, the preferred options for shared e-scooters users were leisure/recreation at the destination and going home.

As shown in Fig. 5(b), when consulted about the alternative mode of transportation if an e-scooter (either private or shared) was unavailable, almost 40 % of private e-scooters users replied they would have used public transport, while only 26 % of shared e-scooters chose this option. On the contrary, while 44 % of shared e-scooters users would have walked, only 24 % of private users would have done so. These preferences go hand in hand with the purpose of the trip and reveal that private e-scooters play a bigger role in replacing public transport trips, given that the purpose of their trip is due to compulsory daily activities such as work and/or going back home. However, it is important to highlight that this tendency cannot only be explained by a focus on proximity to facilities as it intersects with the two dimensions previously discussed, as well as with a focus on issues of affordability and time.

5.5. Time-based exclusion — *'they offer flexibility because they are an individual mode of transport'*

Time-based exclusion encompasses aspects like time restrictions imposed by distance, time of the day, and/or weather. Considering that *"transport is such a core part of people's day-to-day and what people are able to do*" (Interviewee 1), this dimension is key when reflecting upon everyday lifés transport-related inclusion/exclusion. Consequently, given that this dimension focuses more directly on the personal experience of using or not using e-scooters, the discussion in this subsection is primarily supported by survey data. First, e-scooters provide an opportunity to save time, especially when it comes to short trips. 62 % of e-scooters users replied that the main reason for using rental schemes was to save time. As shown in Fig. 6, shared e-scooter riders tend to travel shorter distances than private riders. In the words of Interviewee 6, *"[…] on the days that you are not able to walk, you have this alternative option that arguably is more suitable to those distances than driving a car"*. Second, in terms of restrictions imposed by the time of the day, 68 % of users are likely or very likely to use e-scooters at night. A key point of discussion here is the gender divide. While the percentage of men keen to use e-scooters at night does not vary between private and shared schemes (74 %), responses among women using private and shared e-scooters differ from 79 % to 58 %, respectively. This discrepancy enables us to back perceptions from interviews pointing to the (missed) opportunity that this mode of transport could bring to women when making late-night trips. While these perceptions remain relevant to private users, the lower percentage of female shared scheme users willing to travel at night could be explained by the inadequate coverage/availability of parking bays in operating boroughs.

The frequency of e-scooter trips is also relevant when analysing the impact of this mode of mobility upon users' everyday lives. 83 % of private riders are regular riders, while only 32 % of shared e-scooters users make one or more trips per month. The remaining 68 % are occasional shared e-scooter riders, using the service for no more than two trips in the last six months. More frequently relying on e-scooters for commuting across the city, 67 % of private riders use their e-scooters once or twice per week. Despite the frequency of use, evidence from both -the interviews as well as the surveys- point to the constraints of weather conditions for the likeliness of preferring this form of micro-mobility. When asked about the likeliness of using e-scooters in good weather conditions, 80 % of users and 55 % of non-users were positive about this option. On the contrary, 66 % of users and 76 % of non-users replied that it was very unlikely for them to rely on shared e-scooters in bad weather conditions. This is understood here as the *'seasonal tension'*. Correspondingly, many interviewees asserted that e-scooters are an

