University of Salford MANCHESTER

SHUSU
SUSTAINABLE HOUSING & URBAN STUDIES UNIT

Healthy Active Cities

E-Scooters in Greater Manchester

Final Report

Graeme Sherriff
Luke Blazejewski
Michael Lomas

October 2022

Transport for Greater Manchester

Lime

Healthy Active Cities is a research group at the University of Salford that was formed in 2018 to bring together researchers and stakeholders to develop research on transport in Greater Manchester and beyond. The group has a particular interest in sustainable and active travel technologies and practices. It is based across the School of Health and Society and the School of Science, Engineering and the Environment. salford.ac.uk/healthyactivecities

The **Sustainable Housing & Urban Studies Unit (SHUSU)** is a dedicated multi- disciplinary research and consultancy unit providing a range of services relating to housing and urban management to public and private sector clients. The Unit brings together researchers drawn from a range of disciplines including social policy, housing management, urban geography, environmental management, psychology, social care, and social work. salford.ac.uk/shusu

Transport for Greater Manchester (TfGM) is the public body responsible for delivering Greater Manchester's future transport strategy and commitments. We also deliver a wide range of day-to day public transport and active travel services and projects to keep the city-region moving and growing. With around six million journeys a day, we're working hard to make travel easier through a better connected and well-informed Greater Manchester. To find out more about TfGM please visit tfgm.com/about-tfgm.

Lime is the world's largest provider of shared electric vehicles, with a mission to build a future where transportation is shared, affordable and carbon-free. One of Time Magazine's 100 Most Influential Companies, Lime partners with cities to deploy e-bikes and e-scooters to spur on a new generation of clean alternatives to car ownership; a movement that has so far delivered more than 350 million rides in over 200 cities and 30 countries. Lime is also the most experienced electric micromobility provider in the UK, with Lime e-bike and e-scooter riders in Greater Manchester, London, and Milton Keynes have taken more than 11 million emission free trips since launching in 2018, helping to take an estimated 3 million car journeys off the road. To find out more please visit li.me or contact lime via UKI-policy@li.me.

Authors

Dr Graeme Sherriff
Dr Luke Blazejewski
Dr Michael Lomas
School of Health and Society, University of Salford

Illustrations

Original illustrations by Andrea Motta (omsalvej.com) on behalf of Studio Salford (studio.salford.ac.uk)

Academic advisory group

Dr Esther Anaya, Imperial College London
Dr Nick Davies, Glasgow Caledonian University
Dr Harriet Larrington-Spencer, University of Westminster
Prof. Sven Kesselring, Nürtingen Geislingen University
Dr Justin Spinney, Cardiff University
Lorna Stevenson, University of Westminster
Dr Richard Weston, University of Central Lancashire

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E-Scooters in Greater Manchester: Final Report

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Foreword

Greater Manchester is currently on a journey towards delivering our vision of the "Bee Network". This will join buses, trams, wheeling, walking and other shared mobility services into one integrated transport system which will support seamless end-to-end journeys within Greater Manchester. Shared rental e-scooters have been available for use by the public on the streets of Salford and Rochdale as part of a nationwide Department for Transport trial. The trial has provided an opportunity for Greater Manchester to be at the forefront of transport innovation, providing insights into how shared e-scooters may contribute to the Bee Network vision and help achieve our strategic goals as set out in the 2040 Transport Strategy. Through our partnership with the University of Salford we have been able to increase our understanding of how this new and growing mode of transport can provide benefits to our city region and the challenges their use presents.

The results from the University of Salford's surveys, reference groups and interviews indicate that shared e-scooters are enabling access to work, education, shopping, and social activities. Importantly, they are also providing an alternative sustainable transport option to using a private car. In the 2040 Transport Strategy we set our ambitious Right Mix target of car journeys making up no more than half of all Greater Manchester journeys by 2040. We therefore welcome the evidence that half of respondents who have used a Lime e-scooter said they had used it to replace a journey that would otherwise have been taken in a private vehicle. To achieve our Right Mix target, we will also require an increase in the number of journeys made by active travel and public transport. While 38% of respondents said they had at least once used e-scooters to connect with public transport, 50% of respondents said they had used a e-scooter instead of walking at least once and 13% said they had used a shared e-scooter rather than using their own bike at least once. The evidence of whether they can help achieve our Right Mix targets is therefore mixed. From the interviews conducted though, it does appear that people appreciate the flexibility and resilience e-scooters can provide to the transport network.

While shared e-scooters provide new opportunities for us to meet our strategic objectives, they also present challenges that we must address. As this report sets out, currently e-scooters are more likely to be used by young people and males. Road safety and personal safety currently act as a barrier to their wider use. Concerns also exist about sharing space with e-scooters, both when they are being ridden and when they are parked, especially for vulnerable road users. Ensuring the safety of users and non-users is a priority and one that we will continually seek to address throughout the rest of the trial.

We would like to thank the University of Salford for undertaking this research and the insights they have provided. This report was intended to be published at the end of the trial period. The Department for Transport's decision to extend the trial until May 2024 now gives us additional time to continue our assessment. This, along with this report, will provide us with a detailed evidence base to help evaluate whether shared e-scooters have a future role in Greater Manchester, and what this role may be.

Nicola Kane

Head of Strategic Planning, Insight & Innovation
Transport for Greater Manchester

Transport for Greater Manchester

Foreword

Lime is proud to be the first electric micromobility provider to serve Greater Manchester, with our hugely popular e-scooter service in Salford celebrating its second anniversary.

Since October 2020, more than 80,000 Greater Manchester residents have made more than 400,000 trips, covering a combined distance of 700,000 km - with over a quarter of a million trips taken in the last year alone. Based on our own rider surveying and the University of Salford's independent research, we estimate that this has replaced 100,000 car journeys in the city-region.

The popularity of shared micromobility services in Greater Manchester continues to grow and we are proud to be part of a movement that is demonstrating how e-bike, e-scooter, and bike hire services can be operated safely and responsibly for everyone's benefit. The University of Salford's research has been invaluable in helping us to better understand how e-scooters are being used in Greater Manchester and the benefits they are bringing for improving access to sustainable transport.

This research has helped shape and guide the direction of the trial which has led to benefits for residents including the significant expansion of the service area, recently increasing the e-scooter fleet size by 70%, and launching our award-winning Gen4 e-scooter in Salford.

At the core of Lime's service is making sure our schemes work for as many people as possible. Through our Lime Hero donation platform, we're delighted to have partnered with the Greater Manchester Mayor's Charity to raise funds to tackle homelessness, and our Lime Access scheme provides discounted, sustainable travel for thousands of NHS and emergency workers, students, and travel concession pass holders.

Lime looks forward to continuing to work closely with Transport for Greater Manchester and the University of Salford to further deepen our understanding of the important role shared electric micromobility services can play in creating a fully integrated transport system. Working together, we know that e-scooters will play a big role in the future of sustainable transport across the region and this report is a significant step to delivering this goal.

Alan Clark

Senior Director, Northern Europe
Lime

Executive Summary

Overview

This report presents the findings of a University of Salford study focused on the shared e-scooter trial taking place in Greater Manchester and launched in autumn 2020. Sharing schemes are services that make vehicles, such as e-scooters, available for use on a short-term rental basis. In the case of the Lime e-scooter share scheme operated in Greater Manchester, vehicles are parked in virtual docks within the boundaries of the scheme. The Greater Manchester trial sits within a Department for Transport programme that aims to understand the potential of e-scooters in UK towns and cities, and their impact on people and mobility practices.

Greater Manchester's scheme is run by Lime and has covered two areas in the conurbation. The Salford trial has developed from an initially compact area centred around the University and MediaCityUK and has expanded more recently to encompass a larger area that includes other major employers and transport interchanges. The Rochdale scheme launched in April 2021 and concluded the following year after the planned 12-month trial period.

Method

The study employed a combination of qualitative and quantitative social research methods: three online surveys, 13 reference groups and 49 in-depth interviews. It sought to understand experiences and perceptions of the e-scooters and to identify who is using and might use them, why (and why not), how, and for what purposes. It placed e-scooter riding within a broader context that takes account of other road users, the wider community and vulnerable people. It considered e-scooters, and this share scheme, as part of the provision of transport and mobility services as a whole, therefore exploring the relationship between this new mode and other, more established forms of transport.

Context

E-scooters are the subject of a growing body of research that seeks to position them within mobility practices and to understand the implications for towns and cities of their adoption and spread. Along with recent work on bike share, they are part of the field of shared micromobility. Research to date has looked at a range of pertinent issues including implications for health and activity levels; the potential for and nature of modal shift; environmental impacts from e-scooter manufacture and operation and modal shift; challenges relating to shared spaces, particularly in relation to vulnerable road and pavement users; and considerations of social inclusion in terms of who can benefit from the availability of such shared modes.

Usership

Our findings indicate that use and the potential for use vary between demographic groups. Older age groups are comparatively less likely to use or see themselves using e-scooters (Figure iA). This is also the case for females (Figure iB).

Barriers to use

There is a set of barriers that tend to limit e-scooter use, and experiences of these vary between demographic groups. Road safety and personal safety are prominent barriers, and older people, females and those with a health condition are more likely to say that their e-scooter use is likely to be limited by these issues.

There is evidence that e-scooter use relates to the mobility choices available to an individual and that those who have access to neither a car nor a bicycle are more likely to make use of the share scheme. This suggests some potential for a positive effect on social inclusion, although it is worth noting that some people find the requirement for a provisional driving licence to be a deterrent, and this also applies to the requirement to use a smartphone to access the e-scooters.

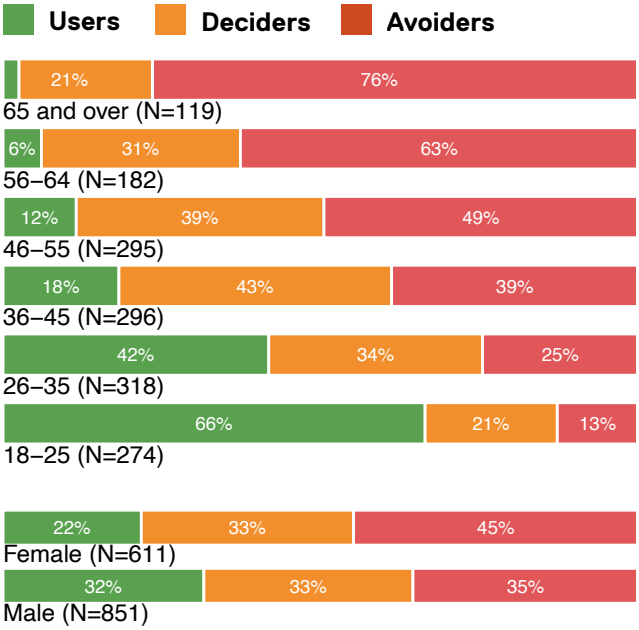


Figure i – Usership of Lime e-scooters across the sample (N=1514). Users (Green) have used an e-scooter; Deciders (Yellow) have not used an e-scooter but are likely to; and Avoiders (Red) have not used an e-scooter and are not likely to.

Relationship with other modes

People are using e-scooters for part of their journeys, in some cases replacing walking and cycling journeys and in other cases making journeys that they would not otherwise have made. This is not necessarily a case of simple substitution: people are seeing roles for e-scooters when running too late to walk, when wanting a less sweaty alternative to cycling or when planning a journey on foot with the option of picking up an e-scooter for the return leg. There are also cases of switching from and connecting to public transport and using e-scooters in combination with buses, trams and trains.

In relation to modal shift and the associated environmental impact, it is noteworthy that around half (49%) of our respondents who had used a Lime e-scooter had made at least one journey that they would have made by car, whether as a driver, a passenger or a taxi or ride-hailing customer. As these journeys were sometimes made when public transport was unavailable, such as when doing shift work, there is a potential social inclusion benefit from this modal shift: providing an alternative that is not only cheaper but also likely to be lower in terms of carbon emissions.

Cost and social inclusion

The cost of e-scooter use can be understood in comparison with other modes and what people are used to spending and prepared to spend on transport. Particular aspects of the shared scheme mean that the per-journey cost might be difficult to predict. Paying per minute can mean that not knowing the quickest route, waiting times at junctions and heavy traffic can affect journey times. Issues with batteries and challenges in finding parking spaces can also add to the length and cost of the journey.

A potential social inclusion benefit relates to those for whom walking and cycling might not (always) be practical but who would like some affordable independent travel. This includes people with health conditions that might limit mobility.

Whilst there is a complex relationship between road safety and personal safety, we have learned that people can value e-scooters as a way of travelling more quickly through spaces at night and avoiding waiting at public transport nodes. Female respondents, in particular, referred to these personal safety benefits.

Shared spaces

The impact of e-scooters on shared spaces has been prominent in the media, and our survey reflects this. A majority of respondents had felt unsafe around e-scooter riders or had had to move out of the way of one. A much smaller number had suffered injuries as a result. Although experiences of injury were infrequent, we should not discount these experiences, not least because perceptions of safety may deter some people, particularly the most vulnerable, from using shared spaces on foot.

Micromobility

Across these observations, we see some qualities that relate to e-scooters as a whole, such as their speed, compactness and relative affordability, as well as the sense of enjoyment to which people refer. Alongside these qualities, we see that shared e-scooters offer the advantages of a shared point-to-point service, including the flexibility to pick up and drop off, to pay per use and to avoid having to store or risk parking a personal vehicle. It is therefore conceivable that some of our findings relate to shared micromobility as a whole, rather than e-scooters in particular.

1. Introduction

This report presents the findings of a study focused on the shared e-scooters trial taking place in Greater Manchester. The trial sits within a Department for Transport programme that aims to understand the potential role of e-scooters in UK towns and cities. We have conducted three stages of qualitative and quantitative research, combining surveys, interviews and reference groups.

1.1 Overview

A trial of shared e-scooters has been running in Greater Manchester since autumn 2020. Initially the trial covered a compact area of Salford, centred around the University of Salford and MediaCityUK. It has since then been expanded to cover more of the city and, for a period of 12 months, included an area in the centre of Rochdale[1]. The scheme is part of a national trial of shared e-scooters that aims to inform policy on the potential legalisation of the vehicles. Use of e-scooters is currently limited to the designated sharing schemes in towns and cities in England: riding privately-owned e-scooters in public spaces remains illegal in the UK.

1.2 The study

The study comprises a combination of qualitative and quantitative social research methods: online surveys, reference groups and in-depth interviews. It seeks to understand experiences and perceptions regarding the scooters and to identify who is using and might use the scooters, why (and why not), how, and for what purpose.

It places the scooters within a broader context that takes account of other road users, the wider community and vulnerable people. By involving people who have used e-scooters alongside those who have not, we have been able to identify what factors might be limiting use and understand the ways in which e-scooters may be affecting other road users. Funded by Lime and Transport for Greater Manchester, the work builds upon the team's previous research on active travel, including bike share (Sherriff et al 2019) and e-cargo bikes (Blazejewski et al 2020) and contributes to the rapid development of micromobility research.

In particular, the research aims to investigate and create an evidence base on:

- who is using, or considering using, e-scooters and how these groups could be categorised;
- reasons for using e-scooters and potential barriers to their (further or more extensive) use;
- the purposes for which e-scooters are being used;
- the relationship of e-scooting with other modes of transport and how this may encourage intermodal travel and drive patronage to more sustainable modes;
- the nature of the e-scooting experience and its relationship with the urban context, including physical infrastructure, traffic and interactions with other road users, pedestrians and cyclists;
- perceptions of e-scooters by users and non-users in relation to convenience, impact, safety, the public realm and interactions with others;
- the distribution of the above factors across demographic groups including gender, ethnicity, socio-economic status and levels of vulnerability and the implications of this for uptake and social inclusion;
- the influence of the Covid-19 pandemic and associated policy responses on use of, and perceptions relating to, e-scooters.

The study is not intended as an evaluation of the Greater Manchester scheme. Rather, it takes it as a case study that enables us to better understand the potential role of e-scooters as part of mobility practices and to learn lessons from this particular scheme.

The research team has worked closed with colleagues at TfGM and Lime to develop this research. All findings and conclusions remain the independent analysis of the research team. Where Lime and TfGM have provided additional information in response to issues raised by the interviewees and survey respondents we have indicated this clearly in the text.

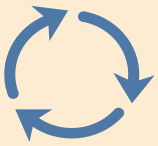
1 https://www.rochdaleonline.co.uk/news-features/2/news-headlines/145597/lime-escooter-trial-comes-to-an-end-after-12-months

1.3 This report

We begin by outlining the current research on e-scooters in the context of micromobility in Chapter 2. Whilst we cannot capture the entirety of this rapidly growing field, it is valuable to identify the prevalent themes and issues to which researchers and policymakers are turning their attention. We then present the detail of our findings over six chapters. In Chapter 3, we establish our sample and look at how e-scooter use, and potential use, differ across demographic groups. In Chapter 4, we explore the reasons for e-scooter use and the factors people are taking into account when making decisions about e-scooters. In Chapter 5, we draw on reflections from our participants relating to their experiences when using e-scooters. In Chapter 6, we describe the ways in which people are building e-scooter use into their transport routines and the modes of transport they are replacing and connecting with. In Chapter 7, we consider issues relating to sharing space and how these apply to e-scooter users and other road and pavement users. In Chapter 8, we look to the future and discuss factors that may limit e-scooter use and the development of share schemes. We conclude, in Chapter 9, with a discussion that brings together our findings and identifies the implications for research and practice.

Reading our findings

Our research uses mixed methods, combining qualitative and quantitative approaches. Qualitative approaches, such as interviews and reference groups, have enabled us to explore experiences and perceptions of e-scooters in depth, to delve into the ways in which people have fitted e-scooters into their regular practices and to understand the factors that may be limiting uptake.

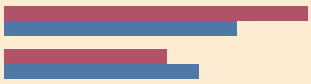


interviews
reference groups
surveys

The use of **mixed methods** over a multi-stage study means we can be iterative. That is, the results from one stage can feed into the next. When designing the survey questions for our online survey, for example, we took account of the themes and issues that arose in our interviews and reference groups.

We include a number of **illustrations** throughout the report. These have been created by an illustrator in response to interview quotes. They are intended as vignettes that bring to life considerations raised by our research participants, They do not portray specific places or occurences.

Qualitative data is presented in the form of quotations from texts, whether interviews, reference groups or 'free text' comments received through the surveys. Specific examples are used to illustrate points connected with broader themes identified through the research.



Quantitative approaches, in this case three online surveys, enable us to reach a larger population. We can ask questions that lead to observations based on percentages of the sample and make comparisons between parts of the sample.

For example, we found that concerns about road safety were a potential barrier for 59% of our sample and that this barrier was more likely to apply to women (67%) than men (54%). We could therefore see that perceptions of safety in traffic were related to gender. We present the results using charts that visualise the ways in which the answers to our survey questions differed across groups determined by, for example, gender, age or vehicle ownership.

In this report, we use the data from our third online survey because, when compared with the first two surveys, this has the greatest number of responses and was conducted at a time when the e-scooter scheme covered a larger area.

We refer to the answers to our questions as variables and use statistical tests to determine the significance of relationships amongst them. These report a p value, which tell us how confident we are that a relationship between variables has not occurred by chance. We use a standard way of indicating this:

* denotes a 'significant' relationship ($p<.05$)

** denotes a 'very significant' relationship ($p<.01$)

*** denotes a 'highly significant' relationship ($p<.001$)

Box 1 Reading our findings

2. Context

2.1 UK naional trial

The Greater Manchester e-scooter share scheme is part of a national trial intended to provide an evidence base on the potential for e-scooters to play a role in how people get around and how they will interact with other road and pavement users. It is intended that the findings will be used to guide future policy decisions around the legality of e-scooters in the UK.

Outside the trial areas, use of privately owned e-scooters in public spaces – including roads, pavements and parks – remains illegal, as do any hire schemes that operate independently of the national trials. Despite the regulatory context, the use of privately owned e-scooters is in evidence and there has been little police intervention (Heydari et al., 2022). In all the trial areas, shared e-scooter use is permitted only on roads, cycle lanes and pavements that are designated as shared use. Users must hold a valid UK full or provisional driving licence, and the scooters are limited to 15.5 mph. Within these national regulations, local areas can place additional restrictions such as lower speed limits.

In spring 2020 there was a call for evidence around micromobility vehicles, flexible bus services and Mobility-as-a-Service as a response to the Covid-19 pandemic[2]. Trials of e-scooters were planned to take place in four Future Transport Zones[3]. These trials aimed to build an evidence base to inform future policy decisions on e-scooter use. During the Covid-19 pandemic, in May 2020, the UK Government announced a package of £2 billion to support the development and installation of new cycling and walking infrastructure[4], as part of the Government's efforts to improve green transport in an unprecedented era of social distancing. As the Covid-19 crisis continued to deepen and the potential for e-scooters as a potentially Covid-safe form of transport became recognised, the Department for Transport announced they were opening up the e-scooter trials to more areas around the UK. Figure 1 shows the trials operating in England at the time of publication.

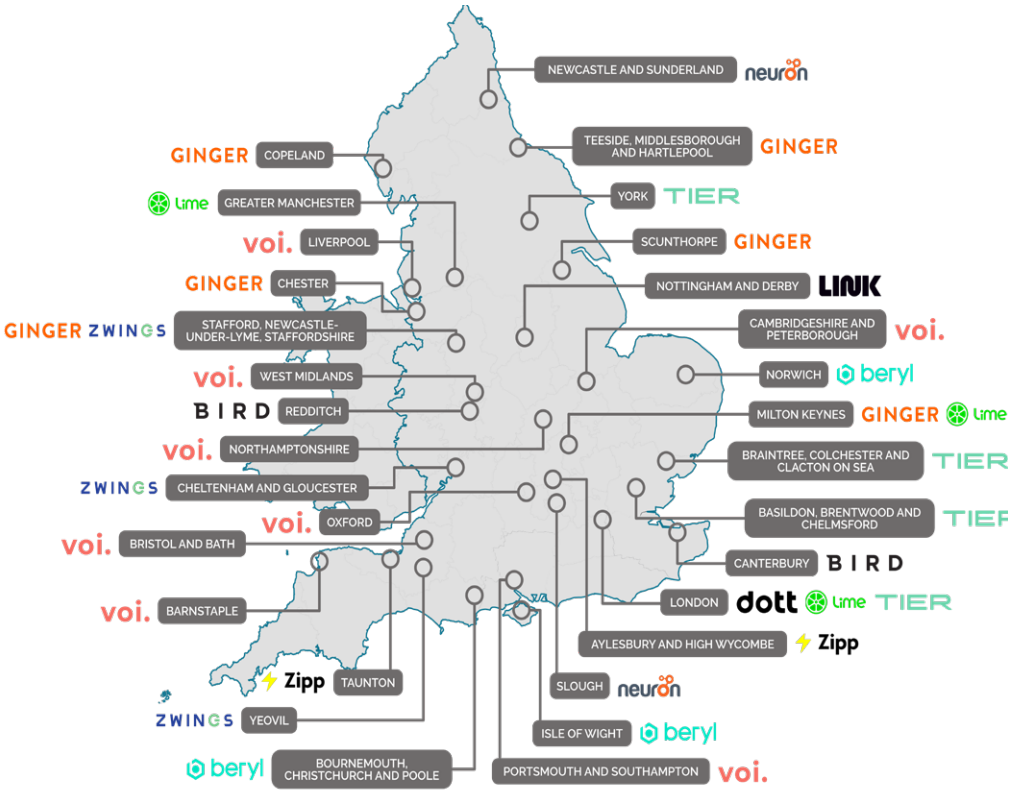


Figure 1 **Locations of e-scooter share trials in England (provided by ComoUK)**

2 https://www.gov.uk/government/consultations/future-of-transport-regulatory-review-call-for-evidence-on-micromobility-vehicles-flexible-bus-services-and-mobility-as-a-service

3 https://www.gov.uk/government/consultations/legalising-rental-e-scooter-trials-defining-e-scooters-and-rules-for-their-use/legalising-rental-e-scooter-trials

4 https://www.gov.uk/government/news/2-billion-package-to-create-new-era-for-cycling-and-walking

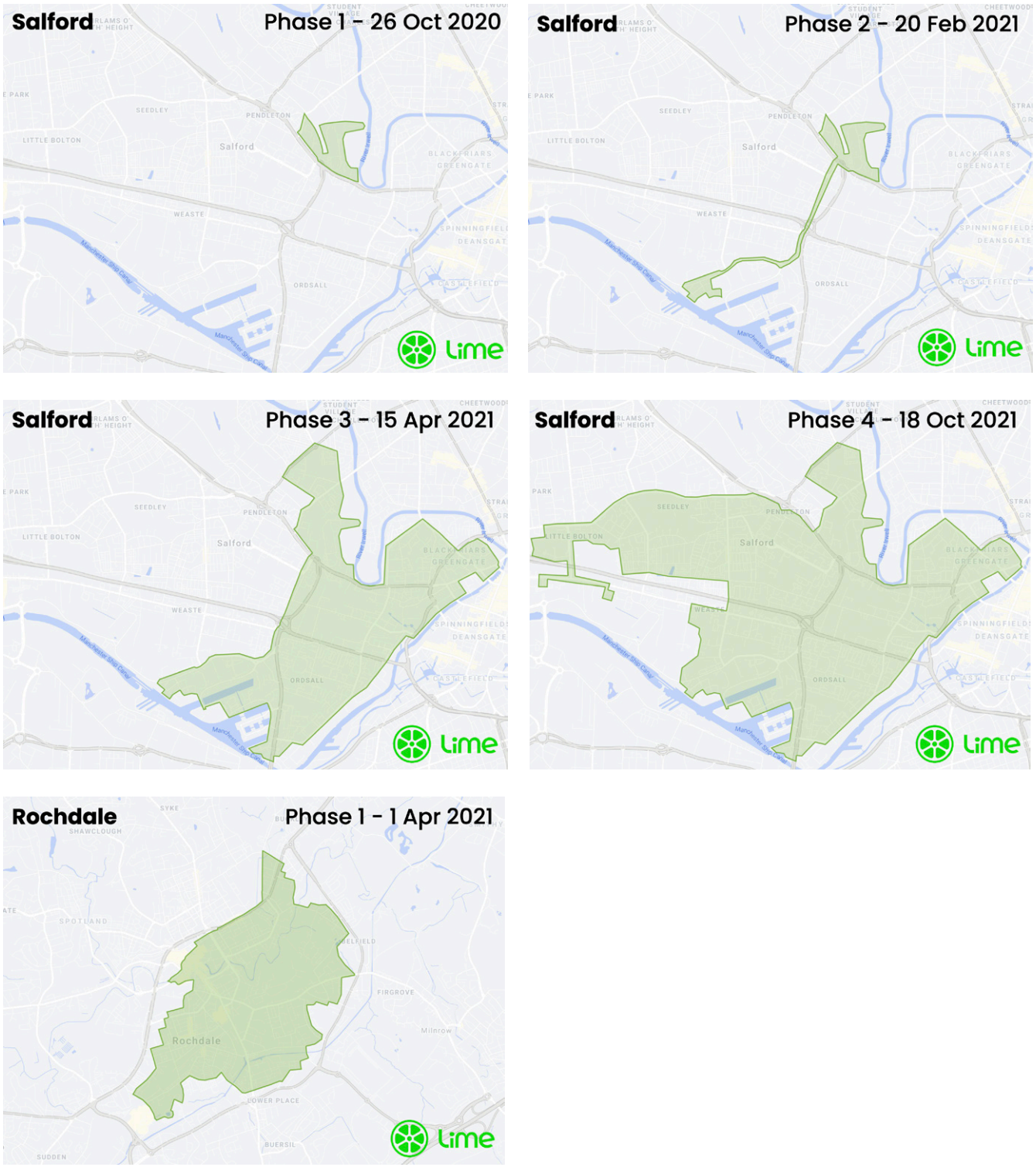


Figure 2 **Maps of the extremities of geofence in Stages 1 to 4 of the Lime trial scheme in Rochdale and Salford**

Salford is one of the cities hosting an e-scooter trial scheme. Phase 1 of the trial launched on 26 October 2020 and could be accessed on the University of Salford's Peel Park campus only (Figure 2). In February 2021, Phase 2 expanded the trial to MediaCityUK with a link route connecting MediaCityUK with the University of Salford. The route between Peel Park and MediaCityUK is a combination of shared pavements, segregated cycling infrastructure and service roads. Phase 3 was launched in spring 2021 and saw the scheme expand to include the majority of the Salford city zone bordering Manchester, including Ordsall and Salford Quays. Phase 4 was announced in summer 2021 and launched on 18 October 2021. It extends the trial scheme to Eccles, a town in Salford that is 3.7 miles (6 kilometres) west of Manchester city centre and includes multiple transport hubs, including bus and tram links, as well as major employer Salford Royal Hospital.

The trial scheme in Rochdale was smaller in scale. It operated in Rochdale town centre between March 2021 and March 2022.

In a Greater Manchester context, the trials build upon policy recognition of the potential value of micromobility in addressing congestion and air quality challenges. The Greater Manchester Transport Strategy 2040 (TfGM 2021) refers to the potential for e-scooters to provide a flexible means of travel while maintaining social distancing in the context, at the time, of Covid-19, improve first and last mile intermodal connectivity and act as a catalyst for active travel.

Using the Lime e-scooters

To use the Lime e-scooter share scheme, people are first required to download the Lime app to their smartphone. Once they have signed up for an account, they can use the app to locate e-scooters that are available close by with the in-app map. The map also indicates the layout and boundaries of the geofence, which demarcates the operational area. They then need to use the app to scan the QR code on the e-scooter, which unlocks the device for use. During the journey, the screen attached to the front of the e-scooter provides information on the speed and remaining battery life (as a percentage). This screen also provides additional information to alert the rider when they are, for example, riding through an area with an additional speed restriction or outside the boundaries of the geofence. At the end of the journey, the ride can be terminated via the app, at which point the user will be prompted to take a photograph to evidence that the e-scooter has been parked appropriately.

Lime's own data suggests an increase in usership, and, at the time of writing, they report that, since the launch, 80,000 Lime riders in Greater Manchester have made over 400,000 trips, covering a combined distance of more than 700,000km. They report that the Salford scheme averages 7,000 trips per week with average trip distances of 2.1km, and 80% of trips have been made by repeat riders[5].

2.2 Overview of research on e-scooters

Shared micromobility

E-scooters are the subject of a growing body of research seeking to position this new mode of transport within mobility practices, understand their contribution to our towns and cities and identify and evaluate their environmental and social impacts. Gössling (2020) dates shared e-scooter systems to 2017 in Los Angeles and points to a rapid growth in provision globally. A similar 'wave' of interest and investment in bike share can be observed (Sherriff et al., 2020; Spinney, 2020). Taken together, e-scooters and bike share are the most prominent examples of shared micromobility (Davies et al., 2020; Shaheen et al., 2020). Shared micromobility entails access for a short time to a transportation mode on an 'as-needed basis' (Popova and Zagulova, 2022:3), and its recent growth has been facilitated through a relationship with smartphone technology (Castellanos et al., 2022).

Research on e-scooters to some extent echoes work on bike share but has tended to be separate and have some distinct foci. These relate to safety for e-scooter riders and other pavement users, potential and observed modal shift and environmental impact of the technology. There has also been some debate around the potential impact upon health and whether e-scooter use could be considered 'active'. There is also a body of work that is more technically informed and relates in particular to optimising the provision of sharing schemes. Research has also looked at the potential economic impact of e-scooters (Leung et al., 2021; Kim and McCarthy, 2022).

Researchers have placed e-scooters within micromobility share schemes (Caspi et al., 2020; Krier et al., 2021) and examined how e-scooters might fit within broader transport systems (Gössling, 2020; Rose et al., 2020). A rich set of context-specific case studies is being formed. Recent examples include Paris (Christoforou et al., 2021), Chicago (Mehzabin Tuli et al., 2021), Munich (Hardt and Bogenberger, 2019) and Brisbane (Haworth et al., 2021a).

5 Data provided directly by Lime

Environmental impact

There is increasing interest in the potential for micromobility schemes to reduce tailpipe emissions as part of life cycle impacts (Hollingsworth et al., 2019). This is an area of contention, and there is a need to better understand the impact of e-scooters and the potential for improvements to be made. Hollingsworth et al (2019) conclude, for example, that increasing scooter lifetimes, using more efficient vehicles, and strategies to reduce the frequency of charging can 'reduce adverse environmental impacts significantly' (Hollingsworth et al., 2019:9). They argue that without such measures there is a risk that the rollout of e-scooters could result in increased greenhouse gas emissions.

Aside from the impact of the operation of e-scooter schemes, the potential environmental impact is predicated to a large extent on modal shift: i.e., the extent to which e-scooter journeys displace those made by other modes, particularly private cars. Available data suggests that e-scooter journeys are more likely to replace journeys that would otherwise have been made by foot, bike or public transport (Nikiforiadis et al., 2021; Wang et al., 2021; Sanders et al., 2022). Orozco-Fontalvo et al (2022a) conclude from a review of research on e-scooters that the vehicles compete primarily with active modes and comment that this 'reduce[s] its environmental benefits'. They note, however, the potential for connectivity with public transport systems to facilitate longer journeys. There is also other research that suggests a greater extent of 'replacement' of driving and ride-hailing trips, in this case in Portland, Oregon, suggesting that there may be more modal shift in some areas and also highlighting the importance of understanding variance across contexts (Nikiforiadis et al., 2021; Popova and Zagulova, 2022). Research into potential modal shift is in its early stages, and it is likely that decision-making around transport choice will be complex and relate to local conditions and opportunities. In a study in Norway, for example, Fearnley (2022) found that those who selected an e-scooter for its speed tended to replace public transport to a greater degree and bikes and cars to a lesser degree, whereas those who chose an e-scooter because public transport did not go to their destination were more likely to replace car trips.

Health

Multiple factors contribute to the impact of e-scooters on health and wellbeing. These include, according to (Glenn et al., 2020), injury rates and physical activity, as well as the potential, through modal shift, to contribute to a reduction in externalities associated with car use, such as air pollution. This debate focuses to a large extent on the potential for e-scooter use to be seen as 'active' – in the sense that walking and cycling are traditionally seen as physically active modes of travel. As a result, there has been some concern about the potential health implications of shifting walking and cycling trips onto e-scooters. Sustrans (2021), for example, argues that e-scooters are not genuinely a form of active travel, and the UK Parliamentary Advisory Council on Transport Safety (PACTS, 2020) contends that e-scooters are 'bad for active travel'. Cook et al (2022) explore the extent to which different micromobility modes can be considered 'active' and argue that this classification does not apply to e-scooters, since, unlike cycles and e-bikes, motion is sustained by a motor rather than the effort of the rider.

Sharing space

A body of work considers e-scooter user safety and injury patterns to date (Badeau et al., 2019; Glenn et al., 2020; Factor et al., 2021; Uluk et al., 2022). The European Transport Safety Council (ETSC) is developing guidelines (ETSC, 2021), and PACTS is investigating privately owned e-scooters (Winchcomb, 2022). Whilst there are clear comparisons to be made with cycling and bike share, researchers are keen to understand how characteristics of e-scooters might introduce new forms of risk. Orozco-Fontalvo et al (2022b:13), for example, contend that the potential for limited manoeuvrability and the fact that users do not consider themselves to need specific skills to ride might mean they are 'prone to quickly lose control'.

Pavement use and the impact on vulnerable pedestrians have been the subject of attention of the media and civil society. This concern relates to the speed of the vehicles and their near-silent operation (Pardo-Ferreira et al., 2020). Caspi et al (2020), for example, found that US news outlets focus on three themes when reporting on e-scooters: conflicts between riders and pedestrians, scooter regulations for riding and operating, and safety concerns. To some extent this is about risk minimisation, but it also relates to how people perceive pedestrian spaces and the danger of 'generally altering the psychological experience of using a space that used to be safer' (Radavoi and Potter, 2022), something that has been termed the 'motorisation of the path' (Gibson et al., 2021). Taratula-Lyons et al (2022) have explored issues with sharing space in Bristol, finding that e-scooter riding is causing 'regular conflict'.

There is an indication that people are less likely to report feeling unsafe around bikes and bike share than they are around e-scooters (James et al., 2019; Useche et al., 2022), perhaps reflecting their speed or novelty. In fact, people who had no experience of riding e-scooters were more likely to report feeling unsafe around e-scooters. James et al (2019:12) suggest that attitudes might change as e-scooters become a more common sight and that later studies on perceived safety could test if perceptions have changed over time. These experiences and

the regulatory contexts differ across countries and cities (Heydari et al., 2022). In Australia, motorised scooters are allowed on pavements (Radavoi and Potter, 2022), but in other settings this is not the case, and there is no indication that e-scooter riders would be allowed on pavements in the UK. In principle, shared schemes can utilise technology to limit pavement use and/or reduce speeds on pavements. Lime, for example, are developing technology to better estimate when users are riding on pedestrian spaces (Lime, 2022). Reseachers in Salford are investigating the potential for technological approaches including warning sounds (Torija et al 2021).

In a North American context, Brown et al (2020) report concerns relating to the potential for micromobility vehicles to block pavement access, having an impact on people with mobility impairments. They place this in the context of ongoing discussions around the allocation of parking space in the public realm. This has received policy attention in the UK (Transport Committee, 2019), as inconsiderate parking could represent a significant impediment for some pedestrians (James et al., 2019). Concerns around 'street clutter' and dangers to vulnerable people were also noted by the UK House of Commons Transport Select Committee (2020) in their review of e-scooters. In the UK, Guide Dogs for the Blind (2021) and the Royal National Institute for the Blind (RNIB, 2020) have raised similar concerns, providing examples of visually impaired people being struck by micromobility vehicles or being injured by carelessly discarded vehicles. Sustrans (2021) has published a statement calling for e-scooter legislation to put in place measures to protect other road and pavement users, including placing limitations on speed and power and banning the use of e-scooters on footways. In response to this body of concern, some e-scooter operators are working on providing effective warning sounds (Topham, 2022).

Social inclusion

Studies to date tend to agree that e-scooters appeal to a younger population that is disproportionately male (Guo and Zhang, 2021; Haworth et al., 2021a; Nikiforiadis et al., 2021). There is also an indication that riders are more likely to be from wealthier backgrounds and have achieved higher levels of education (Nikiforiadis et al., 2021; Wang et al., 2022). These different rates of use may reflect differing barrier profiles, i.e., some groups may be more likely to be deterred by certain barriers than others. Sanders et al (2020), for example, find that men and women tend to talk about different sets of barriers, with women more likely to show concern about road safety and crime. Transport research has explored how experiences of transport differ by gender, considering issues such as safety while waiting for public transport (Chowdhury and van Wee, 2020), harassment on public transport (Gardner et al., 2017) and inequalities in participation in walking and cycling (Pollard and Wagnild, 2017; Prati, 2018; Wild et al., 2021). Researchers have drawn links between gendered social roles and experiences of transport, with women more likely to have caring responsibilities and therefore making trips with multiple purposes for which they need to carry items and possibly children (Pollard and Wagnild, 2017; Perez, 2019).

Whilst it might be unsurprising that women are underrepresented amongst e-scooter riders – as it is the case with cycling – Haworth et al (2021b) point out that the picture could be more complex. They compare e-scooter share and bike share and find that, although in both cases female users are in the minority, they are a larger minority in the former, i.e., the gender gap is narrower. They draw upon Clewlow (2019), who found a comparable relationship, to consider why this might be the case and suggest that women may feel safer on e-scooters because they can be ridden on the footpath, that some clothing options may be better suited to standing on an e-scooter rather than sitting on a bicycle, and that women are less likely to make the longer trips for which a bicycle may be more appropriate. E-scooter operators Dott (2022) have recently published their own work on gender, observing that women using their e-scooters tended to be younger than males and also that women ranked road safety more highly when asked about the barriers that limit e-scooter use and were more likely than men to be deterred by poor weather.

3. Using E-scooters

Lime e-scooters continue to be used in Greater Manchester and there is evidence that people are using them as part of their routines, sometimes on a regular basis. There is an indication that older age groups are less likely to have used an e-scooter and are less likely to see themselves using one. Male respondents, people with lower household incomes and people without a health condition that affects their mobility are more likely to have used e-scooters. People who cycle for part of their regular journeys are less likely to have used an e-scooter but more likely to see themselves using one. People who neither cycle nor drive as part of their regular mobility practices are more likely to have used, or to potentially use, an e-scooter than those who cycle and/or drive.

3.1 Our sample

Figure 3 provides an overview of our sample and the extent to which our survey respondents had used e-scooters. A quarter (25%) of the sample had used a Lime e-scooter in Rochdale or Salford, 4% had used a privately owned e-scooter, and 3% had used both. A majority of respondents (68%) had not used an e-scooter. This sample enables us to understand how and why people are using e-scooters, as well as to look at potential use and identify what factors might be limiting use.

Figure 4 provides some more information on usage patterns. Figure 4A indicates that some respondents were making journeys on e-scooters that they would not otherwise have made, i.e., that they were not necessarily replacing their existing mode(s) of transport with e-scooters. Figure 4B shows the areas of Greater Manchester in which respondents had used Lime e-scooters. Finally, Figure 4C shows that, whilst the majority of users made trips relatively infrequently, there were some people who used e-scooters once a fortnight or more. Finally, The demographic composition of our sample is provided in Appendix D.

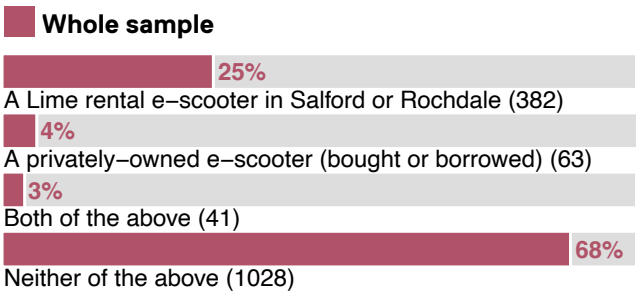


Figure 3 1 Use of shared and privately-owned e-scooters in Greater Manchester across our sample (N=1514)

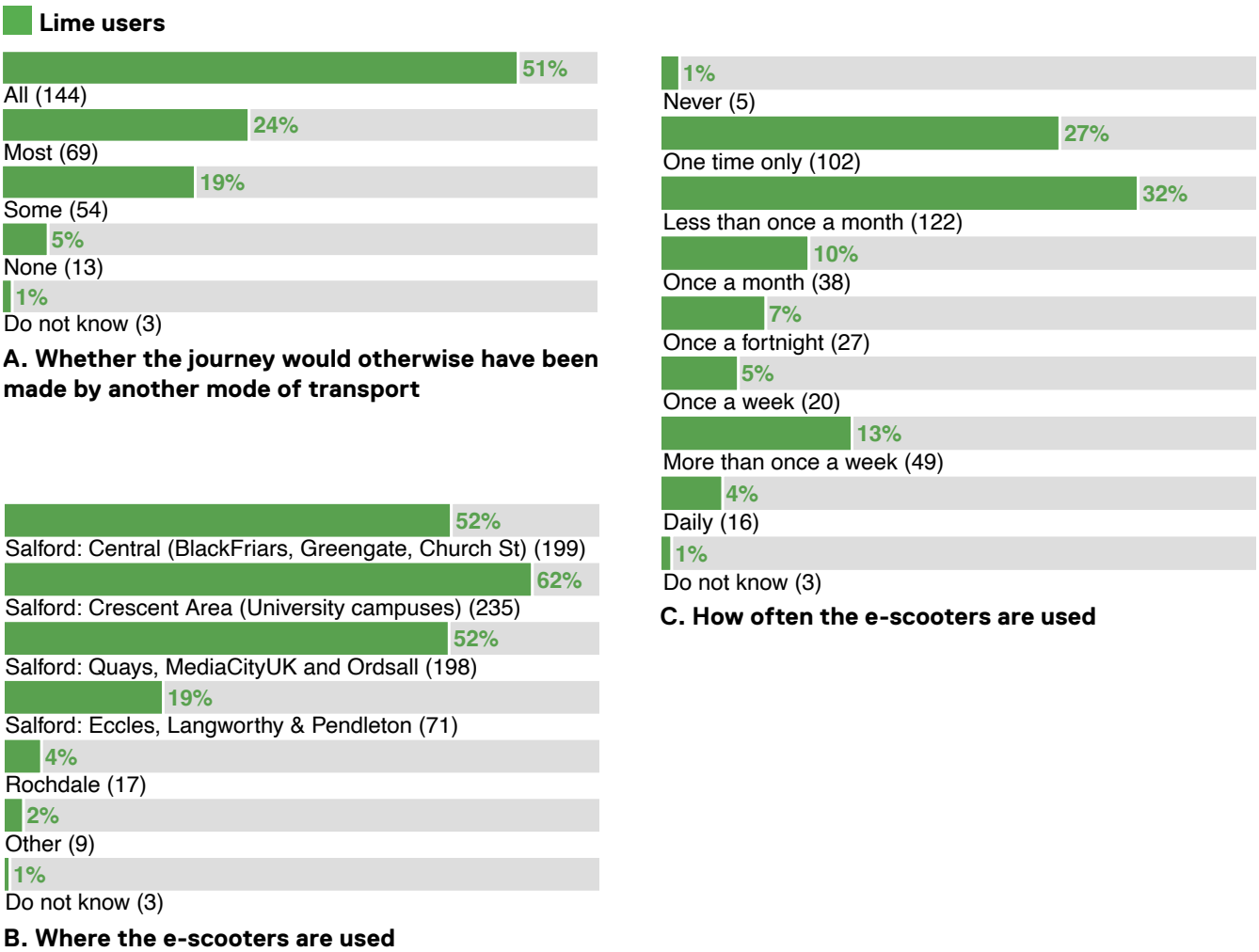


Figure 4 Use of Lime e-scooters in Greater Manchester (Lime users only, N=382)

3.2 Who is using e-scooters?

Our survey provides insights into how actual and potential e-scooter use varies across demographic groups. We can also look at other factors, such as the modes of transport available to our respondents and the ways in which they get around.