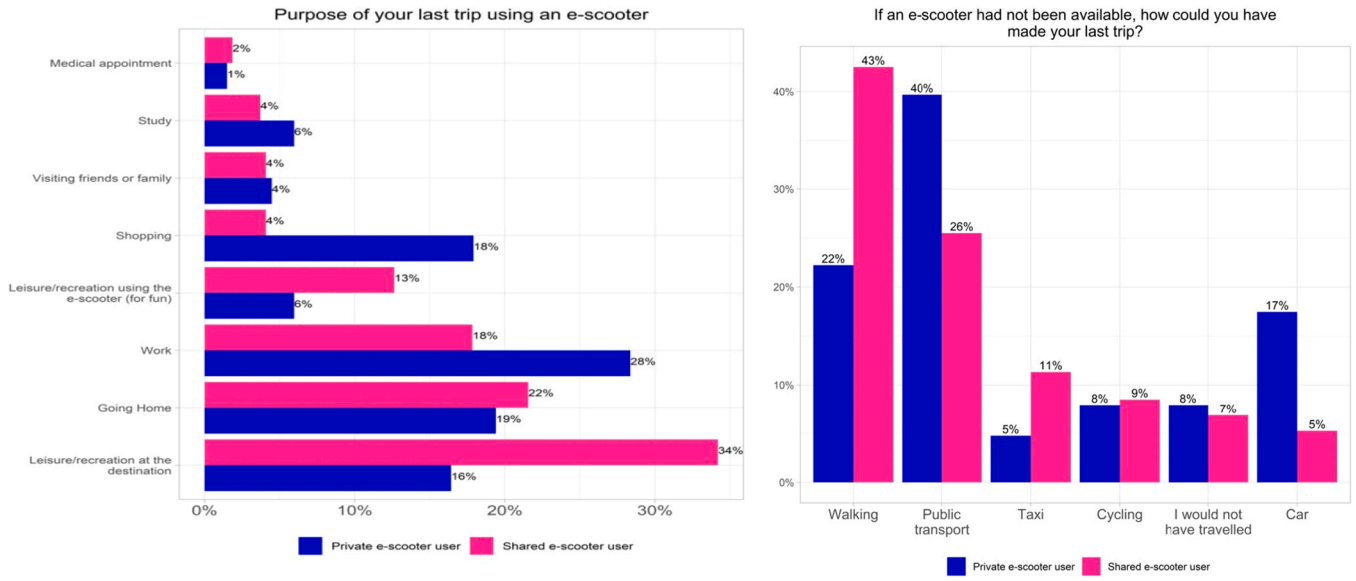

Fig. 5. (a) Purpose of last trip using an e-scooter; (b) Mode shift if an e-scooter had not been available (Source: Authors).

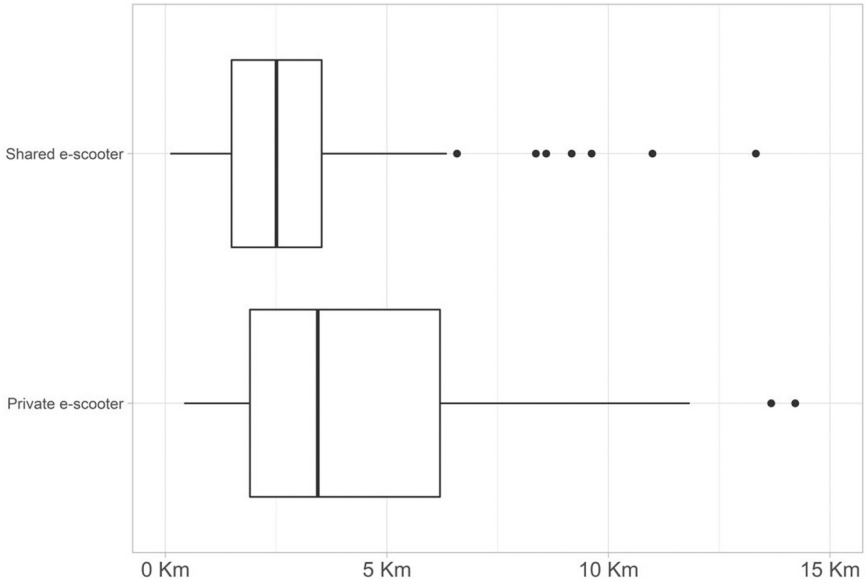

Fig. 6. Travel distances – last-mile trip using an e-scooter (Source: Authors).

excellent alternative for tourist activities but ill-suited for bad weather conditions. When thinking about good practices against the seasonal tension, one interviewee claimed that *"[…] maybe having seasonal services, like in Sofia, in Bulgaria […] the e-scooter schemes just do not operate in the winter […] like there is no point; it is too slow, it is too cold"* (Interview 5).

As such, the tension between being a time saver against shared e-scooters' low coverage and low frequency of use together with the seasonal tension (i.e., being a good alternative for saving time during good-weather conditions and a bad option for the rest of the time), point to the fact that for all the opportunities shared schemes present in terms of time-based inclusion, a series of challenges need to be solved for e-scooters filling a gap in terms of transport-related inclusion for marginalised groups in their daily routines. To be clear, shared e-scooters represent an alternative for occasional users. However, these users are often not those on the margins of TRSE. This evidence relates to remarks from the qualitative analysis referring to e-scooters as a more flexible alternative in terms of travel times. Whilst e-scooters bring flexibility in terms of travel times, a focus on the relationship between coverage, the purpose of the trip, and mode shift enables us to affirm that for all the flexibility e-scooters provide in terms of access to different opportunities and activities, shared e-scooters are not adequately contributing to fill a gap for those that live further from covered areas.

5.6. *Physical exclusion — 'Can I use them?'*

Closely related to physical and cognitive abilities, the physical dimension of TRSE broadens the discussion about who the users and who the non-users of e-scooters are. Put differently, when discussing issues of physical inclusion/exclusion, it is relevant to also engage with the perceptions and practices of non-users to understand how e-scooters work for different groups. Both the interviews as well as the survey responses reveal the relevance of the tension between users and non-users when understanding how innovations affect TRSE.

When asked who the target audience for e-scooters are, interviewees agreed that instead of framing questions around target audiences, e-

scooters are there for anyone who can "use" them. The term "use" here refers to that double conditions of: 1) being physically able to employ e-scooters as a mode of mobility since e-scooters require *"to have a degree of being able to balance… it is not easy to ride an e-scooter…"* (Interview 27), thus, referring to individual ability, and 2) the structural arrangements when making and distributing different capacities to different bodies (i.e., income, spatial infrastructure). Considering this double condition of the capacity to use e-scooters, interviewees associated e-scooters users' profiles with young, active, and fit bodies, mainly men, tech-savvy (digital literates), and short commuters. Against this narrow definition of users, most interviewees agreed that e-scooters are not working for a wide range of social groups. When crossed with the results from the survey, the profile of non-users spans from those feeling/perceiving they cannot ride an e-scooter either because of their body size, physical or mental disabilities, caring responsibilities, age as well as those who — even though fitting into the category of "active and able" bodies — find in e-scooters a threat to urban space coexistence. More importantly, 66 % of respondents were non-users (Table 3).

When it comes to users, the survey results support interviewees' perceptions. More than 60 % of users (private and shared) are men, while less than 30 % are women (Table 3). The gender dimension is also relevant when considering the constraints for using e-scooters. Travelling with bags was the third most voted constraint (31.9 %) among shared e-scooters riders for using the service. It is worth noting that among users, while 43 % of women considered travelling with bags a major constraint, only 27 % of men reckoned this as an inconvenience — the latter talks to the fact that it is usually women who carry more things than men. In contrast to the emphasis interviewees placed on digital literacy as a hindrance to using e-scooters, 81 % of shared e-scooter users perceive apps as not difficult to use. Issues of race, sexual orientation, and education levels are categories that do not tend to generate significant differences between being a regular or an occasional user of shared e-scooters.

Moving from the tension between users and non-users, the physical dimension of TRSE talks to a second strain. This is outlined by questions whether e-scooters reduce the dependency on private vehicles or replace walking-distance trips. Whereas answers to this conundrum cannot be framed in black and white, it is fair to say that regardless of their potential as a short-distance alternative transport mode and a mode of replacing a car travel (and reducing road congestion as per the official narratives goes), they are reducing active travels and public transport travels. The evidence is provided in Fig. 5(b). This graph clearly shows that instead of replacing car travels, the preference would have been either walking or taking public transport. What is more, despite some interviewees associated e-scooters as potentially helpful for mental health, the fact that 53 % of shared e-scooters users chose this mode of transport over walking leads to conclude that e-scooters threaten healthier forms of mobility. Against the sort of argument that people are getting out of cars and using e-scooters, an interviewee highlighted:

> "People that would have walked or cycled, which is an active mode of transport and good for burning calories, are now choosing to use e-scooters […] the health benefits disappeared. But obviously, you are standing up, and you are burning more calories than if you are sitting down [in cars]" (Interviewee 14).