We divided our sample into the categories of **'users'** and **'non-users'**. Users had used a Lime e-scooter in Rochdale or Salford at least once since the launch of the rental scheme in autumn 2020. We further divided the non-user cohort into **'deciders'**, who said they were 'likely' or 'very likely' to use an e-scooter in the future, and **'avoiders'**, who said they were 'unlikely' or 'very unlikely' to use one.

Figure 5A demonstrates a clear and statistically significant relationship between age and user category, with younger respondents more likely to be users and less likely to be deciders or avoiders. Figure 5B identifies a gender split between use categories, with males more likely to be users and females more likely to be avoiders(***)[6]. Figure 5C indicates a potential relationship with household income: for those earning below £30k, the likelihood of using an e-scooter increased as income decreased(***). Those in the lowest income bracket were most likely to have used an e-scooter and least likely to be an 'avoider'. Figure 5D suggests a relationship between health and mobility practice, with those with a 'long-term illness, health problem or impairment that limits daily activities' less likely to have used an e-scooter and less likely to see themselves using one(***).

Given the potential for e-scooters to replace alternative modes of transport, it is also useful to place their use within the context of transport availability and mobility practices. Figure 5E indicates that people who cycle, to whatever extent, were less likely to have used an e-scooter but more likely to be a 'decider'(***). Figure 5F compares those who cycle, those who drive, those who do both and those who do neither. It shows that people who do neither were more likely to use, or have used, e-scooters. This cohort is likely to have limited access to personal transport. Those who both cycle and drive and therefore have these modes of transport available to them were least likely to use e-scooters.

We found that these differences in use category applied to both shared and privately owned e-scooters. Males, people without an illness that limits their mobility, younger people and people who do not cycle were more likely to have used either a shared or a private e-scooter. They also said they were more likely to use one in the future. In the following chapters, we use our qualitative data to explore the reasons for these relationships.

Figure 5G provides a breakdown of usership across Greater Manchester. Given the presence of Lime in the city, it is unsurprising that people in Salford were more likely to have used an e-scooter, and this indicates that the presence of the scheme is leading to take-up. This effect was smaller in Rochdale, but fewer Lime e-scooters were available in Rochdale, and the scheme concluded in spring 2022. It is interesting that people in boroughs outside Salford and Rochdale were using the e-scooters, as this implies that people are making use of them when visiting the area.

6 See section Box 1 on page 2 for an explanation of our presentation of statistical relationships.

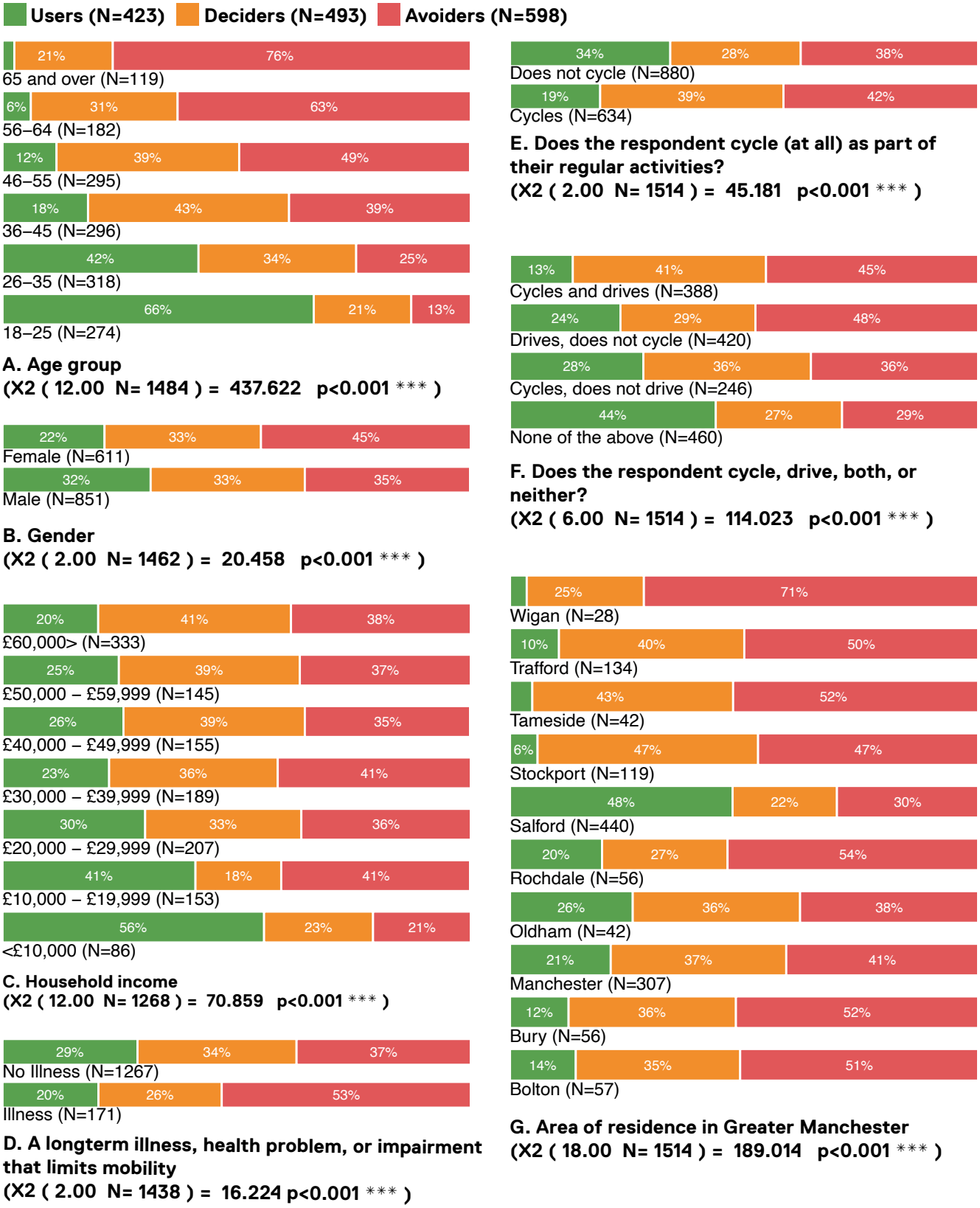


Figure 5 **Percentages of cohort who have used a Lime e-scooter (Users), would be likely to (Deciders) and would be unlikely to (Avoiders) (Whole sample, N=1514)**

4. Choosing e-scooters

Although curiosity and enjoyment are prominent reasons for using e-scooters, this need not cause us to discount them as a 'serious' form of transport. Curiosity is natural when a new mode of transport is being considered, and enjoyment can be part of transport decision-making. Respondents saw potential in e-scooters in relation to faster travel and shorter journey times, reducing their environmental impact and having a mode of personal transport that was more affordable than a car whilst not requiring the physical exertion of a bicycle. This latter point was of particular interest to people with health conditions or vulnerabilities that affect their mobility. In addition to these qualities that relate to e-scooters in general, respondents placed value on the potential of the shared scheme to provide a flexible mode of transport that enabled them to connect with public transport and to avoid the expense of vehicle ownership.

When asking about reasons for using e-scooters, we divided the question into three: e-scooters per se, shared e-scooters and privately owned e-scooters. We wanted to understand what reasons related to e-scooter use per se and then to identify in what ways the reasons for using a shared or privately owned e-scooter might differ. We suspected that many of the reasons would overlap but that the two modes of operation would each have their own characteristics and advantages.

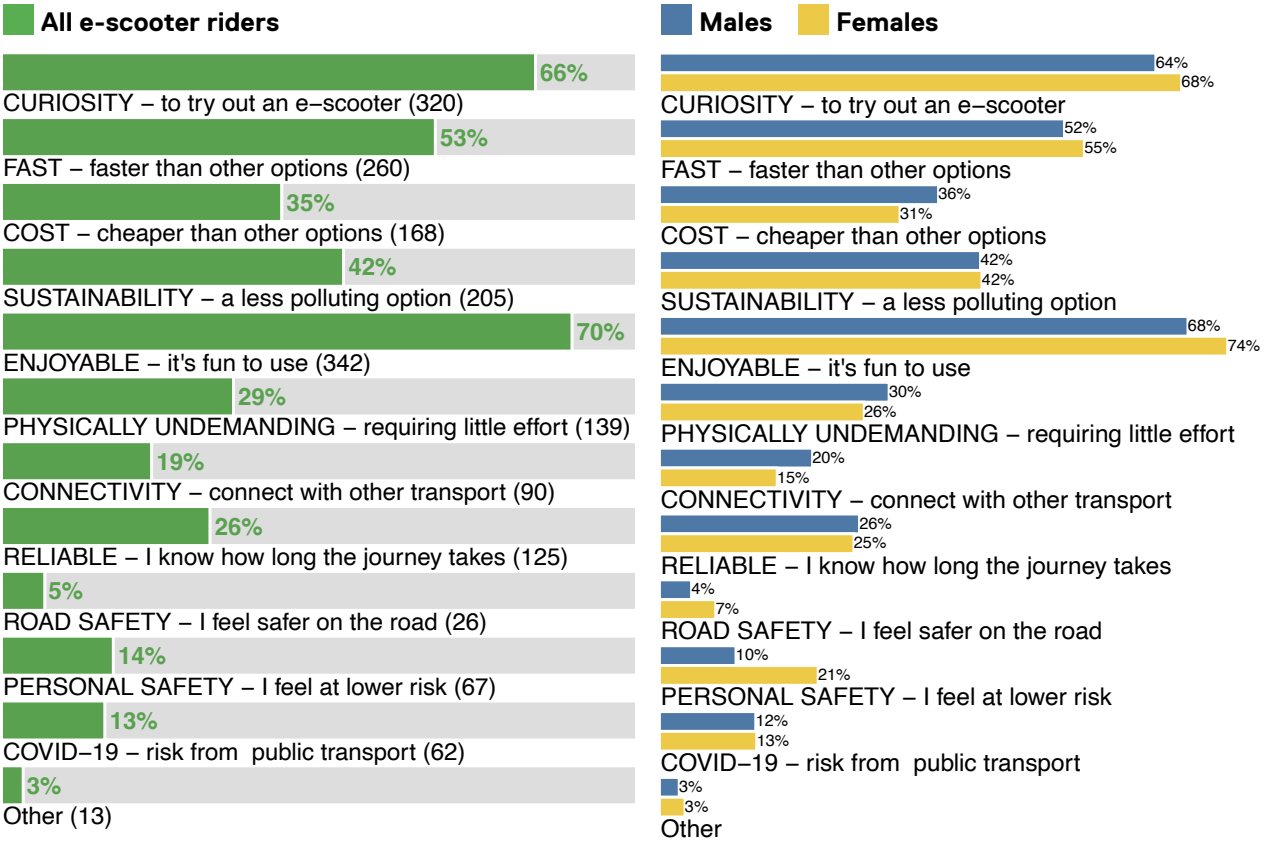


Figure 6 **Reasons selected for using e-scooters (closed list) – (All e-scooter riders, N=486)**

4.1 Curiosity and enjoyment

Figure 6 shows the reasons, selected by respondents, for using an e-scooter per se (both shared and privately owned). The available options in the survey were distilled from our earlier data collection, which is presented in our interim reports (Sherriff et al 2021a; Sherriff et al 2021b). The findings show that two-thirds (66%) of our users had used an e-scooter because they were curious. This is to be expected when considering a relatively new mode of transport.

> Curiosity! It looked like fun!... There aren't lots of things that you could try, actually. It was a lockdown! So I guess that's sympathy to public transport and better use of public space and public realm. So that curiosity would have given a sympathy to wanting to try it. Yes. (Interview 47)

In this account, the participant highlights the significance of the timing of the rollout of the Lime sharing scheme. Coinciding with national lockdowns occurring due to the Covid-19 pandemic, the e-scooters emerged at a time when there were minimal opportunities for engagement with public space – *'It was just for curiosity and fun, because there's not much to do at the moment'* (Interview 1).

A majority of users (70%) had selected 'it's fun to use' as a reason for their e-scooter use. Although the lockdowns could be considered special cases, it is evident that enjoyment continued to be a significant motivation after their cessation, and many respondents alluded to enjoyment in their accounts of e-scooter use: *'if I'm being totally blunt and honest, I find them fun'* (Interview 8); *'You get your 12 mile an hour up, and you get a bit of wind in your hair. They feel fun to use'* (Interview 13); *'They were just such a laugh!'* (Interview 9); *'so why not just try it and go on some adventures'* (Interview 35).

The prominence of curiosity and fun in the motivations profile might imply to some that e-scooters are a less serious mode of transport and that it is their novelty that is causing the current wave of use, rather than their utility. However, this would be an oversimplified conclusion to draw, and our qualitative analysis provides further insight into their perceived utility. With any new mode of transport, there will be a period when people are trying it out. A sharing scheme lends itself to this, since it is possible to take some rides without having to invest in a vehicle, much in the same way that bike share might enable someone to try out cycling without the commitment of buying a bike.

Illustration 1 'I use them because I love them. I don't really need to. If I get off at Victoria Station and I walk to work, there's usually a bank of scooters outside of Sainsbury's, just on the other side of the Irwell. It's a two-minute journey to work, but I use it...' (Interview 38)

The novelty of e-scooters is something that arguably distinguishes e-scooters from bike share: conventional cycles are much more familiar as a mode of transport. This first interviewee describes being curious about e-scooters, the sharing scheme and the app-based concept, and the second notes the novelty of small electric vehicles:

> I think more just curiosity, really, because I'd never used an e-scooter before, so I was quite fascinated by the concept, and just the way that it's controlled by an app. I've used the bikes before – one of the Manchester Mobikes – and I've used bikes in London and stuff, especially the Mobikes, because they were a similar concept. I always thought it was quite a good concept, and I wanted to try them out, so, yes, I just thought I'd download the app and give it a go. (Interview 22)

> I think they're a little bit more fun because they're motorised, they've got a fun element to them. People are like, it's a novelty, if you don't get them for transport like I do, it's a novelty riding them. (Interview 40)

What these accounts highlight is that the enjoyment factor is not limited to use for leisure purposes. When being used for utility purposes, such as a commute to work, e-scooters can add an element of pleasure to a journey.

It is worth noting that a relatively small number, only 40 respondents, selected curiosity with no other motivation, 19 selected 'fun' on its own and 45 selected both curiosity and fun but nothing else. This means that around a fifth (104, or 21%) of e-scooter users in the sample had used an e-scooter for solely these reasons, whereas the remaining 79% had other motivations in addition to fun and curiosity.

> I use them because I love them. I don't really need to. If I get off at Victoria Station and I walk to work, there's usually a bank of scooters outside of Sainsbury's, just on the other side of the Irwell. It's a two-minute journey to work, but I use it…

> …it adds a fun element to what can sometimes just be a bit of a tedious experience commuting… It's the same when I cycle to work, it's the same feeling really. (Interview 38)

In referring to cycling, this second interviewee highlights the fact that enjoyment can be a factor in decision-making on transport and that people might choose to get around in a way that they enjoy. This is a reminder that enjoyment is an element of mobility decision-making in general and is not limited to e-scooters. This point was made in our mobility researchers reference group: *'This aspect need not be downplayed and pitted against 'serious' transport, as it may be a reason people are drawn to them: there is no reason that journeys from A to B should not be enjoyable'* (Reference Group – Mobility Researchers).

Whilst for some their curiosity was expressed through a simple ride 'for its own sake', for others it was part of trying out the vehicles with a view to them becoming a commuting option:

> They looked quite fun, but then I thought, I'm not going to pay to go on a scooter just to go round somewhere I don't need to. Really, for me, it was an easy option for commuting, which made me want to try and actually keep doing it. (Interview 41)

> You're just scooting round having fun, but we were actually testing whether it – what the scooters were like going up and down bumps, stopping, all that sort of stuff. (Interview 10)

> We thought, let's try it, and we just had some fun. At the time, I think it might have been in the uni campus… I probably started using them more seriously for transport the last few months. (Interview 36)

These findings highlight that although people may initially use an e-scooter for fun or out of curiosity, there is additional utility to these experiences. The accounts show that factors relating to comfort, confidence, reliability and safety are being tested. These are factors that will likely feed into future mobility choices.

4.2 Speed and journey times

Another prominent factor in decision-making was speed and journey times, with 53% of respondents selecting 'faster than other options' as a reason for using e-scooters.

> We live at Oxford Road Station, so we could go to the Northern Quarter in five minutes, have a meal, come back. We could go down to Whitworth Park, come back. Suddenly, it actually made us see the city in a different way in the sense that the city is tiny but we can get to these different places that we want to hang out a lot quicker. (Interview 39)

This participant lives in central Manchester – an area not currently covered by an e-scooter sharing scheme – and is describing the benefits that come from private e-scooter use. They describe the convenience e-scooters provide for inner-city travel, making the area seem 'smaller' and easier to navigate.

The ability to make journeys more quickly is something that was important to many interviewees. Speed is relative, however, and depends on what other modes are available or appropriate for any given journey. In some cases, e-scooter use replaced walking:

> It takes about 25 minutes, half an hour to walk, so it cuts a load of time off my commute. (Interview 40)

> Yes, just massively cut down on the length of the walk, turn it from a 40-minute walk to maybe a five/ten-minute walk. (Interview 36)

E-scooters formed part of a trip in combination with walking: *'A couple of times I've taken them in along Chapel Street, or more often what I've done is, if I've gone into town in the evening, like I'll walk in and then maybe get a scooter home because it's a quicker way to get home*' (Interview 13). Here, the interviewee implies that, although an e-scooter was used for the return journey, having this option enabled them to make the initial journey to the destination on foot.

Considerations of speed also related to the ability to avoid the delays associated with traffic congestion:

> I thought for a while, I thought, oh, I quite fancy having a go on one of these. The one thing I hate about living here, especially now I don't work in town, is the fact that you can go out at midnight and get stuck in a traffic jam just to get a pint of milk, and it drives me up the wall. (Interview 37)

4.3 Environmental impact

Another motivating factor for e-scooter use was environmental sustainability. Almost a half (42%) of the sample stated that they used e-scooters because they saw them to be a 'less polluting option' when compared with other available alternatives.

> It's coming more from an environmental standpoint, personally. Annoyingly, I have a diesel car, and I've wanted to get rid of it. It just happened to be it ticked all the boxes, and diesel is the one negative, unfortunately, but I'm very much within the next year wanting to change that, so in the meantime what I'm looking at is: can I be making better trip choices? (Interview 33)

For this interviewee, whilst walking and cycling might appear to be the least environmentally damaging modes of travel, e-scooters offered something comparable at times when they were unable to be active:

> I'm quite an active person, and I do a lot of sport and go running. I'm also frequently injuring myself! In that context, that would be really useful. If I had to make a journey, and I didn't feel I could walk or cycle, I'd still be able to do it in a way that felt like it was the least environmentally damaging and, probably, financially, the cheapest way, but still, yes, still made sense. (Interview 7)

Illustration 2 'I go and swim at The Quays and there's been a couple of times where I've gone part of the way home on them, like started walking home with a friend and then he's gone off one way, and I've just got on the scooter to get the rest of the way home just more quickly. It's that freedom thing, I think.' (Interview 13)

4.4 Flexibility

Figure 7 gives the reasons for using a shared e-scooter in the Greater Manchester scheme. In order to compare the different modes of e-scooter operation, the list of reasons was expressed relative to private ownership. There are characteristics that are distinctive to shared schemes, including the relative cost, convenience and flexibility.