Table 3
Profile of users and non-users (Source: Own elaboration).

Share of total sample		Shared e-scooters users (%) 27.5	Private e-scooters users (%) 6.5	Non-users (%) 66
Gender	Women	29	28	43
	Men	66	69	53
	Non-binary	4	1	4
Age	< 25	31	32	15
	25–35	43	26	34
	> 35	27	42	51
Income	< £20k	19	28	21
	£ 20–40k	32	30	30
	> £40k	47	41	46

5.7. Fear-based exclusion — 'there is a case to make them as safe and higher standard as possible'

Fear-based exclusion encompasses road safety issues for non-users and users, as it relates to fear of injury, as well as gender-related concerns, such as harassment and crime. In terms of road safety, interviewees underlined the threats not only for pedestrians (and non-users in a broader sense), but also for users. Deemed as silent, speedy, small and light, with bad breaks, without lights, and untraceable, among other adjectives, many interviewees agree that e-scooters are ill-equipped to be regarded as motor vehicles. Interviewees representing pedestrians' and cyclists´advocacy groups highlighted the time and effort that has taken them to get back to a place within the contemporary car-oriented city. Associating this to feelings of being displaced, the idea of e-scooters as a threat to non-users is particularly acute among pedestrians and visually impaired people. According to the interviewee 9, the *"emergence of e-scooters has made some of (them) much less confident navigating independently"*. As such, issues of road safety (fear-based exclusion) go hand in hand with aspects of space redistribution and the availability of infrastructure (spatial exclusion). This points to what should be the best interaction among different modes of transport and mobility: trains, cars, buses, bicycles, and pedestrians?

As previously mentioned, private e-scooters are banned from public roads for safety reasons. However, it is worth noting that both private and shared e-scooters are not allowed on the public transport's board. This safety step came after defective lithium-ion batteries in privately-owned e-scooters and e-unicycles caused fires on the network (TfL, 2022). Against this backdrop, contrasting views emerge. On the one hand, some interviewees point to the fact that *"there is a need [with private and shared e-scooters], to make them as safe and higher standard as possible […]"* (Interviewee 5). This focus, however, cannot override an emphasis on the economic dimension. Otherwise, if *"[…] no consideration goes into affordability, then the potential of micro mobility to address inequality in our transport system will be lost [and e-scooters might end up being] very expensive toys that are written for rich"* (Interviewee 5). On the other, for some it is *"extremely crucial to demystify e-scooters"* (Interviewee 27). The same interviewee emphasised the collaborative efforts among the public and private sector when organising events with a focus on safety *"where people can try e-scooters in a safe environment so that they feel more comfortable using them"* (Interviewee 27).

Evidence from the survey is also contrasting between users and non-users. When it comes to shared e-scooters users, 55 % of them believe that e-scooters are not dangerous for users, nor for pedestrians (56 %). In terms of regulations, 66 % of users consider that the government should ease the rules for e-scooters, 58 % asserted e-scooters should be ridden freely on roads, and 64 % affirmed that e-scooters should be allowed in public transport. In contrast, 60 % of non-users do not ride an e-scooter because they deem them as threatening and dangerous for pedestrians, 53 % replied that the government should not allow private e-scooters to be ridden on roads, 46 % mentioned that users should not be allowed to carry e-scooters inside public transport, and 71 % affirmed that helmets should be compulsory when riding an e-scooter. In terms of improving safety road, the majority of users and non-users of shared e-scooters affirmed that it should be compulsory to have audible signals.