> Personally, I know if I saved a little bit I probably could buy a scooter, but I like the option that, as a community, people that maybe couldn't afford that high price point have the option to still use it as a public transport method. It's quite a bit more direct, potentially works out cheaper with the price of travelling in Greater Manchester, so I really like it. (Interview 40)

This quote neatly demonstrates each of these points, identifying that e-scooter use is sometimes more affordable than public transport provision in the area, as well as offering a more direct journey to a desired destination if the start and end points are both within the geofence. Another benefit of sharing schemes over private ownership relates to reducing the risk when parking or storing personal property.

> Now, using your own, I think the benefits that you could get from it being a rental service is obviously shared maintenance responsibility. It's always going to be charged up when I find it. I don't have to bugger about with it in the bottom of my house, putting it in a shed or worried about it being safe at night. Then there's also when I get to work as well, where would I put it? I work on the eighth floor. We've got no place to store cycles, let alone e-scooters, so that's a complete logistic nightmare. It would get stolen by the time I get back. (Interview 46)

> What I can see is it solving that last mile problem. The tram from my house is a mile away and that. I do walk it, but I've cycled it, and I've had my bike nicked twice from Brooklands tram station. (Interview 16)

Looking at the data more closely, the results indicate that females were more likely to value flexibility (41% of females versus 34% of males) and to mention e-scooter access ('I do not own an e-scooter' – 57% compared with 48%). This latter point should be interpreted with care, however, given that it is not clear if it relates to not owning an e-scooter or to not wishing to own one.

One of the advantages of e-scooters, and the rental scheme in particular, identified by interviewees was the degree of flexibility that they offer and the resulting feeling of 'freedom'. In these examples, that freedom is manifest in the ways in which people are able to integrate an e-scooter into walking journeys and the level of spontaneity that this enables:

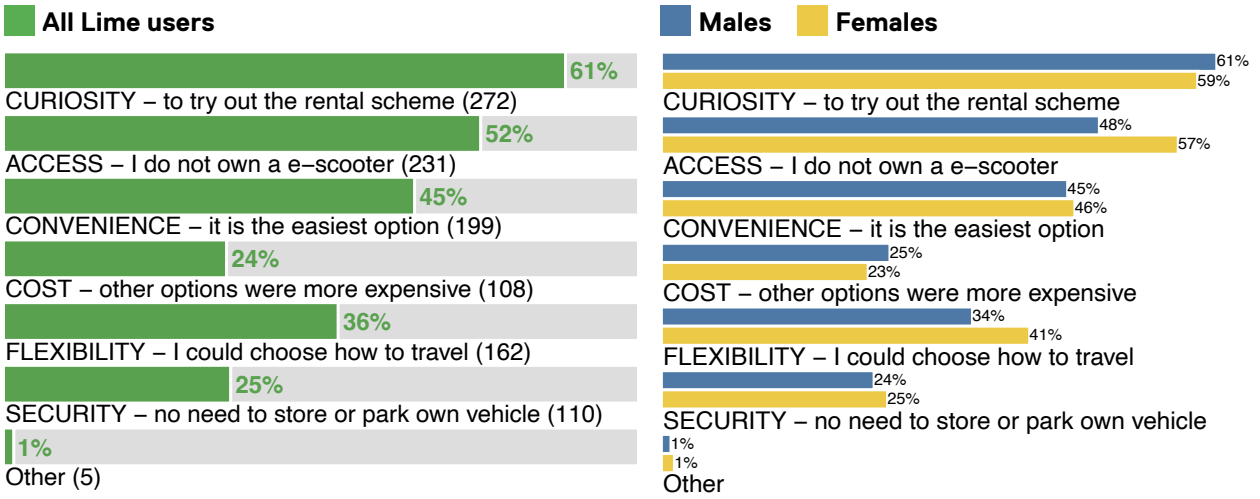


Figure 7 Reasons selected for using Lime shared e-scooters (closed list) (N=382)

> I go and swim at the Quays, and there's been a couple of times where I've gone part of the way home on them, like started walking home with a friend, and then he's gone off one way, and I've just got on the scooter to get the rest of the way home just more quickly. It's that freedom thing, I think. (Interview 13)

> I mean, it allowed me to explore a lot of the Salford area as well, because if you get a day off or something and you go to the shop or whatever or you're going for a walk you don't have to set off to get on the scooter. You can set off, go for a half-an-hour walk and then just decide to come home on one or just have a bit of a ride. I quite like the drop and go or the pick up and go and then drop them off somewhere freedom of it. You're not tied to it. You can just leave it. (Interview 42)

The latter quote also emphasises that e-scooters offer greater freedom to explore the local area and to embark on journeys that individuals may not have previously taken. This level of spontaneity was also linked to an increased level of adaptability:

> The other point-to-point [options are not] as flexible, so your bus options, your tram options aren't as flexible, so at least with scooters you get that flexibility of: oh, that road is blocked, so we can just quickly nip around it this way. (Interview 33)

4.5 Low levels of exertion

Ease of use was another significant factor identified by the sample, with almost 30% of respondents feeling that the low level of physical exertion required would be a reason to use e-scooters. This is likely to be reflected in comments around the potential to avoid perspiration and to arrive at destination fresh. In relation to this, comparisons were made with walking and cycling.

> ...but then there's also the novelty factor of it and the fact that I don't turn up to work in a sweaty state. So if I was to bike, I'd probably just get my own bike because I own three of them, and then I could bike to work, not have to spend a rental charge. The reason I don't do that is because I don't want to get to work and then have to get changed and sort myself out for the day, I want to arrive fresh. (Interview 46)

There is also evidence from our respondents that e-scooters provide additional opportunities for people who might not otherwise be able to use a personal vehicle due to health conditions or other impairments. This first quote, for example, refers to a period of low mobility due to an injury; the second to having mobility affected by medication; and the third to anticipating lower mobility as the respondent ages:

> In central Manchester my e-scooter allowed me to venture to different parts of the city with ease. When my mobility was lowered due to injury this was a major lift to my mental health.
> (Comment – Survey 3)

> I'm on long-term medication that affects my mobility, so sometimes I can walk all right and other times I can't, so I just thought, oh, that's a really – I put off going across to Peel Park if I'm not feeling too good that day, whereas now, with the scooters, I was thinking I don't – that doesn't impair me now from getting to somewhere else. (Interview 20)

> I just think about mobility, and then I think, I'm getting on, I'm 50 this year, I've got a dodgy knee from rugby. You think, these devices in the future help elderly, injured people that struggle with their mobility. They're a piece of freedom. They're a really, really powerful tool. (Interview 39)

The following two quotes highlight the increased potential for such individuals to engage with activities that may not otherwise be possible due to mobility issues:

> 'I'm just in pain most of the time. Walking far distances can be quite hard for me sometimes, so I was just looking to find something that wasn't a car, essentially, and that could get around places that the buses weren't going to. For me personally, it was just fun. It's kind of like riding a bike, but without the effort. (Interview 49)

> Journey to university campus – for studying, social activities and the gym. I have CFS/ME and it means I can go to campus more often than if I had to walk the whole way or get an uber. I walk from [home] to closest e-scooter parking on junction of Seaford Road and Frederick Road (0.3 mi). I then get an e-scooter to campus (0.4 mi). I then take this journey in reverse if I haven't had alcohol, or walk the whole way back if I have. (Comment – Survey 3)

These findings are particularly interesting, given the quantitative data presented in Section 3.2. This showed that those with a 'long-term illness, health problem or impairment that limits daily activities' were less likely to have used an e-scooter and were less likely to see themselves doing so. Considering these findings in tandem arguably indicates that although some people with mobility issues are currently making use of e-scooters, the majority of people in this category do not see this as something from which they can currently benefit.

An additional issue that related to vulnerability was that during the Covid-19 pandemic exposure to the virus was a concern for some people. This interviewee, for example, saw e-scooters to be an alternative to public transport for people concerned about social distancing:

> Particularly with the last two years, you've got that health issue negated with you being out in the open air, so you're not sharing the taxi or a bus or whatever with other people. So those were my pros for it; it was basically the health side from an air point of view. (Interview 33)

Illustration 3 '... but then there's also the novelty factor of it and the fact that I don't turn up to work in a sweaty state.' (Interview 46)

5. Experiencing e-scooters

There are a range of factors that shape experiences of e-scooter use, some of which may limit the extent of take-up and act as barriers to a wider usership. Some users experienced difficulties finding an e-scooter to use and returning their e-scooter at the end of their journey. Battery life can be an issue, causing people to have to end their rides early and sometimes unexpectedly. The operational area of the scheme limited the journeys people could make and caused some to experience the scooter cutting out without notice. The cost of e-scooter use can be understood relative to other modes and the availability of transport options. The combination of per-minute charging, unknown routes and unexpected issues with geofencing can mean that costs are difficult to predict.

In our surveys and interviews, we gave people opportunities to tell us about their experiences when using e-scooters in Rochdale and Salford. Figure 8 summarises the responses to the question about experiences when using a Lime e-scooter. The list of options for this, and other, questions was developed from an initial analysis of interviews with e-scooter riders early in the study.

Whilst this list consists of experiences that are problematic and may limit e-scooter use, this should not imply that all e-scooter users encountered these issues. It is also worth noting that, although our focus is the Lime service in Greater Manchester, there is no reason to suppose that these issues relate only to Lime e-scooters. It is likely that they reflect challenges across e-scooter provision and, possibly, (shared) micromobility in a wider sense.

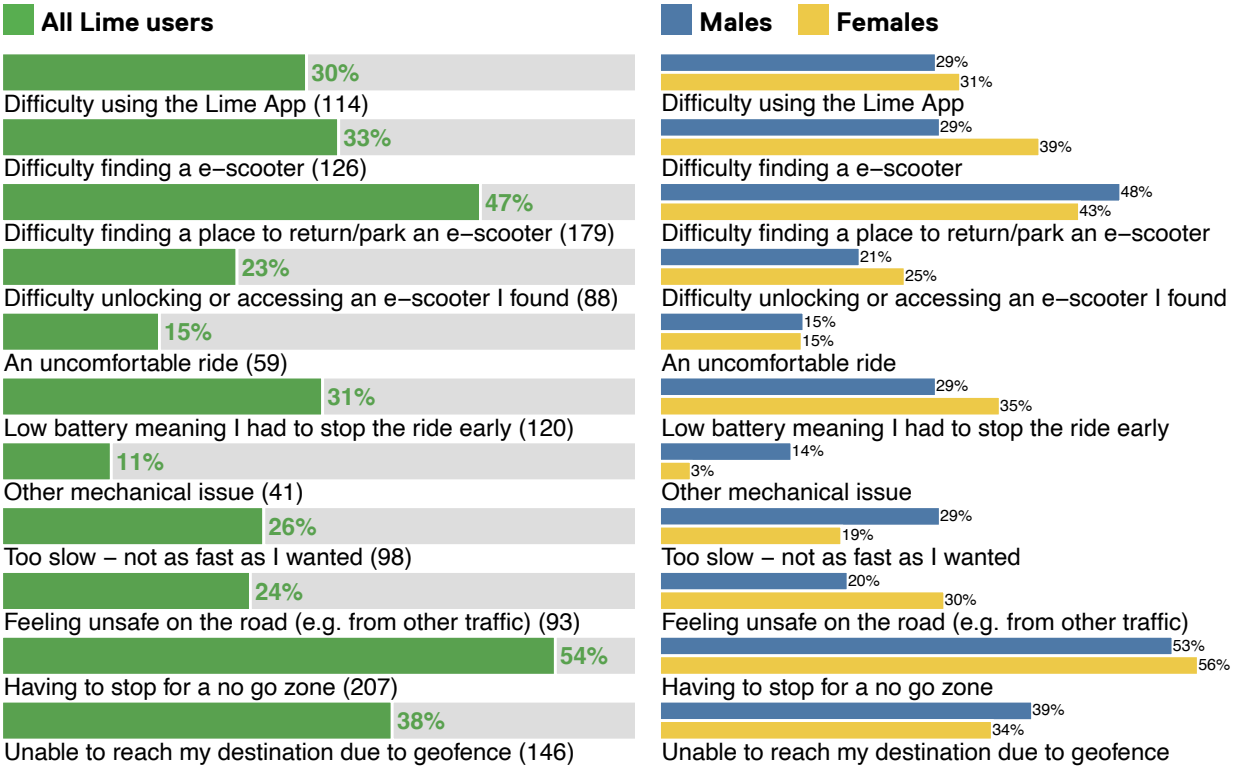


Figure 8 **Experiences when using a Lime e-scooter (closed list) (Lime users only, N=382)**

We have seen in the previous chapter that many people reported e-scooter use to be an enjoyable experience. These challenges should be understood in this context.

5.1 Finding/parking a scooter

One of the prominent categories of issues related to finding e-scooters and returning them to a virtual dock. The nature of Lime's design, with virtual docks, means that users need to locate an e-scooter at the start of their journey and then find an appropriate parking zone when they have finished using the e-scooter. A third (33%) of respondents had experienced difficulty finding an e-scooter, and almost a half (47%) had found it difficult to find a place to return and park an e-scooter. Relatedly, almost a quarter (23%) had had difficulty unlocking or accessing an e-scooter once they had located it. Lime report that, since these surveys were conducted, they have increased parking capacity by 30% (Appendix B).

The size of the operational area and the distribution of docks within that are important considerations when planning a shared scheme and can have an impact upon accessibility:

> The parking spots can be, I think it depends on journeys for that. I think that's the only things that are really a negative side of shared transport. You can't, obviously, cover everywhere, and you've got to make sure that people that are using them are looking after them. (Interview 40)

When parking spaces are well distributed relative to a user's needs, a share scheme can be convenient:

> I think it's quite convenient, especially after work, because I know Salford have a lot of these stations where they are: you can just hop on one and go. Because I live close to another parking station, it works quite well.' (Interview 41)

> I do think there's definitely a place for e-scooters. They just make so much sense because they're small, they're quick, you can park them up easily. (Interview 19)

Conversely, some users found that the parking locations did not suit their requirements: *'There are not enough parking spaces in Salford quays area, I have to go past my flat then back on myself to park it. But also would be useful to be able to park at more locations, as again this dictates journeys massively'* (Additional comments provided). Lime report that they have been increasing the number of parking spaces available as the trial has progressed (Appendix B).

Illustration 4 'On several rentals had to push for half a mile as alarm stated no riding zone, even though I'd already travelled through the area on the initial journey. Was annoyed that I was still charged whilst walking as I couldn't park it.' (Survey 3 – Comments).

Difficulty finding parking spaces was of concern to respondents not only because it added time to their journeys and made it difficult to predict journey times but also because this additional time would be included in the cost of their journey. This issue of cost unpredictability could perhaps be alleviated if the geofence were simplified.

> On several rentals had to push for half a mile as alarm stated no riding zone, even though I'd already travelled through the area on the initial journey. Was annoyed that I was still charged whilst walking as I couldn't park it. (Comment – Survey 3)

> ...time being added on when you arrive somewhere but then the app says you can't leave it at this place, so you're then looking, it's maybe another 20p, 40p or whatever clocking up while you're finding somewhere where you can leave it. (Interview 19)

Almost a third (30%) of respondents who had used a Lime e-scooter told us that they had had some 'difficulty using the Lime App', an example of this being unable to end the ride on the app: *'Yes, the glitches – one of the common ones is it won't shut down. You try to end the ride, and it won't end'* (Interview 12).

5.2 Battery

Some interviewees reported difficulties related to battery life. Almost a third (31%) of our users reported having to stop a ride early due to a low battery. Interviewees described the process of finding and selecting an e-scooter and noted that checking the remaining battery life was part of this: *'if I remember rightly, there were about five or six scooters to choose from, but none of them were, had got a very high battery percentage left on them'* (Interview 16). Having to spend time checking this could add to journey times and result in people finding e-scooters to be unreliable:

> So, I walk from mine to a parking station which is about 15/20 minutes from my house I then get the e-scooter and ride for [for] 10 mins to work, it is very convenient when the app is working and there scooters available, it hard to find a good scooter with good battery life, which makes the journey longer sometimes.' (Comment – Survey 3)

A clearer indication of the capacity of the battery and the distance this would enable the user to cover would help to alleviate some of this concern, as this interviewee notes: *'I also wish we could see on the scooter how far the battery would take us (for example: 50%, 7miles / 14 kilometres) etc because it would help me avoid battery anxiety'* (Comment – Survey 3). This information is available in the Lime App to some extent, so these concerns may imply that interviewees were not aware of this or did not find the information reliable.

Where interviewees had experienced unexpected drops in charge, this meant that it could be difficult to predict journey times or to select a scooter and be confident that it could last for the entire journey. The issue of trust and reliability in the battery system was underlined by one participant, who noted that if this was improved then they would have more confidence in the system. Additionally, they noted that unreliable battery life presents a particular challenge if there are few parking locations along their route:

> I think it's that not really knowing if I'm going to be able to get the whole journey. There's not any drop-off points any more on my journey, so it makes it a little bit more difficult... I think battery life, as well. If there was some consistency of I know that X amount of battery will always get me this far, from home to work, I know I can get there on 30 per cent, say, that'd make me feel a lot more confident. (Interview 40)

Another interviewee reported a similar experience. In this case, Lime had given them some compensation:

> The only one time was where the battery stopped working, and I think it said 70 per cent. I just took it to the nearest parking spot, and I just walked. I reported it in the app, and actually I think they gave me 50 per cent off the next ride. (Interview 41)

Lime have commented that issues with batteries relate in part to fleet size, i.e. the number of available vehicles, and that it would be expected that these problematic experiences would be less frequent now that the fleet size has increased.

5.3 Geofence/operational area

The use of a geofence, which delineates the operational area of the scheme by controlling where e-scooters can be activated and ridden, has enabled Lime and Salford City Council to gradually roll out the scheme across Salford. The extent of the geofence and the locations of no-go, go-slow and parking zones are subject to Salford City Council approval.

By way of context, this contrasts with the approach to the Greater Manchester bike share scheme that was run by Mobike in 2017 and 2018, whereby bikes could be dropped off anywhere within a set area, and this decision may to some extent reflect concerns about repeating some of the problems associated with that scheme, particularly the aspect of street clutter (Sherriff et al, 2018). As our transport reference group reflected, *'One of the challenges has been convincing decision-makers that the Salford e-scooter scheme will not be exposed to some of the problems suffered by the 2018 Mobike bike share scheme'* (Reference Group – Transport Planners). An interviewee reflected on this and noted that the e-scooter parking zones were a positive development for the scheme: *'The experience with the Mobikes when they were deployed in Manchester was a little bit chaotic, and I think the idea of having set parking spaces for them, having plenty and well-thought-out places to put the stuff, is good'* (Interview 8).

The technology is also able to control how fast a user can travel in certain areas. For example, when scooting into high-density zones, such as the University of Salford campus, the scooters will automatically slow down to lower the risk of collisions with pedestrians or other road users. In these examples, interviewees comment positively on this feature:

> It pretty much does what I need it to do, and it obviously slows down when you have to slow down, and if there's a no-ride zone, obviously, there's no riding. (Interview 22)

> It was very clever the way it had some GPS built-in intelligence as to where it could actually go. You know how the speed goes down as you get to a junction and things like that? That was impressive. (Interview 16)

The converse is, however, that journeys are limited in scope. Some 38% of respondents, for example, had experienced not being able to reach their destination because of limitations imposed by the geofence. For some, this means the current scheme will not be suitable:

> The only reason, really, I've not used it myself is because currently I'm just outside the boundary of where they are located or where the pick-up points are. (Interview 17)

> The only major thing is fault is the geofence. It would be great if I could complete a whole journey on the e scooter. (Comment – Survey 3)

> I definitely think I would find it useful in certain situations. The only reason, really, I've not used it myself is because currently I'm just outside the boundary of where they are located or where the pick-up points are convenient for me or pick-up and drop-offs. That is the only reason I've not used it, because on a lot of occasions I've wanted to go a short distance, say go to town, because I'm only about a mile away from the city centre where I am now. I would have rather got a scooter because I know how to use them. I'm familiar with them, and I think that would be a better, more economical way than getting a taxi, which is what I do now. (Interview 27)

The geofence has grown substantially during the trial. At the scheme's launch in 2020 the geofence was initially limited to the University of Salford campus. As the area has grown, so have the number of users and the range of journeys: ***'Then when I found out that they were expanding the area, I started to use them a bit more'*** (Interview 22).

One of the most common issues raised related to the scheme ending at the Salford border and not crossing over into Manchester. Respondents implied that a larger area would result in additional journey opportunities for which an e-scooter might be used:

> They're there; I can see them. They're available, but not to me, because I have to go into Manchester for work. (Interview 29)

> The e-scooter trial in Salford is frustrating in §that it comes so close to the boundary with Manchester but you can't use them in it. (Comment – Survey 3)

> Please expand Salford into the centre of Manchester! I work in Media City and would love to use the scheme to get to my home in the city centre. (Comment –Survey 3)

In this comment, the respondent compares the Lime scheme with one they had used overseas, the latter being less restricted:

> The only problem I have with Lime is that the zone is very small and you can't go everywhere in Manchester. Like if I wanted to catch the train and I'm in Salford trying to get to Piccadilly it wouldn't be possible due to the ride zone. For example, when I travelled to Istanbul they had E-scooters everywhere and the ride zone covered almost all of Istanbul which made it a huge [are] where your allowed to take your scooter. So, if lime doesn't become like that in the future then I highly doubt I'll be using your services on a regular basis. (Comment – Survey 3)

For one of our interviewees, the restrictions placed on use in the Lime scheme were part of their motivation for purchasing their own e-scooter:

> I think that's probably the only major difference that I've seen is that obviously the private scooters have got no… no kind of control infrastructure round about them. You take it out the box, and it does what it does out of the box, whereas the rental ones have got a bit of a control about "Well, you've gone beyond the limits of where the scheme operates". (Interview 14)

Over half (62, or 60%) of privately-owned e-scooters users who responded to the survey indicated that one of the reasons they used a private e-scooter was that the coverage of the rental scheme in its current form does not extend to include the places they wish to travel to. This finding can be seen as a sign that expanding the operational area could increase the feasibility of the scheme for utility journeys.