Moving from the fear of injury to that of crime or harassment, the gender divide is of crucial importance since women are more prone to feel harassed in public spaces. This intersects with the physical and the spatial dimension. Connected to a fear of exposing their bodies in public, interviewee 8 expressed their concern about *"size […] because I am large,*

that would be something that I would be fearful of getting harassed. [….] I have been harassed before on a bike so, yeah, I would be worried about that". Whilst this concern applies to private and shared e-scoters alike, the connection of fear-based exclusion to infrastructure and time of the day applies mainly to shared e-scooters. *"[There is] good evidence that women, in particular, are influenced by dark […] so, if parking tends to be in [dark] places [and/or] on the corner of the poorly lit street, that might pose a bigger barrier to women participating and using [shared e-scooters] than it does to men"* (Interviewee 2). Evidence from the survey backs these apprehensions: 65 % of users and 44 % of non-users asserted that people are not safe from crime and sexual harassment when riding an e-scooter. By the same token, when asked about the reasons for using the services, fear of crime (2.2 %) and fear of sexual harassment (2.8 %) were the two lowest scored reasons for shared e-scooters users to choose this alternative. Noteworthy, while no male respondents declared fear of sexual harassment as a reason to use shared e-scooters, 10 % of female respondents did. This underscores the importance of addressing safety issues to make e-scooters a viable alternative for night travel, highlighting their potential if adequate coverage is made available.

5.8. Discrimination-based exclusion — 'a damaging narrative around young ethnic minority men causing trouble on (private) e-scooters'

This dimension relates to the way in which e-scooters and their riders are perceived by the general opinion. Broadly speaking, while private e-scooters entail stern negative opinions, perceptions of shared e-scooters are more nuanced. Importantly, the divide between private and shared e-scooters set out by the current regulation plays a significant role in drawing out these divisive perceptions. As noted by Interviewee 4, *"I think discrimination is something that is selectively enforced […] if selective enforcement (is set out) by any law, then law bias comes into this [discrimination]"*. This is the way in which regulations play a pivotal role in shaping ideological views and perceptions. In the case of e-scooters, by deeming private e-scooters illegal, regulations exert control over its usage by defining acceptable behaviours, spaces, and identities within urban environments. Additionally, through the establishment of rules governing shared e-scooter operation, such as speed limits, designated riding areas, and age restrictions, regulatory bodies shape the ways in which e-scooters are perceived and experienced by both riders and members of general public. These regulations not only regulate individual conduct but also construct and reinforce broader societal norms and values regarding mobility, safety, and urban governance, which can reproduce or reinforce discriminatory views.

Deemed as reckless and underpinned by racialised and class associations, private e-scooter users are mainly stigmatised. However, there is no publicly available figures and data that can properly back such insights. In fact, interview discussions highlighted this stigmatisation as *"a really damaging narrative around kind of young ethnic minority men causing trouble on e-scooters. […] I do not think e-scooters users are the cause of that because that perception is there. […] It is not nice when that becomes part of the additional sort of judgment"* (Interviewee 5).

Less problematic are the judgments upheld by the design of private e-scooters (in opposition to riders' demographics). As asserted by Interviewee 21 (National Government): *"[…] because of the low speeds, the danger [of shared e-scooters] is massively reduced, and we want to focus our very limited resources on the ones that are most likely to cause danger, which is the private schools with 'no-up' speed limit. So, the majority of our enforcement is 100 % on private e-scooters."* While the survey responses did not directly address perceptions of discrimination, an important takeaway from this dimension is the need to shift away from discourses that attribute users' imprudence and misconduct towards a focus on regulating the design and operations of e-scooters at both local and national levels. Additionally, it would be essential to consider the role of media portrayal in shaping public perception and discourse surrounding e-scooters.

6. Discussion — "[…] it came quickly, it upsets some people, and some people love it, and it is a very divisive issue"

In line with previous research on TRSE, the findings of this study point at the broad spectrum of opportunities and challenges presented by e-scooters in urban transport ecosystems in London. From the yet-unrealised potential to fill specific gaps in transport supply to the systematic exclusion of certain groups, our analysis suggests significant challenges for materialising inclusive future scenarios for e-scooters in cities. Some of our findings show similar trends to those observed in other urban contexts, particularly in Europe. For instance, the profile of shared e-scooter users shows glaring gender differences, with mostly men being users, as it has been found in France and Italy (Campisi et al., 2021; Christoforou et al., 2021). Similarly, shared e-scooter users in our sample represent the typical early-adopter profile of young adults with higher purchasing power found in similar works elsewhere. However, data from private e-scooter users suggest more diverse user profiles, departing from what has become the expected profile of users of these new technologies.

Although their operation is currently illegal, private e-scooters seem to respond to the urban mobility needs of an older and less wealthy population than what is often typified in research about this mode. This is reflected by the stark differences in the frequency and purpose of use of private and shared e-scooters shown under the temporal and facilities dimensions of TRSE. Our evidence pointed out that the private e-scooter is primarily a utilitarian vehicle which is frequently used while the shared e-scooter is an occasional service used mainly for leisure. Such a takeaway raises further questions about the role of these vehicles in a changing mobility landscape when compared, for instance, with bicycles, as hinted by earlier research (Curl and Fitt, 2020).

A more detailed look at each dimension sheds further light on the challenges that need to be rendered with caution if an inclusive future scenario is envisioned for e-scooters. Whilst the time-based and facilities dimensions of TRSE highlight the positive contribution of e-scooters' flexibility to daily travel strategies of those in a position to use them, dimensions such as the geographical (inadequate and unequal coverage), spatial (distribution and politics of urban space) and physical dimensions (tensions between users and non-users) paint a much gloomier picture, particularly for shared e-scooter services. Findings from interviews and their contrast with quantitative and spatial evidence in each of these dimensions also point at the relevance of governance arrangements and power relations and the way they manifest in space as significant drivers of social exclusion.

Unequal coverage, one of the most common barriers reported to the use of shared e-scooters, is partially caused by decentralised decisions on the location of the parking bays and politically driven decisions not to extend services to vulnerable areas in local jurisdictions, participating in the trials. Despite overall negative perceptions about coverage, particularly in London, perspectives about other models of service, such as the free-floating parking in Newcastle, seem to bypass this challenge only to create higher perceptions of exclusion in the physical and fear dimension by means of the obstacles the vehicles pose for pedestrians and persons with disabilities in public space. By the same token, framing the analysis in terms of exclusion makes it possible to examine the role of digital technologies as instruments of control and power. Such is the case of geofencing, which creates gaps in operational areas and limits shared services' availability and usefulness to reach specific destinations, but whose rules and parameters are defined by a myriad of interests and stakeholders.

Being a largely short-distance mode, e-scooters provide a powerful reminder of the influence of scale in the reproduction of the transport-related social exclusion (Jones and Lucas, 2012). For example, in London, the configuration of shared e-scooter trials is first fragmented at the city level by the limited number of boroughs participating in the trials, reducing coverage mostly to middle and higher-income boroughs in the south and western parts of the city. At the borough scale, however, this

issue is further compounded by local politics and financial restrictions for the infrastructure provision. The lack of connectivity with key facilities, as identified by various interviewees, leads to an unrealised potential of e-scooters in addressing more diverse travel needs than what they currently can. This is further illustrated by evidence of the modal shift from private and shared e-scooters. While the first are mainly replacing public transport, walking, and private cars, the second are substituting walking, public transport, and taxi.

The TRSE framework also entices reflections about deeper systemic issues underpinning some of the social consequences of transport modes. Examples of these systemic issues include regulations and governance, as well as deeply entrenched social perceptions and stigmas, which lead to reflections on race/ethnicity, poverty, and disability (Hine and Mitchell, 2003; Lucas, 2019; Yigitcanlar et al., 2019). The limited number of local authorities opting in the shared e-scooter pilots will provide a minimal picture of the performance and integration of these new vehicles in urban environments, informing national decisions with learnings from handful urban areas. Furthermore, while all pilots are implemented in England, but decisions made at the UK level, it is likely that decisions overlook the legislative functions of devolved governments in Scotland, Wales, and Northern Ireland. This speaks to the fragmented governance arrangement of shared e-scooter pilots and the implicit exclusion visible in the decision-making processes that translate learnings from the pilots to policy and regulation.

Regulations (or lack thereof) are constantly in the background of perceptions about e-scooters, particularly when addressing the fear dimension. Vulnerable groups constantly address the issues of road safety, both in relation to the current use of private and shared e-scooters and regarding uncertainties about enforcement, behaviour, and design standards in the future. Perceptions about behaviour of private e-scooter users are also deeply intertwined with a stereotypical profile of the users of this illegal mode. Negative associations related to ethnicity, age, and occupation of whom many perceive to be the primary riders of private e-scooters are frequently reinforced by anecdotal and word-of-mouth testimonies that add uncertainty and fear. This supports the need for incorporating a discrimination dimension to the application of TRSE to emerging modes of transport.