The existence of a geofenced operational area means that there is a need to be able to see where the e-scooters can be accessed, ridden and parked. One of the challenges reported by our participants was that it could sometimes be difficult to see, on the app, exactly where the e-scooters could be used. This interviewee explained that this had limited their journeys:

> I think there's probably a bit of clarity needed in the Lime App, just as I said, because I've tapped in certain places and it wasn't outright clear as to whether or not you could either use it there or park there, were the two things that I was a little bit unsure about. That's what sometimes stops me from making certain journeys. (Interview 33)

This relates to the changes in the geofence over time as the operational area was expanded. As this interviewee comments, it was not always clear to potential users that these changes were happening:

> I found out actually they'd extended the geofencing to the centre of Salford, all that way intro Trinity. I was totally unaware of that. I discovered that by chance, looking on the app and seeing scooters scattered down Chapel Street. (Interview 12)

Some participants reported experiences of the e-scooter cutting out or slowing down unexpectedly. Here, an interviewee recalls the e-scooter cutting out and leaving them feeling unsafe, and another recalls needing to push the e-scooter along as they reached a 'no-go' area:

> I was on a road near a river (no go zone) the scooter cut out and I had to push it which left me initially in a dangerous position in the right lane of a 2-lane road. (Comment – Survey 3)

> When you are limited outside of [saying] the Salford industrial units past Media City it's a whole stretch of cycle lane optimised for bikes and cyclists. The restricted geo-location wastes your journey when you could have done the 30-minute walk without the scooter. Essentially you are lugging a piece of dead weight that doesn't even roll on manual power. (Comment – Survey 3)

This quote emphasises the importance of having a good understanding of the geofence in order to maximise the utility of a sharing scheme. The participant emphasises the need to plan ahead and to deviate from previously preferred routes of travel. This has an impact not only on the perceived practicality of the use of e-scooters but also on their cost-effectiveness, with the need to reroute mid-journey adding to both the duration and the distance of the journey, ultimately leading to increased costs. This was made more challenging by the difficulty of ascertaining the exact location of the geofence boundaries and restricted no-go areas, particularly whilst in motion: *'you cannot use your phone whilst riding to check you're going in the right direction'* (Comment – Survey 3). Lime report that they are now adding mobile phone holders to the e-scooters.

5.4 Cost

Overview

Cost is a complex issue. Attitudes towards expenditure vary greatly, and perceptions of the cost of e-scooter rental will be shaped by an individual's budgetary constraints, their travel needs and the modes of transport they have available to them, as well as what they think transport is worth to them. The relative cost of e-scooter use can therefore be both a barrier to and an incentive for use.

For around a quarter of survey respondents (24%; Figure 6), the comparative cost of Lime e-scooters was a reason for using them; for others it was a factor that could limit their use. 47% said that the cost of a Lime e-scooter was a factor that would limit their use, and 51% said that the initial capital cost of a private e-scooter would. We did not find a simple relationship between these responses and household income.

The sense of value for money therefore varies greatly. In the following examples, two people refer to journeys of around five pounds, the first implying that this is inexpensive, while the second feels five pounds as a cumulative everyday cost could soon add up and make walking a more cost-effective choice:

> I think the pricing is about fair. I think where I'd probably start to think more seriously is about those longer journeys. I've always seen them as a final-mile-type mode of transport, particularly in London. I only expect that to ever be a couple of pounds, never more than about £5 for a short journey. (Interview 33)

> If I was doing that too many times, I'd stop doing that, because I'd be like, "Oh, it's going to cost me a fiver again, I'm going to just walk", so, yes. (Interview 1)

In context of other transport options

Perceptions of cost can also relate to how much an individual is spending on transport as a whole. For this participant, their relatively infrequent use of the rental e-scooters is part of a 'minimal' transport expenditure. The occasional cost of e-scooter use is therefore not a concern. They note, however, that if e-scooter use were to become a more frequent practice, they might have to budget more carefully:

> If it's to and from work, I tend to not really keep too much of an eye on it, because I know it's usually between £1.80 and £2.30 and because my travel expenses are minimal. Both myself and my partner don't drive; my partner typically works from home, or he will also get a scooter into Greater Manchester because he works in the city centre, or we walk… If I'm going from home into the city and it's going to be costing upwards of £3, then I'd probably take it into account, but on a day-to-day basis, typically not. (Interview 40)

Lime offer ways of paying per month (Appendix B) to reduce costs. This interviewee, who had budgeted for e-scooter use as part of their mobility, had found these useful:

> I'm quite impressed with the costs. It's not too bad, especially if your Lime pass, if you use it frequently, it's well worth it; you make your money back quick with the Lime Prime, they're called, or something like that… Generally, a journey, it can be between 90 pence to £1.50, and with the economy these days it's not really that significant; I don't notice it that much, I guess. Yes, it's not something I've found myself budgeting for. (Interview 36)

> I gave it a go a couple of times, but the cost is £2.20: I think it was a £1 to unlock, and then it was something like £1.20 for the ride. I just thought, well, that's like £4.40 for a return journey, which I just thought, it's quite a lot for just a short journey on a scooter. (Interview 48)

When thinking about e-scooters as modes of transport, it is to be expected that people make comparisons with other modes of transport, especially when considering e-scooters as part of their mobility practices and an

alternative to other modes. These interviewees compare the cost with bus fares, which they had found to be cheaper:

> ...it's a bit expensive, isn't it, but I didn't mind, just for the fun of it, but again, if that was what you were relying on every day, thinking around you'd probably start to tally that up against the cost of a bus ticket. (Interview 1)

> With bikes it's the same thing. You see 5p a minute, and you go, that's a great deal, but then you think like, if I did this for half an hour every day I'm paying £6 just to commute; it would actually be cheaper to get a bus. (Interview 44)

In these examples, a favourable comparison is made with taxis and trains:

> I used to use train to get to uni or my friend's house or to city centre, and every time I had to pay £4.50 per ride. However, since I found out about Lime e-scooter[s] I now save a lot. I would use the e-scooter from my accommodation to city centre and continue by foot for at least five minutes to get to my destination. They are so reliable. (Comment – Survey 3)

> If I hadn't used the scooter to get home fairly quickly, like at ten o'clock at night, I probably would have got a taxi rather than walk home, so that was definitely a cheaper way to get home. (Interview 13)

In this case, the interviewee had been able to make some savings after realising they could use an e-scooter to travel to work:

> Obviously, then going to work and using the buses and things like that, I then realised that I could walk ten minutes, find the nearest scooter spot, jump on a scooter, and with the membership and stuff like that the amount of cash saving was absolutely ridiculous. So it was, I think I just remembered about them, had a look on the app to see where the nearest drop-off would be and whether it would make more sense just to scoot instead. That first trial run was an absolute success, so it just carried on. (Interview 46)

They reflected on the bus journeys they had previously made, noting that fares differed across different operators, that return fares were not available and that day passes were not worth it, since they would have had to take three trips to break even. With the Lime subscription monthly fee, which covered unlocking, they estimated that the marginal cost per journey was approximately 90p.

When sharing a journey with another person, however, e-scooters may be less competitive. This interviewee compares ride-hailing and e-scooters:

> As an example, my partner and I both took an e-scooter from Salford University campus to MediaCity to trial them. Our journey cost just below £6 each, which is £12 between us. The same journey by Uber would have cost circa £8.50, which would be not only cheaper but faster, more convenient and less weather-dependent. If the scooter rental scheme is to take off it needs to be cheap, very cheap, cheaper than the bus. The journey above should have costed us no more than £2 each. (Comment –Survey 3)

As people become used to using an e-scooter for regular journeys it could be expected that they consider purchasing their own in order to reduce per-use costs, as this interviewee reflects:

> So far, I'm not really taking into account the cost, but I think I should. I think it's one of the reasons why I probably need to get one of my own, because I think the cost might eventually just buy me one. (Interview 35)

Predictability of cost

It was not only the cost per se that interviewees compared, but also the predictability: knowing how long a journey will take, ultimately how much a journey will cost, and therefore being able to budget. Predictability was an aspect many participants saw to be important if they were to rely on e-scooters daily, but the ability to budget is something that is likely to be particularly important to people on lower incomes:

> ...but I know I'm going to get on the bus and spend my £1.90, and then I'm in town, whereas if I get on the scooter and I'm not sure how much it's going to cost me, that could be a limiting factor for someone on a lower income. (Interview 13)

Whilst in this case it was the bus that was the option for which the cost was more predictable, this next interviewee makes a comparison with ride-hailing and finds that e-scooters were the cheaper alternative, in which they had more control over the journey and therefore the cost:

> I think, because I don't pay attention as well. I used to get a lot of Ubers before the scooters came in. The scooters, to me, were a cheaper alternative, which I had more control over as far as I knew how long the journey would take, pretty much, and, providing there was one available, I was in control of how I got there. (Interview 42)

These observations about predictability of cost relate to the nature of the costing model. One interviewee compared the Salford scheme with the Santander bikes in London, noting that the latter scheme has a flat fee per ride: *'I think the thing with the scooters is you don't know until you finish using it how much it's going to cost'* (Interview 13).

This unpredictability stemmed in part from unfamiliarity – not having a feel for e-scooter routes and lengths of journey – as well as the existence of elements of the route that would be inherently unpredictable, such as junctions and traffic lights: *'Cost-wise that seems quite expensive if we're trying to encourage a modal shift. I don't know, 20p a minute. You could spend minutes just at traffic lights, couldn't you?'* (Interview 19).

An implication of this is that riders might feel pressured to ride at speed and possibly ignore red lights: *'You're charged per minute, right? I always see that, like with taxis, you are incentivised to push through a red light, because if you sit at the red light for five minutes it costs people in the back £1'* (Interview 44).

There are two particular factors that respond to contemporary challenges and changes in mobility patterns. Firstly, the growth of working at home following the Covid-19 lockdowns means that expectations around commuting costs may be changing. This first interviewee describes having lower transport costs since having flexible work arrangements involving working from home. This means that transport costs are 'minimal' and less of a concern for them. E-scooter use is therefore like 'coffee money'. The second interviewee describes a similar working arrangement but notes that this means that the lower frequency of commuting means that monthly passes and similar payment regimes are less attractive:

> It's like coffee money in a way. It's something I don't think about, which sounds… I'm not sat in my gilded room now talking about it! It's just something I wouldn't think about. I mean, if I realised I was spending a lot on them I might think about it differently, but since I've got a flexible working arrangement where I can work from home one week and I'm in the office the next, the cost is just so minimal. (Interview 42)

> In terms of the cost, it's not too bad. I think, on average, it usually costs about £3.20 for me, for one journey. Because I'm only in the office a couple of times a week, I think, oh, it's not so bad. When I first started at Salford, I was coming in every day, so I tried the monthly pass thing they do, which I think is a tenner a month. Then, if I remember, I think you get free fees and a bit of discount off the minute cost, which I think was quite good. Obviously, I can't justify that now, because I'm only in twice a week. (Interview 41)

Secondly, in times of increasing petrol prices against the background of a cost of living crisis and inflation, e-scooters have taken on a new relevance for some:

> The scheme has been very valuable to me with rising costs of petrol the scheme offers a fast convenient option that is much cheaper than other public transport options. (Comment – Survey 3)

5.5 Other issues

Driving licence requirement

In the national set of trials there is a requirement to have a provisional driving licence to access an e-scooter. This requirement inevitably meant that some people were unable to do so, with one participant questioning the fairness of such an approach: *'a lot of adults don't have driving licenses, so I can't foresee that that would be a fair way of doing it, restricting people to having a driving licence'* (Interview 4).

The ongoing cost of renewing your provisional licence for access to the scheme would also be an issue: *'Once you get a provisional licence, if you don't pass your test, you have to renew that, so it's an ongoing cost'* (Reference Group – Community Organisations).

This comment evidences a survey respondent's sense of exclusion. They refer to their own non-electric scooter, which they say they chose over a bike because they live in a first-floor flat and have nowhere to store a bike:

> An e-scooter would be a great alternative for me but, because I don't have a smartphone or a provisional driving licence, I'm pretty much excluded from using one. As such, I will stick to walking, the bus and figuring out if I can make it easier to fold and store my existing scooter. (Comment – Survey 1)

This person also commented that the driving licence requirement means that children cannot benefit from the scheme and that: 'This is particularly a shame given how crowded school buses are as it will make the kids more dependent on their parents to get them to and from school' (Comment – Survey 1). To another interviewee, however, this was positive in that it limited behaviour that they implied would be undesirable: *'I think the fact that you need to have your provisional driving licence is genius for the fact that that stops kids going, "Whoa! Scooter!" '* (Interview 6).

Use of technology

A smartphone is also a requirement: an app must be downloaded in order to unlock and use a Lime e-scooter. This was a potential barrier: *'The trial isn't being run here, but also I haven't got a smartphone and I haven't got a provisional licence, so I [couldn't use it anyway]'* (Interview 2).

There is also a higher likelihood for older generations to be less tech-savvy and perhaps have less familiarity with smartphone technology, and online banking could also act as a barrier: *'I don't really know how to do the payment thing. I recognise it's on an app, or on your phone or something, isn't it?'* (Interview 31).

One participant summarised these barriers, subtly reflecting on the overall level of accessibility of such an approach: *'So, you've got to be comfortable on the road, comfortable with a phone, comfortable with payments, paying over the phone, and you've got to have mobile internet'* (Reference Group – Community Organisations).

Weather

Unsurprisingly for a shared transport scheme in the northwest of England, weather was cited as a barrier to use: *'My only concern is because the Manchester – wonderful weather it is – but the time I get from A to B, the distance isn't great, but it's also for the fact that you could be absolutely soaked to the bone'* (Interview 6).

Another participant added that, while they might not mind about getting wet personally while riding, they were more concerned about the equipment they need to travel with getting wet: *'I'm a musician as well. I do a lot of carrying around instruments and stuff all the time. I'm not too fussed about me getting wet, it's more about getting my stuff wet, that make sense?'* (Interview 21). Some concern was expressed by one participant about the safety of using e-scooters in the rain: *'I didn't use it when it was raining. I think that was probably the only other thing. I'm not sure I would – I don't know how they'd fare in the rain'* (Interview 29).

Using with friends and family

The inability to rent more than one e-scooter per account was recognised as a limitation for certain kinds of users. This could be a concern for families, one participant noted, who might want to incorporate e-scooter use into their weekly routines:

> You're not going to get young mums doing their family shopping on an e-scooter. It ain't going to happen. If you've got a couple of kids in tow and shopping bags and things, they're not designed for that kind of thing. So we're actually starting to see some natural limitations in use of this form of transport to the kind of individuals that would benefit from it. (Reference Group - Disabled People and Other Vulnerable Road Users)

Lime offer this feature internationally, but are not allowed to offer it as part of the UK trials (Appendix B).

Shopping and carrying

When Covid-19 restrictions began to be lifted in 2021, and the trial scheme moved into Phase 3 and Phase 4 with a larger geofence, we began to see more examples of utility use. One example of this was using the e-scooters for grocery shopping: *'Usually go to the park, to go to the shops; take a backpack and just put the shopping in my backpack, because it's much easier than walking around with shopping'* (Interview 36). Another participant alluded to the barriers of e-scooters when shopping, principally in relation to carrying the shopping home:

> On the occasions if I did just need to nip down to the shop for some milk and eggs or whatever, that would be a quick backpack on the job, on-the-back-type job… I know I wouldn't be going to Tesco and doing my full weekly grocery shop and trying to get that back on them! (Interview 33)

Carrying shopping without a backpack was a challenge: *'It was a bit awkward. I found the way I ended up doing was doing the thing of literally having the bag hanging off my arm/on the wrist… which was a bit funny to do'* (Interview 32). It may therefore be preferable to have some kind of facility for carrying luggage: *'It would be useful to have a small basket, if that's possible, but I don't know – that would be quite helpful if there was some kind of way of storing something on the scooters safely'* (Interview 36).

There is an indication then, that e-scooter sharing schemes might be useful for grocery shopping, but that the level of usefulness might be determined by the creativity or resilience of the user (particularly carrying the groceries home). For some people, the e-scooters are seen as less useful in this regard, but there is an implication that people would find this a useful role for e-scooters if it were possible to carry more:

> …if I know that I have a lot of shopping to do I will just walk it or even take a bus, because it usually comes up to a back bag and two tote bags on both my arms, and because on the scooter there's like a balance involved, so I don't want to tip over. (Interview 39)

6. Connecting E-scooters

There is evidence that people are building e-scooter rides into their mobility routines and using them to make connections with other modes of transport. They are replacing journeys that would have been made by other means and connecting with other transport options as part of those journeys. Some 67% of Lime users had made at least one journey by e-scooter for which they would otherwise have used a mode of transport other than walking, and half (49%) of respondents had replaced journeys they would have made by private car. People reported that e-scooters offered a faster alternative to walking and sometimes a cheaper choice when compared with public transport. The scooters can also plug gaps in public transport journeys, and replace taxis and ride-hailing (e.g. Uber) at times when public transport is insufficient.

6.1 Overview

In our survey, use purposes (e.g., work, fun or social) are treated separately to reasons for using (e.g., cost saving, speed or sustainability). Across our cohort of Lime users, three-quarters (74%) had used an e-scooter for transport ('To get to a destination, as opposed to using one for fun or out of curiosity'). There is a slight difference by gender, with 76% of males compared with 69% of females having made a journey like this. For those who used a Lime e-scooter to get from A to B, rather than simply for fun or out of curiosity, there are a range of use cases (Figure 9). Work, education, shopping and social occasions are most prominent, which would be expected as these are common journey purposes.

There is some variation here. Males were more likely to have used an e-scooter for transport per se, whereas there were specific cases for which females were more likely to have used an e-scooter: to get to work (44% versus 39%), college or university (37% versus 22%) and healthcare (20% versus 9%). Males were slightly more likely to have used an e-scooter to connect with public transport (35% versus 32%). There is also an indication that older groups were more likely to use an e-scooter to connect with public transport. Younger groups were more likely to use an e-scootver to get to sport, social or entertainment or to get to college or university. Older groups were more likely to use an e-scooter to get to work.

Some of the journeys discussed in this section were made by individuals using their own private e-scooter, rather than those available through the trial scheme. These examples will be highlighted either in the journey description or in the quote itself. Private users are not limited by any geofence restrictions, nor are they subject to pay-as-you-scoot charges. Documenting some of these use cases may aid understanding of the future direction of e-scooter share schemes, which may come to cover large areas.

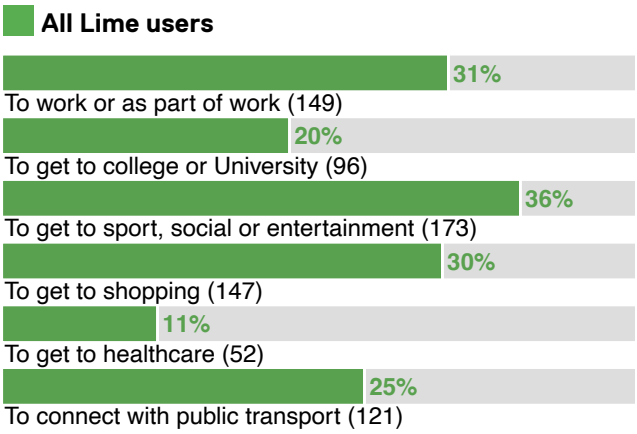


Figure 9 Journey purpose when using a Lime e-scooter (closed list) (N=382)

As shown in Figure 10A, half of respondents (50%) of respondents told us that they had used an e-scooter to replace one or more walking journeys, and 41% instead of a taxi or Uber. 17% and 13% had replaced a car journey as driver or passenger, respectively. Given that respondents could select more than one response, it is instructive to group the categories (Figure 10B). A total of 67% selected at least one mode other than walking, and 42% selected one or more of the forms of public transport listed. Some 54% selected walking, cycling or both. Taken together, a quarter (25%) of respondents had replaced a journey that they would have made by private car as driver or passenger. If we include taxis and ride-hailing in this group, the figure is 49%.

Note that this means that 49% of *respondents* had replaced at least one journey that would otherwise have been made by car. It does not mean that 49% of e-scooter *journeys* had replaced a journey made by car. Figures 10C and 10D summarise the answers concerning the modes of transport with which respondents used e-scooters to connect with – using an e-scooter to get to a public transport interchange, for example.