Being a very divisive issue, by implementing a TRSE perspective, it is possible to consider opposing views about e-scooters found across all sectors related directly or indirectly to urban mobility and technology. Our research highlights the need for critical evidence-based discussions about the intersections between emerging transport technologies and structural issues of infrastructure provision, governance, politics, and social inequalities at different scales. Furthermore, they point to the role of socially driven transport regulations and standards for innovations in shaping safer, sustainable, and equitable urban mobility futures for all.

7. Conclusion

This paper sets out to unpack some of the complexities of introducing e-scooters in urban transport ecosystems from a perspective of TRSE. The TRSE framework was selected because of its long tradition in transport equity research and its application to complex empirical realities inside and outside of the UK and European context (Bantis and Haworth, 2020; Church et al., 2000; Lucas, 2019; Oviedo and Titheridge, 2016). While not often applied to emerging modes of transport, adopting a TRSE perspective provided the researchers in this study with the necessary room for manoeuvre to navigate and analyse the diverse - and often unexpected - perceptions, interpretations, and attitudes of different stakeholders towards this, still-novel, mode of transport. It also enabled us to account for the added complexity of a rapidly changing regulatory and policy environment marked by uncertainty. Such uncertainty is perhaps best illustrated by the constantly shifting end date for many shared e-scooter trials or the announcement of regulatory decisions before actual laws could be enforced, as discussed in Section 3. The dimension-based analysis enabled us to sift through the influence of these changes in particular aspects of concern for interviewees and to reflect on the different social and organisational positions of participants that underpin their responses. By the same token, considering the intersecting nature of all dimensions and their contributions to TRSE, it was possible to visualise a comprehensive picture of e-scooters and inclusion, which was enriched by the localised nuances of private and shared e-scooter use, provision, and regulation.

Methodologically, the analysis in this paper speaks to the need for both scalable and in-depth evidence. First of all, to enable a reliable overview of characteristics, behaviours, and perceptions of users and non-users of transport modes. Secondly, to illustrate the diverse perspectives, contradictions, and understandings emerging from key stakeholders across the transport sector. Scale and diversity of participants, however, need to be leveraged by questionnaires and interview guidelines that consider the multi-dimensional and intersectional nature of social exclusion related to transport, tailored to the specific social and organisational positions of participants. Research methods also require localised and time-sensible designs that allow researchers to adapt and inform their insights by changes in the political, regulatory, and functional environment in which transport technologies operate and are introduced. Empirically, the evidence about different users and non-users of e-scooters contributes to existing gaps in knowledge about who uses private and shared vehicles and services and what role they play in meeting their mobility needs. Nevertheless, it is essential to understand the nuances behind current debates and the drivers and motivations of different stakeholder groups to adopt different positions and practices. A multi-sectoral and transdisciplinary analysis of evidence addressing the eight proposed dimensions of TRSE allowed us to shed light on issues not often brought forward, such as discrimination, spatial politics, (mis)use of technology for enforcing power imbalances, and the need for more flexible design and operations. Additionally, here are also some methodological limitations to consider. Firstly, the recruitment of interviewees and survey respondents may have introduced sample selection bias as they were recruited through personal and professional connections. This could limit the generalisability of the findings across stakeholders involved in the micro-mobility landscape in London, and may overlook critical perspectives from certain organisations and/or social groups disproportionally impacted by the rental trials. Secondly, while the online survey aimed to capture a broad range of perspectives on e-scooter use, it may not have fully represented the diversity of experiences and attitudes among Londoners. The survey focused primarily on travel practices, perceptions, and demographics related to e-scooters, but it may have overlooked other important factors that influence individuals' decisions and attitudes toward micromobility. Lastly, as in all qualitative research, despite efforts to ensure data quality through member checking and engagement with participants, there is still the potential for subjectivity in interpreting the data. The researchers' interpretations of participants' meanings and experiences may be influenced by their own biases or perspectives, which could impact the validity and reliability of the findings.

Further research into the local dynamics of both shared and private e-scooters in cities across the country is necessary to add nuance to the social consequences of different operational models and transport and urban environments in which these technologies are inserted. Moreover, it is necessary to critically explore the environmental dimension of e-scooters from systemic and longitudinal perspectives, understanding current trade-offs between immediate carbon reduction contributions and future pollution of the environment linked with electronic waste and other by-products of vehicle production, operation, and disposal. However, a significant barrier to conducting such research effectively lies in the limited accessibility of evidence about the trials to the public. This lack of publicly available data poses a challenge to fostering informed analysis on the future of shared e-scooter programmes for urban transportation ecosystems. Investigation of the economics of e-scooter service provision, infrastructure, and potential policies of (dis) incentives for using these technologies in combination with other modes

is necessary to explore further feasibility of unrealised potentials for inclusion identified in this study.

Ethics

This study was reviewed and approved by Development Planning Unit Local Research Ethics Committee with the approval number DPU2022/03.

CRediT authorship contribution statement

Anastasia Trofimova: Writing – review & editing, Writing – original draft, Visualization, Investigation, Formal analysis, Data curation. **Carolina Moore:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation. **Daniel Oviedo:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Annex 1. Interview Questions

Question Type	Prompts and Follow-Ups	Clarifications/Side Notes
	We are conducting research focusing on the e-scooters trials in the UK, seeking to identify the opportunities and challenges of this micro-mobility alternative from a perspective of transport related social exclusion (TRSE). We are reaching a diverse range of actors from the public and private sectors and from civil society who can contribute with different insights, perspectives, and information.	Intro
Opening question	1. Can you start by telling me a little about **yourself and the institution/ organisation where you work** — whatever is more relevant? What is the focus of your work, your values, your relation to micro-mobility?	Icebreaker + contextualisation
TRSE	2. When I say the term "transport related social exclusion", what comes to mind? Can you elaborate on what this means to you and what aspects or issues come to mind?	Broad notion of TRSE
E-scooter questions + TRSE	3. Who (social groups, individual profiles), in your view, is the target audience of e-scooters — and why? 4. [Show visual aid with TRSE dimensions, prompts and the wheel of identities — explain them carefully.] 5. **How do you think e-scooters influence TRSE (or inclusion)? What are the advantages and disadvantages this new modality offers?**	Role of e-scooters in reinforcing or decreasing TRSE — who it is aimed at, and who it does not see? Participants may go through the scheme as they wish, but make sure that they are somehow covering most/all dimensions. If they already started to discuss some dimensions, you may also prompt them to expand on these issues. For example, if you talked about gender issues, how do you think this relates to this TRSE framework? More importantly, focus on how e-scooters (or micro-mobility more broadly) impact these dimensions.
Current or envisioned practices and actions	6. [All sectors] Could you highlight practices or regulations that somehow address or recognise social inclusion or exclusion in relation to micro-mobility? If so, please elaborate. Does not have to be in London; we can talk about good practices adopted elsewhere. [Private sector] Based on the diverse aspects we have unpacked, are there any practices or regulations in your company focused on the theme of inclusion and exclusion at the moment? Or envisioned practices? [Public sector] Based on the diverse aspects we have unpacked, are you currently working on any actions or regulations that address the theme of inclusion and exclusion? Or envisioned practices?	
Ideal practices and actions (normative vision)	7. [All sectors] Vision for micro-mobility in the future — what do you consider to be **an ideal scenario of inclusive mobility**? Which actions or practices must be carried for us to achieve this ideal scenario? [Private and public sectors] Then, what could be done? Which practices and actions are needed for us to achieve an 'ideal' scenario?	
Barriers, constrains and governance	8. [All sectors] What are the main barriers and constrains for a more inclusive micro-mobility scene? 9. What is the role of your organisation in achieving that vision? What is it doing planning to do? 10. Anyone to recommend to contact for interview?	

Data availability

Data will be made available on request.

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