6.2 Journeys

We asked respondents to give examples of the e-scooter journeys they had made, particularly those that they made on a regular basis. In Box 1, these examples are listed, focusing on commuting to work and college, with

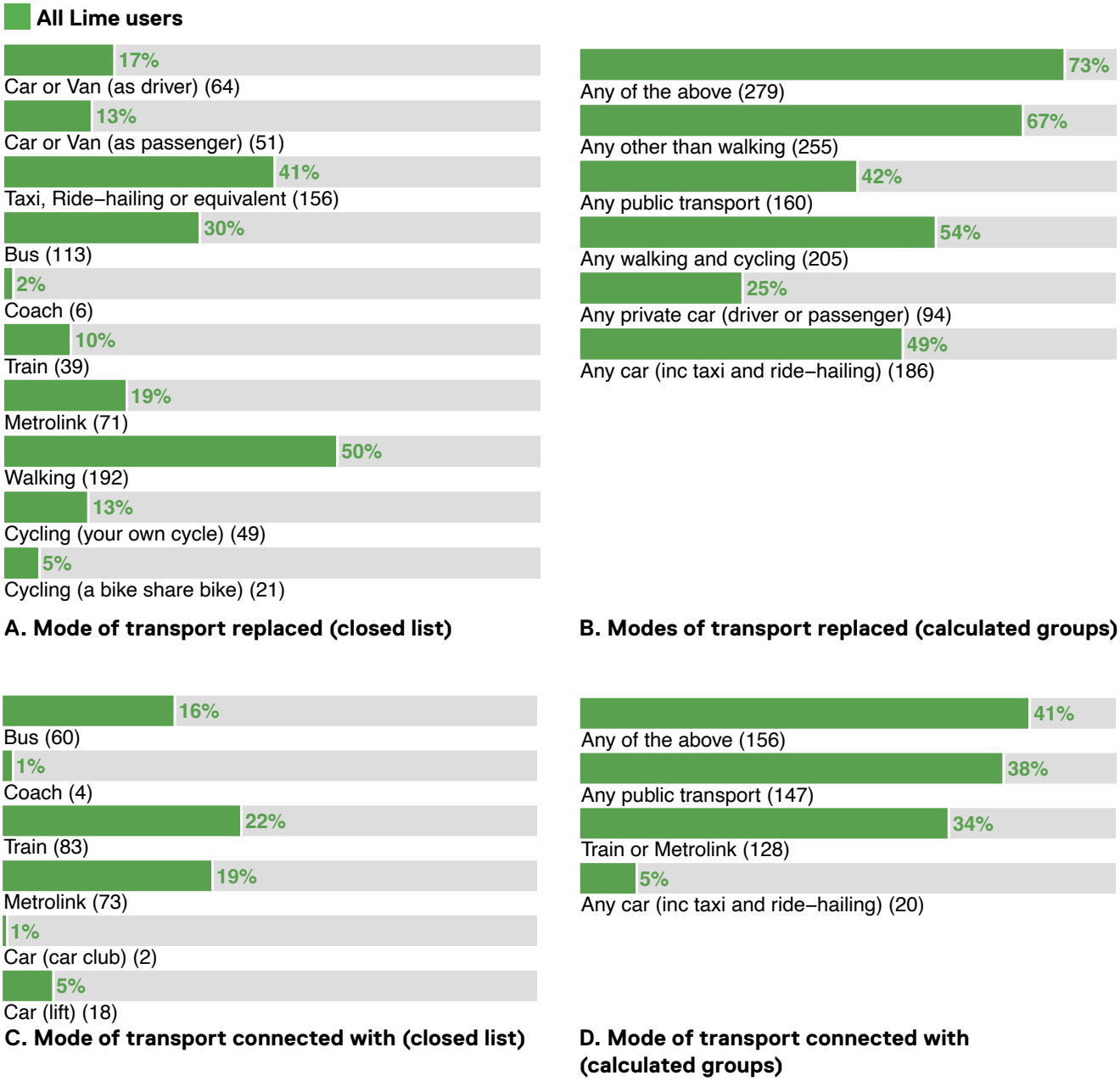


Figure 10 Percentage of Lime users making at least one journey that would have otherwise been made by a specific mode of transport (A&B) and those making at least one journey connecting with a specific mode of transport (C&D). (N=382)

the intention of providing a sense of how these new vehicles are being used.

This list prompts a number of observations. These statements evidence many of the motivations for using e-scooters already discussed in Chapter 4. These include journey time, cost, enjoyment and feeling in control. E-scooter journeys are relatively short: generally up to 30 minutes but more often around 15 minutes. In some cases, e-scooters are used as a way of connecting with other modes of transport as part of longer journeys – we refer to this as multimodality.

As discussed, there are a range of reasons for choosing to use an e-scooter to make a journey, and many, if not most, are in some way a reflection of the relationship of e-scooters to other available transport options. Respondents gave examples of being able to use e-scooters to make trips more quickly than walking:

> I go to park run at Peel Park on Saturdays and when there is a convenient scooter available I will use it to save time on my journey. (Comment – Survey 3)

> I have used the scooters to get from my accommodation to Salford University campus, as I sometimes wake up late and wouldn't make it on time by other means, a 15 minute walk is usually an 8 minute scooter ride. (Comment – Survey 3)

As discussed in Section 7.3, personal safety was a consideration:

> ...it is especially helpful when I finish work when it is either late or dark, using the scooters is a quicker and safer method in replacement of walking. (Comment – Survey 3)

> Returning home late from pubs or parties, cheaper than buying an Uber and safer than walking. (Comment – Survey 3)

The interviews provide context on the use of e-scooters for transport and associated decision-making. As this regular user evidences in their description of their morning routine, the presence of the Lime shared scheme provided an opportunity for some spontaneity. They also illustrate the way e-scooters are considered in combination with other modes – in this case, for example, ride-hailing is the user's reserve plan.

> I will wake up... I'll look to see if there are any available first, because, if I'm relying on getting the scooter... If I know I can get one, I know that it's going to take me about 15 minutes to get to work. If they're not available, then I have to change my plans and I'll have to get an Uber or I'll have to set off very quickly. There's a little bit of unreliability about them, but more often than not there are scooters available. (Interview 42)

The availability of e-scooters was a consideration, and interviewees expressed a need for a level of reliability. In order for the e-scooters to be a legitimate option, then, and for people to build them into their routines, it was recognised there would need to be trust in the reliability of the trial scheme long-term: *'what I would need to be confident is, is that I'm always going to get a scooter once I get off at Salford and that it's going to be easy in the morning to get a scooter to get to the train station'* (Interview 26).

Related to this flexibility, respondents also commented on the value of having e-scooters available at times when they were either running late or did not feel like walking – *'I use it to get to work when I may be running too late to walk'* (Comment – Survey 3). This next interviewee, for example, describes their experience on a route with no public transport options. In this situation, e-scooters could fill the gap, particularly when Phase 2 opened a link between MediaCityUK and the University of Salford campus:

> I use it getting to and from work. I work on campus, along the main road, and I live down near the Quays, so there's an active scooter route for me to be able to get in quite easily. The way that I get into work, there's not really another public transport option. If I'm running late or don't fancy walking that day, usually I would just jump on the scooter. There's not really another good option that is direct. (Interview 40).

6.3 Public transport

Replacing and connecting

E-scooter use can be understood in relation to other transport options on offer and this includes public transport, i.e. the network of buses, trains and trams across Greater Manchester. 42% of Lime users (Figure 10B) had used an e-scooter for at least one journey they would otherwise have made by public transport and 38% (FIgure 10D) had made at least one journey in which they connected with public transport, e.g. using an e-scooter to get to a tram stop. Opportunities to do this would be limited by the operational area and the extent to which it reached bus, tram and train stops and stations, and this was a limitation of the earlier stages. In terms of potential use, 55% of the whole sample selected connecting with public transport as a reason for which they would use e-scooters in the future (Figure 18).

Private and shared

Privately-owned and shared e-scooters had different roles, advantages and disadvantages when combined with public transport. When combining shared e-scooters with public transport, and assuming the locations of the virtual docks fit the required journey, an individual does not have to worry about carrying the scooter on public transport:

> You know how crowded the trains get, and I really wouldn't want to be trying to carry around a folding bike or a folding scooter or something on the train. It would be far more convenient to be able to just hire one and then just leave it at the other end and not have to worry about it. (Research Group – Road Users)

I usually walk from Irlams o' th' Height to Salford Quays. Due to the boundaries set by Lime the scooters don't cover all my journey, but they do cover a significant part of this and saves me at least 30 mins from my commute.

I use them to get to work in central Manchester. It cuts a 40 minute walk into a 15 minute ride and a 10 minute walk (from Salford Central Station to Frederick Road campus to Pendleton).

To get to my work I need to change trains in Manchester city centre to get out to my office in Salford. 9 times out of 10 my first train is delayed so I miss my connection. Now I have the option to walk to the Salford border from Deansgate to pick up an e-scooter and then nip up the A6. Fantastic – saves me being late for work and I arrive happy to have had the fun and speed of the scooter rather than annoyed and frustrated that my train was messed up yet again!

I used the e-scooter for my journey to work, from my home until where the geofence ends at the centre of Manchester.

I use the Lime scooters at least a few times per week to do my entire journey into work. These journeys usually take between 10-15 minutes and are about 1.5 km in distance.

Commute to walk from Wilburn Basin to boundary of Salford east to Salford station. I now own a bike and cycle the other way without the Salford boundary restriction.

Since beginning a job in the city centre of Manchester I now regularly rely on the Lime scooters situated near Salford University in order to reduce my travel time from around 40 minutes to 15-20 minutes. It is especially helpful when I finish work when it is either late or dark. Using the scooters is a quicker and safer method in replacement of walking.

Typically, I need to go to campus which would be a 10 minute walk. The shops tend to be a mile away, so I tend to cut that time down by half. Whenever I need to go from my flat to Salford Central to get to Manchester city centre.

Coming back home from hospital late at night, going to pick up my bike I left at the hospital once. Mostly so I can catch trains if I'm running late or get to lectures on times.

So I walk from mine to a parking station which is about 15/20 minutes from my house. I then get the e-scooter and ride for 10 mins to work. It is very convenient when the app is working and [there] scooters available. It hard to find a good scooter with good battery life, which makes the journey longer sometimes.

I use them quite regularly to get towards the city centre when I'm meeting people or going to work.

I have picked up an e-scooter on my way to the office. I would make the whole journey by e-scooter but I lived outside of the geofence at the time of use.

I walk to my nearest scooter pick-up, scoot to the closest to my work, park up, and then walk the remainder to work!

I have a part time job at Premier Inn MediaCity on weekends, so every Saturday and Sunday I will use my electric scooter to get to work from my house in Ordsall and it will take 20 minutes to get there and to come back.

I start work in MediaCity area and coming from Prestwich there are no available public transport at 5am to get me to work.

I drive 5 miles to the outskirts of town and then use my scooter from my car to my office which is around 1 mile.

From Victoria Metrolink to University of Salford. You have to walk over the river into the geofence and find a scooter but it's on demand, cheaper, often quicker and more fun than the train or bus.

I use e-scooters when travelling to the train station for work when I would have otherwise ordered an Uber.

I use them to get to work in central Manchester. It cuts a 40 minute walk into a 15 minute ride and a 10 minute walk (from Salford Central Station to Frederick Road campus to Pendleton). I think they're great, less than half the price of an Uber. If anyone has issue with them then that's just idiots driving unsafely.

To/from work rather than getting a taxi (especially when finishing work late and Uber is expensive). Usually, 2-3 mile commute.

Regularly use them to get to work. To me an Uber especially at peak times can cost £7-£15 for a short city centre trip and is nearly always slower than a scooter. I can get to work from Blackfriars Road to Exchange Quay in as round 12-15 minutes on average, and it's so consistent that I actually enjoy my commutes now. I get more fresh air and feel more in control of my day. The route is around 3-4 km.

I regularly use the e-scooter in Liverpool when travelling from my apartment to my university as well as to the train station. Before I tried the e-scooters I would walk or take an Uber.

Travelling home to Salford from work in city centre. When available, quicker and cheaper than taxi. Never used them into town as not comfortable with riding in traffic. Late night/early morning finishing shift is less traffic.

Box 2 Selected e-scooters use cases, as described by survey respondents (direct quotes)

Conversely, private ownership affords the owner the advantage of being able to carry the e-scooter and not be concerned about finding a virtual dock. This is not something that is possible with Lime e-scooters, and it is against the terms of use.

> When I was down in London a few weeks ago, I noticed a guy who'd got an e-scooter, and it had just collapsed, and he'd got it on his back – literal personal transport that you just pop out of a duffel coat or something. I thought that was in principle, in theory, that's a great thing. (Interview 16)

For another interviewee, however, the use of a private e-scooter in this way did not appeal. They felt that it would be difficult to store a private e-scooter at their destination, in this case their university:

> The thing is, I could picture myself getting into uni and then being like, now what do I do with this scooter? Am I just walking around with a scooter all the time? Do I have a scooter strapped to my back? If they're electric, they're even bigger and clunkier. Again, if there was somewhere like a cycle store for scooters in uni that was actually secure or if I had a personal locker or something, then I'd probably be more inclined to use them. (Interview 44)

Whilst an advantage of private ownership might be being able to carry the e-scooter on public transport, concern was expressed in our vulnerable users reference group that this could lead to overcrowding and be to the detriment of people with wheelchairs and guide dogs:

> ...if e-scooters can be taken on buses, with buses in their already limited format for people using wheelchairs and with guide dogs, there is the risk that they take up the space that is designated for those people. (Reference Group – Disabled People and Vulnerable Users)

E-scooters alongside public transport

As a shared mode of transport available at points around Salford, then, the Lime e-scooters were of use when public transport was unavailable or limited. In this first example, the interviewee does not own a car, and it is too early for public transport to be operating. The e-scooters are the only transport choice available to him during his working hours early in the morning. For him the scooters offer a low-cost alternative to regular taxi use. Similarly, the second interviewee saw e-scooters to be a less expensive option in comparison with taxis and ride-hailing:

> Sometimes I may need to be at a place very early in the morning, and maybe there are no buses yet, so maybe in my area the buses start activities by 4.45 or 4.50 thereabouts, and I need to be at my destination before five o'clock, so I would have to find an alternative means, and I don't want to take an Uber, so I'd probably have to go there using other means. (Interview 35)

> Getting to work. At the time buses would be heavily delayed by road works/traffic on Chapel Street. I would ride from Frederick Road where I lived at the time to the furthest point into Manchester, then walk the rest. I worked in Northern Quarter as a bartender therefore finish late, Taxis/Ubers would be expensive, and no buses would be on. (Comment – Survey 3)

By providing a shared mode that could be combined with public transport, e-scooters formed a complement to public services when delays or missed connections were experienced. One participant noted that they could use an e-scooter for the final leg of their journey if they had missed their final train connection: they could walk from Deansgate Station across the border from Manchester into Salford to pick up an e-scooter. In this case, the e-scooter scheme was bridging other elements of transport provision.

> To get to my work I need to change trains in Manchester city centre to get out to my office in Salford. 9 times out of 10 my first train is delayed so I miss my connection. Now I have the option to walk to the Salford border from Deansgate to pick up an e-scooter and then nip up the A6. Fantastic – saves me being late for work and I arrive happy to have had the fun and speed of the scooter rather than annoyed and frustrated that my train was messed up yet again! (Comment – Survey 3)

In another example, a participant described how the e-scooters gave them a practical option for getting to their second nearest Metrolink station when their local Metrolink station was temporarily closed: ***'I have recently, while the tram's been out of action, gone to MediaCity from the house with the scooter, then boarded the tram'*** (Interview 34).

Not all respondents saw potential for them to connect with public transport, however. This quote evidences the importance of understanding e-scooters in the context of the available mobility options:

> The journeys I use the scooters for, they're short enough, anyway, so I can just use the scooter. Plus, if I did want to combine it with public transport, it wouldn't really make much sense, because there isn't public transport that takes me between the routes that I use it for. If I was going to make longer journeys, I would just walk to bus stop. (Interview 41)

For University of Salford staff and students, there is free access on a bus from the Peel Park campus to MediaCityUK and therefore little (financial) incentive to use an e-scooter: ***'I'm not going to go to the trouble of paying to hire an e-scooter when I can get on the bus for free and go down to MediaCity'*** (Reference Group – Road Users).

Replacing public transport

Whilst these examples show e-scooters, and the sharing scheme in particular, as a vehicle that could fill the gaps in their public transport use, other respondents described using e-scooters *instead* of trams, trains and buses. Some participants use their private e-scooters to commute to work, and for one participant this was a more efficient option than any alternatives: *'getting there by any other means, for instance, a bus, it was two buses that would take over an hour round trip. So in comparison to being able to scoot, it's ten to fifteen minutes. So it was a no-brainer'* (Interview 17).

Another participant noted, upon realising they could use the e-scooters to get to work rather than having to rely on a bus service they had found to be unreliable:

> From door to the first place where I'd get the scooter from, it's about, to be exact, it's about a seven- or eight-minute walk to that first scooter point. I then scoot for about seven minutes, I think it is, is how long it normally takes me on average, and then from that point to the office is about ten minutes after that. So altogether it's about a 25/30-minute journey… If I was to get the bus, I would leave earlier than what I would if I was going to scoot, because I'd have to factor in the reliability issue of, I'd probably go for the bus before the one that I'd actually need to get. (Interview 46)

> I use one nearly every week to get to college as it's a very efficient form of transport and the cost is very little compared to other modes of transport. (Comment – Survey 3)

Earlier in the study, when concerns about e-scooters were more prevalent, an additional advantage of e-scooters over public transport was the potential for social distancing*: 'it would be something I would want to try out, especially with me being able to socially distance as I am nervous to use public transport'* (Comment – Survey 1).

6.4 Cars, taxis and ride-hailing

There are also a number of examples of people using e-scooters instead of taxis and ride-hailing. Some 41% of Lime users responding to the survey had done this. The shared scheme e-scooters in particular provided something akin to these point-to-point services. As this interviewee reflected, the e-scooters can be cheaper and provide a sense of control over the journey:

> I used to get a lot of Ubers before the scooters came in. The scooters, to me, were a cheaper alternative, which I had more control over as far as I knew how long the journey would take, pretty much, and, providing there was one available, I was in control of how I got there. Also, just getting a bit of air as well and stuff. I found it a much more pleasant, I don't know, morning than going in in a car where someone's potentially just going to talk my ear off for the entire journey and I don't want to! (Interview 42)

These examples once again highlight control, flexibility and enjoyment as factors for which e-scooters might score more highly than taxis and ride-hailing. People did, however, raise issues with e-scooters, and it is clear that there are advantages and disadvantages when compared with taxis and ride-hailing. These may be related to the reduced ability to socialise during a journey or the economies of scale that come with sharing a ride: *"Yes, I'd use it if I was going for a pint in town or something. I'd opt for that if I was by myself. If I was with friends, probably would go for an Uber instead, but I do use it for other bits and bobs"* (Interview 46). This interviewee, for example, finds that ride-hailing is more convenient, less weather-dependent and, when travelling with others, cheaper:

> As an example, my partner and I both took an E-Scooter from Salford University campus to Media City to trial them. Our journey cost just below £6 each, which is £12 between us. The same journey by Uber would have cost circa £8.50, which would be not only cheaper, but faster, more convenient and less weather dependent. If the scooter rental scheme is to take off it needs to be cheap, very cheap, cheaper than the bus. The journey above should have costed us no more than £2 each. (Comment – Survey 3)

There were some references to replacing car journeys. In this example, public transport was not available, and the interviewee implies that the only way to make the journey would have been by car: '*To and from work. It takes 3 mins longer but is far cheaper, less stressful, and better for the environment. 3.6km 15mins travel time. No cross-town services are available. Other than the car'* (Comment – Survey 3).

Whilst not directly connected to commuting, there were some examples of using e-scooters in combination with private cars. One participant described how the availability of a shared e-scooter solved their problem when their car broke down while on holiday (in this case outside Salford), filling in the gaps to and from the garage, which would otherwise have been a lengthy walk:

> Our car broke down when we were there, so had to get it to the garage – well, it needed seeing to. He got an e-scooter back from the garage to where we were staying. Then he did that return to pick the car up, got an e-scooter to the garage to pick the car up. It filled those gaps.
> (Interview 19)

Another participant described combining certain journeys with driving by putting their private e-scooter in the car on the way to their destination. This afforded them some flexibility, meaning they could mchose to have a drink, they could get home on their e-scooter and return to the car the following day on their e-scooter, store the scooter in the car and drive home again:

> If I'm going to the pub I'll take the bike, and, to be honest, what I do with the scooter is: if we've driven to the pub, I'll leave the car there and take the scooter the next day and go and get it, because I can put the scooter in the back of the car. (Interview 43)

7. Safely Sharing Space

The relationship with safety is complex. On the one hand, concerns about road safety act as a barrier to e-scooter use for many people. On the other, some people report feeling safer on e-scooters than they would on other modes of transport. These concerns not only reflect a sense of danger in traffic, which is a well-established barrier to cycling: they also relate to specific aspects of e-scooters, notably the small wheels. In relation to personal safety, e-scooter use can be an attractive alternative to walking alone at night and to waiting at public transport interchanges. Members of the public report concerns about sharing space with e-scooters, and there is evidence that people have felt unsafe around e-scooters when walking and cycling and that they have experienced near misses and, to a lesser extent, related injuries.

7.1 Road safety

In this chapter we discuss issues relating to safety. These relate to all e-scooters (private-owned or shared). Some of the experiences described occured outside of the trial zone.

Perceptions of safety on the road are a concern for potential e-scooter users. There is also evidence that existing users have felt unsafe at times when scooting. Around a quarter (24%) of users reported this, with more women than men (30% versus 20%) selecting this option from the list of options (Figure 8). Conversely, a small number of respondents (5%) indicated one of their motivations for using an e-scooter was that they felt safer than they would on other modes of transport (Figure 6).

Figure 11 shows the respondents, across the whole sample, would feel confident riding an e-scooter. It shows a difference between males and females that is most pronounced on roads and on-road cycle lanes: males are more likely to be confident riding an e-scooter on these.

Looking at age groups (Figure G13E), the difference in confidence is most pronounced for roads, with older people much less likely to say they are confident using an e-scooter on roads. This is also the case for pavements, perhaps reflecting concern about sharing space with pedestrians. Across all these surfaces, people who cycle (Figure G13D) are more likely or equally likely to be confident riding, with the exception of pavements.

These show that a relatively small proportion of users and non-users or would feel confident riding on, roads.

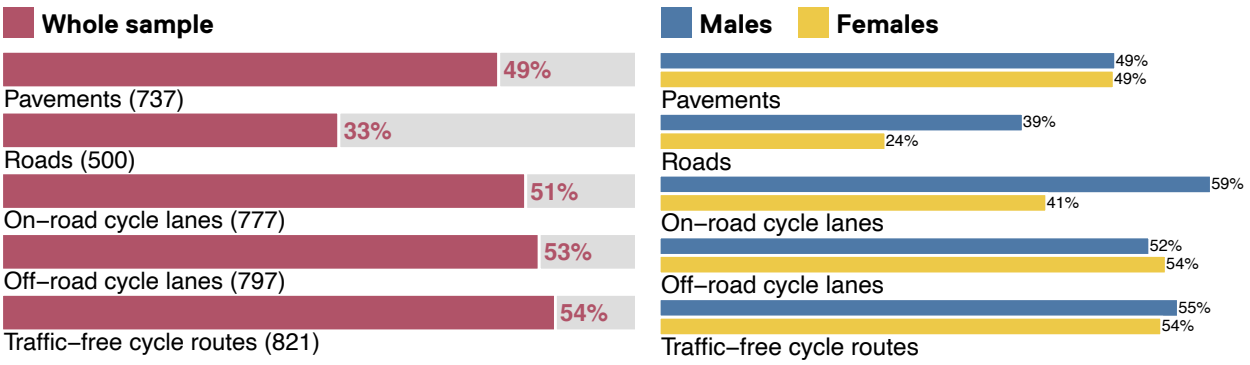


Figure 11 Percentage of respondents who would feel confident to ride an e-scooter in each type of infrastructure (closed list) (N=1514)

In fact, the proportion of non-users is much lower (11% of 'avoiders' and 22% of 'deciders versus 33% of users - Figure G13F). This implies that a low level of confidence in riding on roads may be a barrier that is limiting take-up.

The relatively low levels of confidence in riding o n the road, especially amongst non-users, are likely to reflect a sense of danger when riding in traffic. This is something that is well understood and widely recognised as a barrier to cycling, and our findings suggest that this also applies to e-scooters: ***'It's that segregation, for me, that absolutely would make the difference between using any scooter – if we're talking about scooters – and not'*** (Interview 4). This respondent explains further and is specific about their sense of safety in [Greater] Manchester:

> My main concern is the same reason I don't cycle in Manchester anymore. The cycle lanes are absolutely awful, and the drivers are aggressive and arrogant. E-scooters are dangerous on the pavement but on the road, they are at risk from car drivers. we need segregated lanes for cyclists and scooters. No one is brave enough to anger the almighty car drivers though.
> (Comment – Survey 3)

This interviewee reflects on their experience, noting that the pavement would have felt safer, and shares their sense of feeling unwelcome on the roads:

> That would be the way I get home, because you can't come down Blackfriars. Chapel Street – I don't know if they still do – they had a load of roadworks, and it was like down to one lane, and it was a bit of a nightmare because I ended up, I was on the scooter coming through this very narrow section with basically a whole traffic jam behind me, and there was no escape because it was all coned off and everything. I'm quite sure the cars hate me, but I was just like, okay, well, I'm just going to pretend like I'm a bike and take the lane, and they're just going to have to get over it, but I probably should have thought in advance and just been on the pavement. It did say not to ride them on the pavement. (Interview 13)

Conversely, for another respondent, e-scooters provided an opportunity to use car-free routes and therefore avoid potential danger from road traffic: ***'Going to work – riding down the beautiful canal that runs parallel to Oldham Road so I don't have to interact with cars'*** (Comment – Survey 3).

In this sense, the experiences of e-scooter riders highlight concerns that are already recognised in active travel research, such as the advantages of segregated infrastructure and the importance of other road users being aware and responsible:

> I also feel as though the emergence of e-scooters has been good in flagging up the lack of active travel infrastructure within cities and how this urgently needs to be addressed (a 16-year-old on an e-scooter shouldn't have to choose between being a nuisance on the pavement and being vulnerable on the road, there should be more segregated infrastructure).
> (Comment – Survey 1)

We have noted that female respondents and older people were more likely to express concern about safety and see this as a factor that might limit their e-scooter use. This interviewee reflects on why this might be the case, relating it in part to perceptions of risk:

> That is why they're aimed at the age group they're aimed at. They're not aimed at my age group, because your age group and younger, your fear levels and adrenaline levels are – you're prepared to take more risks than somebody my age would. (Interview 15)

Whilst this connects with cycling, there is an indication that there is something particular about e-scooters. This may be partly, as evidenced in the quote above, about other road users not expecting you on the roads and perhaps not knowing how to respond accordingly. It also appears to relate to the physical design of e-scooters themselves and their relatively small wheels in particular, especially when combined with low-quality road surfaces:

> Maybe it's a safety thing because, like I said, the wheels are quite small. The pavements are a lot smoother to ride on, and the roads can be quite bumpy. It feels safer, I think. If there was a cycle lane on the road, I'll almost always take that because it's just more freedom and no concern about cars or pedestrians. (Interview 36)

> The roads are awful here, potholes, so if you were riding an e-scooter on some roads around Manchester, you'd come off. (Interview 43)

> Firstly, road conditions are utterly disgraceful and tram lines are a constant factor. Scooters are small-wheeled vehicles so these environmental make them unsuitable for Manchester. (Comment – Survey 3)

Note that this second interviewee was referring to e-scooters in general. Note that the size of wheels varies, and Lime report having tested their vehicles around tram lines (Appendix B). This interviewee, for example, compares their perception of e-scooter use with how they feel whilst riding their bike:

> I understand that during busy times roads would be a more suitable place for them to be. However, using Deansgate as an example, I would fear that the road surface and small wheels would be disastrous. It's hard enough on "full size" bike wheels to traverse.
> (Comment – Survey 3)

As this interviewee indicates, even people accustomed to cycling on the road may feel more comfortable riding an e-scooter on pavements. They relate their choice to the smoothness of pavements and size of e-scooter wheels:

> [I] do ride on the pavement more frequently with an e-scooter than I would on a bike. I would rarely really ride on the pavement with a bike unless it was completely empty. When, sometimes, with e-scooters, if the traffic's bad and there's plenty of space on the pavement, I'd take the pavement option… Maybe it's a safety thing because, like I said, the wheels are quite small. The pavements are a lot smoother to ride on, and the roads can be quite bumpy. It feels safer, I think. (Interview 36)

There is an indication that an advantage of private e-scooter ownership may be the ability to make a choice about features such as wheel size. This interviewee explains this and relates it to their sense of safety:

> ...the road surface, the surface to cycle on was actually very bumpy. Not because it was an unmade road, but because the flags that you were going over were very... I'm not quite, how to describe them, but there were lots and lots of little indentations in them. That's with the presumably solid tyres on the Lime scooters, made it for a really lot of vibration. It was not a comfortable ride at all. So I told myself that as and when you guys manage to make them legal, which I hope you do, I would certainly buy one that had got bigger tyres or pneumatic tyres or something, because the ride quality itself wasn't very good. (Interview 16 – note that Lime e-scooters do have pneumatic tyres)

A potential response to these concerns is some form of training. This interviewee mentions that this could be the motivational factor in them trying an e-scooter for the first time: *'If there was a training facility, say at Salford University on a Saturday morning or something, then, yes. So that's what I would say. It would make me change my mind.'* (Interview 15)

The point here is that e-scooter use shares with cycling barriers relating to road safety, but that the qualities of e-scooters means that these are perceived differently. In some cases e-scooters are perceived to be put the rider at more risk than they would be on a cycle. E-scooters vary, and rental operators tend to provide more robust vehicles, when compared with the cheaper end of the range available for private ownership. These points relate to perceptions and it is beyond the scope of this study to assess actual risk.

Illustration 5 'My main concern is the same reason I don't cycle in Manchester anymore. The cycle lanes are absolutely awful, and the drivers are aggressive and arrogant. E scooters are dangerous on the pavement but on the road, they are at risk from car drivers. we need segregated lanes for cyclists and scooters.' (Comment - Survey 3)

7.2 Helmets

Most users (80%) reported that they did not wear a helmet when using an e-scooter, and only 6% wore one 'all of the time' (Figure 12). The inability to rent a helmet when renting an e-scooter was a factor that would limit use for 28% of respondents (30% of females and 26% of males; see Figure 20). Lime do not offer helmets and report that their own research suggests people would not use them, but they do offer a discount with a 'helmet selfie' (Appendix B).

Helmet use for cycling is a complex issue, and this research suggests that this is also the case for e-scooters. Whilst some argue that helmet use when cycling should be mandatory in order to protect users (Walker, 2017), others point to limitations on the ability of cycle helmets to protect when moving at speed (Schleinitz et al., 2018) and to a tendency for helmet laws to present an additional barrier to cycling. In making it appear more dangerous, it is argued, they could lower the number of people cycling (Rissel and Wen, 2011) and therefore increase the risk to those who do cycle. In share schemes helmet use is a particular challenge (Sherriff et al., 2020), since individuals would need to carry a helmet just in case or scheme providers would need to somehow ensure the availability of helmets in a hygienic and, more recently, Covid-safe way.

The comments from our research participants reflect this complexity. Our findings suggest there is notable crossover here, with many non-users implying that they would consider trying out the e-scooters if they had access to a helmet:

> I'd have to be provided with a helmet, or I'd have to buy a helmet myself, and I was going to say, a test area where you could go and have training. (Interview 15)

> I think why I haven't tried them myself – I don't have a helmet, and it's quite an investment to get a helmet just to have a go on one. (Interview 18)

As this interviewee reflects, it is not convenient to carry a helmet in case they decide to use an e-scooter:

> I think I would want to wear one to feel safe, because you're still on the road and things are going a hell of a faster than you are… I'm not going to have a helmet to hand whenever I want to pick up one of these things. I would if I was going to use it long-term. (Interview 6)

Although the Lime App contains information about wearing a helmet, it remains unlikely that casual users will have access to one:

> … and the app says you should wear a helmet, but if you're just out and about, you're not going to just have your bike helmet. I guess, if you were planning to use it to commute that you would. (Interview 9)

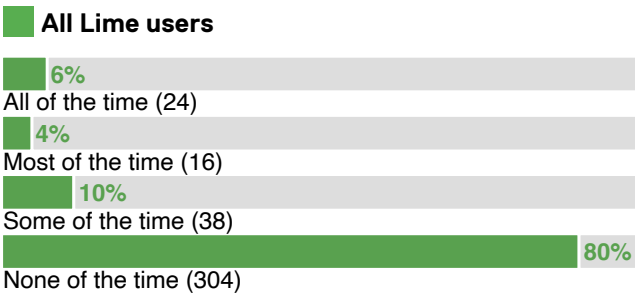


Figure 12 **Percentage of Lime users reporting wearing helmets while riding (N=382)**

7.3 Personal safety

The relationship between e-scooters and safety is complex, especially when personal safety is considered. Some 21% of females gave personal safety as a reason for using an e-scooter, as opposed to 10% of males (Figure 6), whereas 30% of respondents gave personal safety as a concern that might limit their use of e-scooters: 33% of females and 27% of males.

As this interviewee indicated, use of an e-scooter can help people feel safer when travelling at night because they can travel faster through public spaces: *'I'm not someone who's particularly worried about walking at night or whatever. I do it, but it does feel safer to be on a bike or a scooter because you're on the road moving faster'* (Interview 13). One survey respondent added to this point, noting that the realtive slowness of walking contributes to fears around personal safety: *'I would use e-scooter at night in unsafe areas, as walking in such areas is more risky. Slower speed of walking make[s] people more vulnerable and available to attacks'* (Comment – Survey 1). For another, *'it would be useful to have a scooter, especially when it's darker and when it gets to wintertime, to be able to feel a bit safer nipping to the shop and back'* (Interview 21).

This female interviewee describes weighing up road safety and personal safety: whilst being able to move faster on an e-scooter means feeling less vulnerable to harassment, there may be dangers from road traffic: *'You might be more vulnerable on the roads with someone hitting you in a car, so I suppose it probably balances out, but it just feels a bit safer to be moving that bit faster and be on the road'* (Interview 13). A sense of danger in traffic can therefore mean that people are not confident in using e-scooters and therefore not able to benefit in relation to personal safety:

> If I felt safer to walk or cycle to the tram stop, I would, but I wouldn't feel safe… I think I'd be more confident once I'd had, well, once I knew how to use it properly, and it wasn't like my first or second time, kind of thing. Then I'd feel safer on it because if I did get any hassle, I could just zoom off, can't I? (Interview 30)

These experiences are individual, and it is not the case that everyone will feel safe(r) when cycling or e-scooting. This interviewee, for example, felt that she would 'stand out' and, as a result, felt more vulnerable. This relates in part to the relative novelty of e-scooters and might be less of an issue if in the future they become a more common sight.

Illustration 6 'I would use e-scooter at night in unsafe areas, as walking in such areas is more risky. Slower speed of walking make[s] people more vulnerable and available to attacks' (Comment - Survey 3)

> I wouldn't be very confident going away from the university on them, just because you stand out, don't you? I think anything where you stand out you could become a bit of a target around Salford.' (Interview 5)

> You're always, especially as a woman, a bit of a target. (Reference Group – Women)

Our women's reference group also noted the potential of shared schemes to reduce the need for people to wait alone for taxis and public transport at night, since a shared vehicle might be available more immediately for them to use instead.

7.4 Other road and pavement users

Overview

As discussed in Chapter 2, media coverage relating to e-scooter use frequently focuses on their potential impact on public safety. We wanted to better understand how people perceive and experience e-scooters and, in particular, what challenges there are in sharing space with them. As well as asking people about their specific experiences, we asked respondents to indicate if they agreed with the statement 'E-scooters are a risk to public safety' (Figure 13). This is something that divided the sample, with 49% of respondents agreeing to some extent with this statement, 44% disagreeing and 8% undecided. Females were more likely to be undecided on this issue, and males were more likely to strongly disagree. Older age groups were much more likely to agree with the statement, which may reflect their greater vulnerability when sharing space with e-scooters and may also be related to their generally lower level of interest in e-scooters. People with health conditions that affect their mobility were also more likely to agree. People already using e-scooters were less likely than others to agree with the statement.

As shown in Figure 14, half (51%) had had to move out of the way of an e-scooter rider, around a third (35%) had been 'passed too close by an e-scooter rider', around a quarter (27%) had experienced what they determined to be a 'near miss' with one and a fifth (19%) had been 'blocked or inconvenienced' by a parked e-scooter. Grouping these issues together, almost two-thirds (62%) of the total sample selected one or more of the issues listed. These figures reflect experiences around both shared and privately owned e-scooters.

Examining the data more closely reveals evidence of a relationship with age among these issues, with older age groups more likely to report such negative experiences (Figure 14). This finding is potentially explained by the higher levels of risk aversion in older populations (Zilker et al., 2020), which would increase the likelihood that an individual would interpret an experience with an e-scooter as a threat to their physical safety. People with an illness or long-term health condition were also more likely to report such experiences. It is also the case that female respondents were more likely to say they had felt unsafe around e-scooter riders.

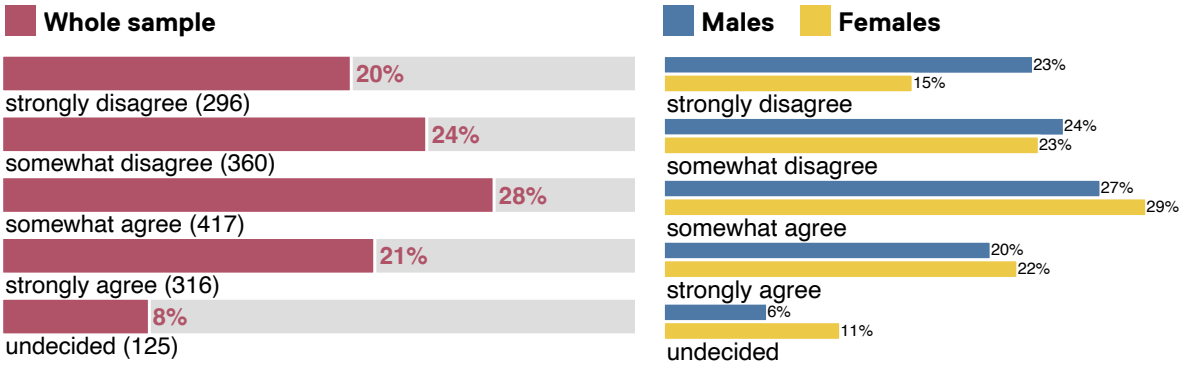


Figure 13 Percentages of respondents agreeing or disagreeing with the statement 'E-scooters are a risk to public safety' (N=1514)

Whilst the numbers of respondents reporting injuries relating to an e-scooter (n=18) or tripping over a parked e-scooter and falling (n=46) were low as a proportion of the sample, these should not be discounted and do indicate that fears around safety have some basis in actual events. It is important to take perceptions of safety seriously, not only because they could result in injury, but also because they could mean people avoiding certain areas or deciding not to make certain journeys. Lime report that three minor and one serious injury have been reported to them and/or Salford City Council since the launch of the share scheme in Salfor.

It is worth noting that at least some e-scooter users also shared their concerns about these issues and expressed their desire to ride safely and responsibly, and to some extent it is the case that *'Riding on pavement isn't inherently dangerous, it's about the speed and awareness'* (Comment – Survey 3). E-scooter riders can therefore help pedestrians feel less at risk around them. In this case, the interviewee's words imply recognition of the pedestrian's right of way on footpaths: *'I would not do it if there was a pedestrian on the pavement. I would stop or whatever'* (Interview 16). Relatedly, this interviewee describes how they try to behave responsibly around people walking: *'...if the pedestrians are coming up, I'll slow down or give them plenty of space. If I have to get off, I'll get off rather than speeding past closely*' (Interview 36).

Interviewee 16 continued, reflecting that the risks commonly associated with the use of e-scooters on pavements do not reflect the behaviour of all e-scooter riders but that they are rather a consequence of what they see as antisocial and dangerous decision-making on the part of a subsection of users: *'but the fact that there are a few bad lawbreakers around, who just don't seem to have regard for other road users, means that we all have to be tarred by the same brush'* (Interview 16).

Concerns about e-scooter riding

While the previous examples of e-scooter riders being careful around other users of shared space do reflect a sense of responsibility evidenced by a selection of users, this is not necessarily representative of all users. The theme of antisocial and inappropriate use was well documented within the qualitative data. Note that in the following quotes the respondents do not always distinguish between shared and privately owned e-scooters:

> ...you drive through Burnage [Manchester] on the way into town, and there are guys in the middle of the... Three or four of them in the middle of the road, cutting and going on the wrong side of the road, riding up the footpath. (Interview 43)

This is just one example, but there were many comments relating to what was seen as irresponsible use that could put other road users in danger: *'I have observed many near misses with people on e-scooters doing things like riding the wrong way up a one-way street whilst texting, jumping traffic lights and weaving about in traffic and crowded spaces'* (Comment – Survey 3). Another respondent describes the extent to which they perceive this to be a problem:

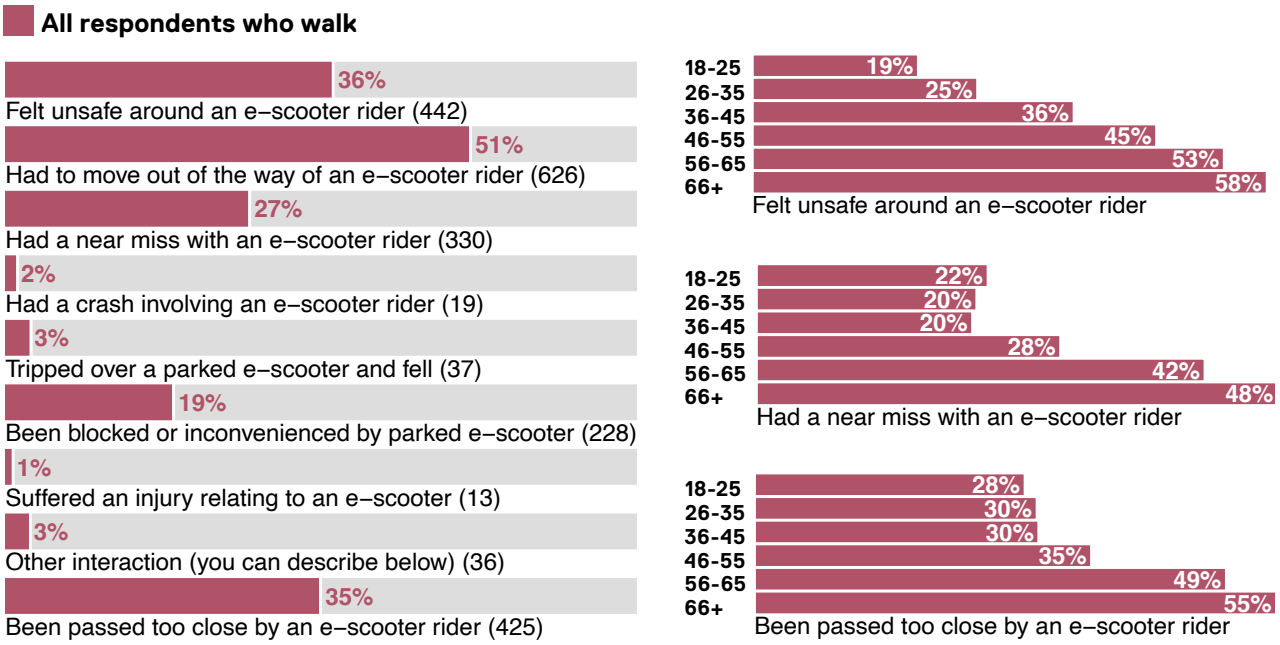


Figure 14 Percentages of respondents who walk who have experienced each issue with any e-scooter (private or shared scheme) (closed list) (Whole sample, N=1223)

> E-scooters are a menace to public safety. I have encountered them in Paris, Manchester and London. In all instances they are left untidily on pavements, in parks and even sticking out of canals. This presents a hazard to everyone but particularly older people, those with children, and the visually impaired. As a cyclist I have had to swerve to avoid e-scooters many times (it is becoming a daily occurrence in Manchester and Salford) – often to avoid them on roads, or even heading against the one way systems of cycle lanes/roads. (Comment – Survey 3)

The quote emphasises that such issues are present in multiple contexts, as well as internationally.

Of the various examples provided by pedestrians, the common underlying theme appears to relate to the speed of e-scooters, which can prevent other pavement users from manoeuvring themselves to safety when moving in close proximity to them. As we have noted previously, it was not always possible to ascertain whether interviewees were referring to shared or private e-scooters in this case. The first of the following points, however, relates to privately owned e-scooters specifically in that it mentions modifications to avoid speed caps, as well as riding without lights:

> Many riders have a lack of road sense and some e-scooters have been tweaked to go faster than the limit allowed. I see them ridden at night in badly illuminated areas with no lights and little consideration for pedestrians and cyclists. (Comment – Survey 3)

> If I'm walking along a road and I get to a corner, I'm going to turn the corner. If there's a pedestrian coming towards me, you both stop. If it's a scooter coming round that corner, you're in big trouble. (Interview 15)

> If someone's walking along with a pram or something, and then someone having to dodge out the way or whatever else. I've seen a few near misses. (Interview 21)

Taken together, the implication of these observations is that, as a result of the presence of e-scooters, people may feel less safe when walking within the spaces that are allocated to them and to which they should feel entitled:

Illustration 7 'They are dangerous. They go too fast and people use them dangerously. It is hard to walk by myself with e-scooters around, it is worse when I am walking the dog and I can't imagine having small children (at least with the dog I can quickly pull them out of the way, a child's reaction time and size may put them in greater danger)' (Survey 3 – Comments).

> I feel like as a pedestrian I feel some entitlement to, this is the space that I should feel safe in the city. I should be able to cross the Lowry Bridge and not have someone whizz down it in the other direction because it's a nice flat surface, but it happens all the time. Mostly negative emotions I suppose you could put, and not great experiences. (Interview 44)

> Walking between Salford University and Manchester City Centre e-scooter riders are constantly speeding along the pavement, brushing pedestrians and blocking the walkway. (Comment – Survey 3)

> They are dangerous. They go too fast and people use them dangerously. It is hard to walk by myself with e-scooters around, it is worse when I am walking the dog and I can't imagine having small children (at least with the dog I can quickly pull them out of the way, a child's reaction time and size may put them in greater danger) (Comment – Survey 3).

This survey respondent illustrates the intensity with which such interactions can be experienced: *'They are SOOOOO annoying. I constantly have to move out of the way of them as they zoom past at 100mph and my life flashes before my eyes'* (Comment – Survey 3).

The following interviewee contributes further to the theme of responsibility in shared spaces. They note that, from their perspective, people walking will not be looking out for other vehicles, as pavements are considered to be a safe space: *'I don't really concentrate when I'm on a pavement because I think I'm okay and there's lots of people about'* (Interview 30).

Injuries

A theme closely linked to safety concerns is the concern that accidents involving e-scooters may lead to physical injury and that with the expansion of e-scooter share schemes, or the legalisation of e-scooters more broadly, this may in turn contribute to more injuries as we see more e-scooters on our roads:

> Yes, I'm still a bit 50/50 about the whole thing because there are irresponsible people, and obviously I'm aware that people have been killed and injured on the scooters… It's definitely a good mode of transport, but it's just those safety aspects that are a bit worrying, in the least. (Interview 48)

This quote illustrates this perception: specifically, the potential for e-scooters to be involved in injuries and fatalities. People's concerns about fatalities connected with e-scooters may be connected with certain high-profile news stories about e-scooter collisions, as public interest in the vehicles continues to evolve. Within the free text section of the survey, there were some first-hand accounts of injuries:

> I was knocked off my pushbike at traffic lights as the person on the e-scooter didn't stop (not seriously injured, but a few scratches and cuts) (Comment – Survey 3)

> Children are using e-scooters. I was nearly knocked down and the parent thought it was funny. (Comment – Survey 3)

> I was knocked off my e scooter when I had right of way and the driver sped off. I was left injured and unable to ride resulting in me having to get an Uber back home. (Comment – Survey 3)

> My dog and I were hit by a young person riding the scooter too fast without care or attention of other park users. My dog was injured. There needs to be more robust geofencing to ensure they can only be used on roads and not pavements. (Comment – Survey 3)

These examples each evidence the potential risk of e-scooters sharing space with pedestrians but also offer insight into factors that may mitigate this. Such factors would include greater awareness of safety, knowledge of road rules and, potentially, the use of the geofence to restrict use and limit speed.

Parking and land use

So far, the observations and concerns explored in this section relate to e-scooters in motion. An additional set of comments from the study data relate to parked e-scooters. These comments relate to the 'virtual dock' design of the scheme, which means that the e-scooters are free-standing in a certain area, rather than physically locked to dedicated infrastructure. They relate to the perceptions of the research participants and it should be noted that parking may be interpretted to be inappropriate or problematic even if it is within the rules of the share scheme. Lime report that there has been a high level of compliance with their parking rules (Appendix B).

> You see the Lime scooters everywhere just thrown on the floor, and there doesn't seem to be anything they can do to stop that. (Interview 44)

> I've seen lots of abandoned e-scooters down the back roads which look a mess and block the pavements. (Comment – Survey 3)

A provision of a scheme with virtual docks prompts questions about its relationship with the surrounding spaces, and respondents raised concerns about e-scooters being parked in ways that were inconvenient to pavement users and potentially dangerous. In this sense, e-scooters add an *'… extra layer to an already complicated and, at times, fractious problem of how you manage shared spaces'* (Interview 14). As discussed in one of our reference groups, *'pavements are already an overburdened space, becoming narrower and more cluttered as roads are widened, cars are parked on pavements, and people cycle on pavements because they perceive roads to be not safe enough'* (Reference Group – Community Organisations). One respondent told us that they already *'find it difficult to walk on the pavements with bicycles, parked and moving cars and uneven paving slabs so to add e scooters would make it almost impossible to get anywhere safely'* (Comment – Survey 3).

The issue is not solely about transport but also about the use of pedestrian spaces in a general sense: *'… bins on bin day. People leave them in the middle of the*

pavement and block it for disabled users' (Interview 33). Taken together, what these accounts highlight is that e-scooter use cannot be considered in isolation but should rather be understood from a perspective of 'shared space'. To take such an approach enables one to consider different modes of transport and ways of traversing space in a more holistic sense.

These observations aside, it is understandable that people feel concerned that existing challenges for pedestrians will intensify with the addition of another vehicle type*: 'I am, like your man says, a pedestrian as well, and it's bad enough having cycles on the pavement. The idea of having, and being squeezed off the pavement by, another vehicle is quite frightening and quite worrying'* (Reference Group – Disabled People and Other Vulnerable Road Users).

Vulnerabilities

We noted above that people with an illness or long-term health condition were more likely to report experiencing feeling unsafe when close to a moving e-scooter. This was an issue that became evident in the interviews, where concerns were expressed about the impact of sharing space on people with vulnerabilities including, for example, mobility impairments:

> I work with loads of people who use wheelchairs, and sometimes I'm just like, they wouldn't be able to get round all these scooters. (Interview 18)

> ...depending on your disability, impairment, your difference, your need, it just makes it that bit harder to manoeuvre or to navigate that space. (Reference Group – Disabled People and Other Vulnerable Road Users)

As discussed above, these concerns appeared to reflect the challenges that would be faced by pedestrians, including wheelchair users, in manoeuvring themselves to safety when in close proximity to an e-scooter. Furthermore, in our reference group focused on disability, it was noted that autistic people might struggle with a fast-approaching e-scooter and that people with mobility impairments would struggle to take evasive action.

Comments received through the survey offer further examples of the characteristics of e-scooters that exacerbate these risks:

> Like all modes of transport, it is all about the user and their care and consideration for others and themselves. Very difficult to hear them coming up behind you if you are hard of hearing. Same could be said for joggers. (Comment – Survey 3)

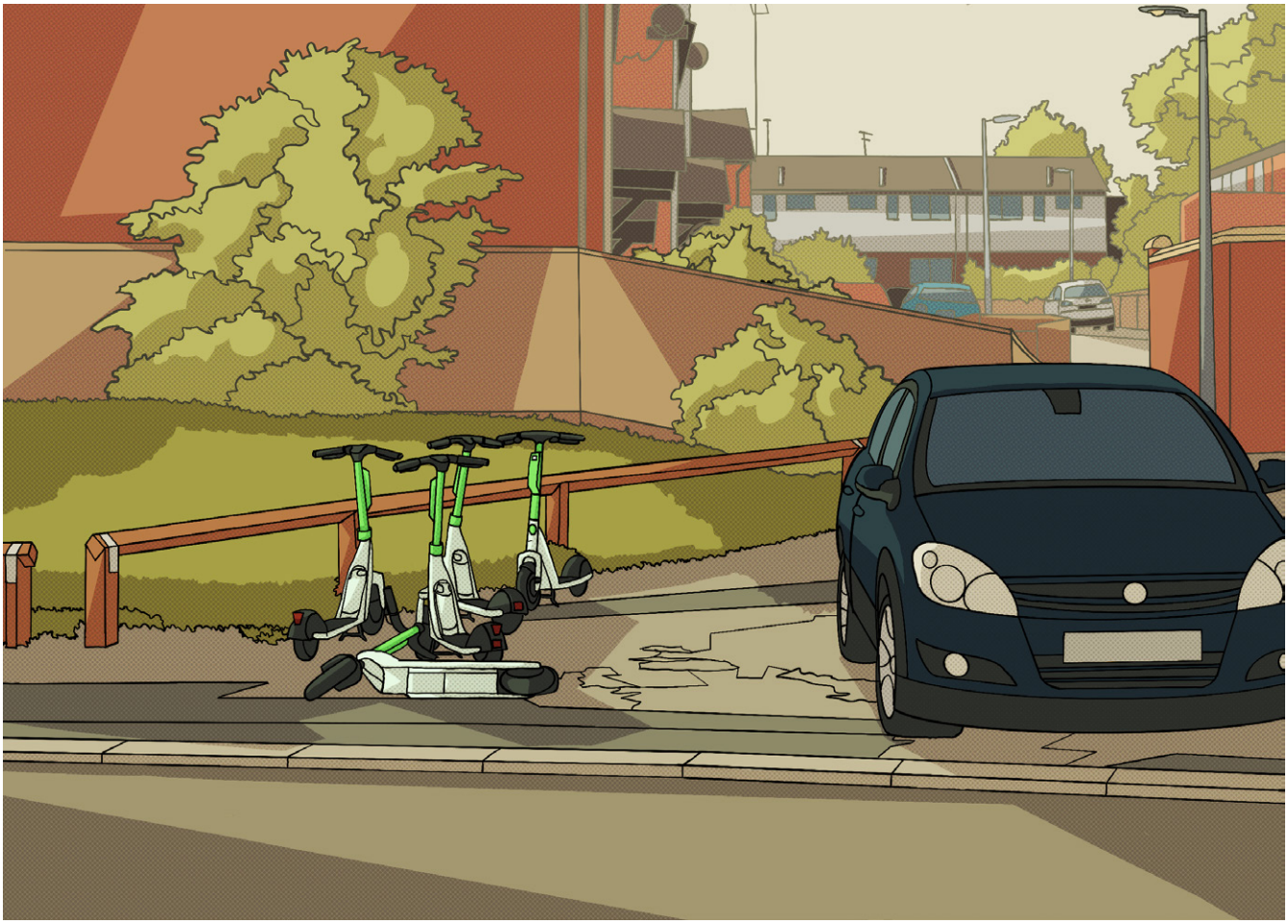


Illustration 8 '[I] find it difficult to walk on the pavements with... parked and moving cars and uneven paving slabs so to add e-scooters would make it almost impossible to get anywhere safely' (Comment - Survey 3) 'You see the Lime scooters everywhere just thrown on the floor and there doesn't seem to be anything they can do to stop that.' (Interview 44)

> I had a near miss on a pavement as I am hard of hearing and did not hear them coming up behind me and I stepped out in front of them – on the pavement! (Comment – Survey 3)

There was a lot of concern expressed by users and non-users alike about the potential impact of inconsiderate e-scooter use on vulnerable people. This perceived threat does not only relate to the behaviour of users but also to the characteristics of e-scooters. Their speed, acceleration and quietness are perceived as factors that might pose a risk to vulnerable road users: *'As e-scooters are quiet, if they come up behind deaf or hard of hearing, blind or visually impaired people it can be quite shocking, and the pavement can become a hostile area rather than a safe pedestrian haven*' (Reference Group – Disabled People and Vulnerable Road Users). It should of course be noted that there are other vehicles, including cycles and electric cars, that are quiet and could be using pavement space, but our focus has been e-scooters.

The following two quotes highlight experiences and concerns about the impact of inconsiderate e-scooter use on vulnerable people in their lives:

> When I was out with my mum that time when someone came, and we were walking from a side street to join another road, they were coming down the pavement. Literally, like, yes, she could have been – she didn't fall over, but it was a very, very near miss of her. (Interview 18).

> I have a neighbour downstairs who's blind, and he's brilliant with it, he knows the neighbourhood now so he can walk on his own, but if he's coming round a corner, he doesn't have a dog, he has the stick, and he knows the area really well, and he goes out – he comes round the corner, and there's a cyclist coming towards him or a scooter coming towards him, he won't stand a chance, will he? (Interview 11)

These accounts emphasise the difficulties presented by the relatively low volume of sound emitted from e-scooters and other electric powered vehicles when in transit: an issue with even greater significance for those with sensory impairments. These respondents, for example, felt that e-scooters fit within a set of potential hazards:

> Dangerous means of transport for riders, pedestrians and all road and pavement users. Even when parked in correct bays they still seem to be moved and throw about the pavement. Trip hazard for partially sighted people and also dangerous for hard of hearing pedestrians. (Comment – Survey 3)

> My concern is the littering of streets with rental scooters – they are often strewn across roads and pavements and being low down can be difficult to spot at night. As an able-bodied person who walks and cycles, occasional pushing a buggy, this is an inconvenience, but I have serious concerns about the impact on people with reduced mobility or visual impairment. Any implementation would need very careful consideration on how to manage the storage problem. The current trials in Salford are already an issue (they are on my commute). (Comment – Survey 3)

Effect on and relationship with cycling

When asked about the relationship between e-scooters and cycling, our reference group of mobility researchers suggested that the success of e-scooters may hinge on the ability of e-scooter users and people cycling to 'get along':

> There seems to be a close relationship with cycling, as e-scooters are perceived to account for similar use cases and share the same spaces, whilst the ways in which e-scooters play out in cities may therefore be strongly determined by the extent of cycling infrastructure and a culture of cycle use. (Reference Group – Mobility Researchers)

We asked respondents who cycle about their experiences sharing space with e-scooters. Of that cohort, 43% mentioned one or more issues, around a quarter (23%) had felt unsafe around an e-scooter rider, had had to move out of the way of an e-scooter rider (26%), or had had a close pass (23%) (Figure 15). A small number (1%) had had a 'crash' or had suffered an injury as a consequence of an experience with an e-scooter (1%).

There is evidence of concern about how cycling and scooting will share space. In this example, a respondent expresses concerns that the presence of e-scooters will further contribute to the aggressive behaviour they see exhibited by car drivers, in particular, towards other road users: *'As a cyclist I get loads of aggro from car drivers and I can see this *escalating big time* as e-scooterists join the throng of non-car road users and are (like many cyclists) oblivious to the Highway Code'* (Comment – Survey 3). This sense that the behaviour of people cycling and using e-scooters can affect the image of these practices is something this interviewee was aware of: *'I would have no issue of using one on a pavement, but I know from when I cycle with my bike on the pavement I think a lot of the time it gives you a bad rep'* (Interview 4).

Another interviewee raised concerns about bicycles and e-scooters sharing cycle lanes, expressing a belief that current infrastructure is no suitable to the further addition of e-scooters to road traffic. In this case the interviewee, who cycles, feels that sharing space with e-scooters would be problematic, something they associate with e-scooter rider behaviour: *'The infrastructure is definitely not set up for scooters. If I was a cyclist, I wouldn't want to share a cycle lane with an e-scooter, seeing the recklessness that people use them adopt'* (Interview 24). To others, however, e-scooter users could share cycle infrastructure, and this adds weight to calls for more extensive active travel infrastructure.

Understanding regulations

Related to sharing space, there is a broader point around awareness of what is actually legal and illegal in relation to e-scooter use: *'I am totally unclear as to whether they should be on the pavement, whether they should be on the road, how fast they're supposed to go, should people be wearing helmets?'* (Reference Group – Community Organisations). This relates to both the e-scooter trial scheme and private e-scooter users, as these participants note:

> I think the messaging round e-scooters is confused, that at the moment people can illegally use them as part of a hire scheme, but there's nothing to stop them going into a shop and buying one, but then it's illegal to use it on the roads, but it's legal to use a rented one. (Interview 14)

> It would have been very interesting to have known exactly where I was allowed to go with it and where I couldn't. Did I have basically the same rights as a cyclist, or, because it was not a pedelec-type machine, it's actually a motorised vehicle, perhaps I should have stayed on the road. I don't know about that, and I wasn't given much guidance about that. (Interview 16)

This lack of clarity can have an impact upon road and pavement users:

> I feel the biggest issue at the moment is that no one knows where e-scooters should be driven (pavement, bike lanes or road), and so instead they switch between all three and don't appear to follow any highway rules – this can make other road users and pedestrians feel nervous because you can never be sure what an e-scooter is going to do. (Comment – Survey 3)

An example given by an interviewee suggests that not all retailers are communicating clearly about the restrictions. She described the experience of purchasing her private e-scooter in a high street shop. She recalls that only at the point of sale was she told by the shop assistant about the limitations on where the scooter could be used legally:

> *...just before point of sale in terms of putting my card into the machine to buy it, they talked me through it and said, "Oh, you do know that legally we're obliged to tell you these should only be used on private land thwat's owned by you. You can't use it on roads, and you should not use it on public access roads and things like that.' (Interview 17)*

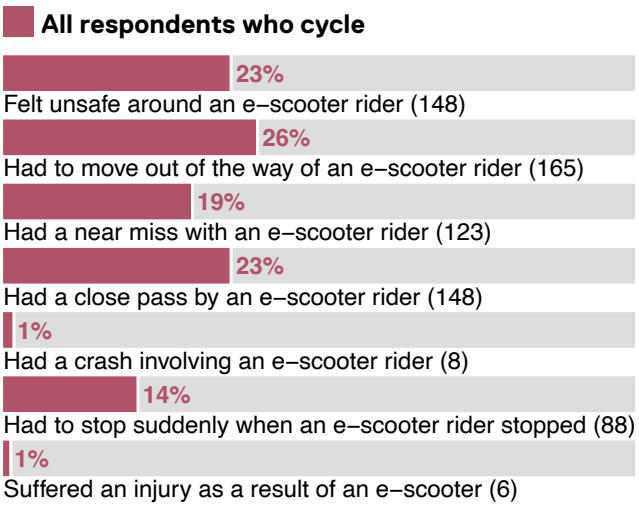


Figure 15 Percentage of respondents who cycle who have experienced each issue (closed list) (N=634)

When asked if she understood this legality: *'I said, "Yes, of course", even though we'd had a ten-minute conversation about me commuting to work'* (Interview 17).

This is perhaps more pertinent at a time when e-scooters and associated legislation are relatively new and it can therefore be expected that awareness is low:

> I guess a bit more signage in terms of, or awareness in general of, where you can and should use the scooters. Like I say, we just went on the paths or the bikes lanes because it was quiet, and we thought it's not bothering anyone. But I don't really know if we were supposed to be doing that or we were supposed to be on the road! (Interview 9)

The challenge of sharing space is complicated by a lack of clear guidance on where to use e-scooters. Although, in the Greater Manchester context, information was provided by Lime, users of privately owned e-scooters have less information. Given that privately owned e-scooters are illegal in public spaces, there is no 'right' place to ride them, but, as we have evidenced above, where they *are* ridden may affect other road users.

Illustration 9 'I have CFS/ME and it means I can go to campus more often than if I had to walk the whole way or get an uber. I walk from [postcode]w to closest e-scooter parking on junction of Seaford Road and Frederick Road (0.3 mi). I then get an e-scooter to campus (0.4 mi). I then take this journey in reverse if I haven't had alcohol, or walk the whole way back if I have.' (Comment - Survey 3)

8. Boosting E-scooter Use

Around half our sample saw themselves using an e-scooter in the future. Younger people, males, people without a long-term health condition and current e-scooter users were more likely to agree that e-scooters are 'for people like me'. Facilitating and encouraging e-scooter use is likely to require that a set of barriers are mitigated. These include costs and payment regimes, road safety, personal safety, knowledge of routes and anxiety about battery life and are experienced with differing intensity across demographic groups.

8.1 Anticipating future use

In order to understand the potential for e-scooter use we introduced a future scenario:

Sometime in the near future, it is now fully legal to ride privately owned e-scooters on public roads, and there is an e-scooter rental scheme that operates across Greater Manchester. We asked respondents about their potential use under these conditions.

Figure 16 summarise the likeliness of using shared or private e-scooters under this scenario. Over half (54%) of respondents were 'somewhat likely' or 'very likely' to see themselves using shared e-scooters. This figure was lower for private e-scooters, at 32%, and 44% of respondents saw themselves as 'very unlikely' to use private e-scooters. Looking across these two cases, males were more likely than females (Figure G1B & G1E) to say they were likely to use an e-scooter, and in both cases older age groups were more likely to see themselves as 'very unlikely' to use an e-scooter (Figure G1E & G2E). People with a long-term illness were less likely than those without such a condition to see themselves using an e-scooter. In terms of differences between demographic groups, then, expectations around future use were therefore similar to those relating to current use.

Figure 17A list the modes of transport people would see themselves replacing with e-scooters. Figure 17B groups these into categories. Figure 17C presents ansers to the question 'Assuming you continue to make the journeys you currently make, would you see yourself using an e-scooter (privately owned or rented) for any of these journeys?' Over half (54%) of respondents said they would see themselves using an e-scooter for some or all of the journeys they currently make (58% of males compared with 49% of females). Figure 17D shows the journey purposes of potential users. With the exception of healthcare, male respondents were more likely than females to see themselves fulfilling each of these journey purposes on an e-scooter.

8.2 Barriers to e-scooter use

We asked all respondents to select from a list of factors that would be likely to limit how much they use e-scooters. Whilst these questions relate to potential use, as opposed to the actual use explored in previous chapters, it should be noted that these barriers related to the current situation and not to the future scenario described above. Current users were included in this question, on the assumption that there might be reasons why they do not use e-scooters as much as they might otherwise do – i.e. barriers apply to users as well as non-users. We asked separate questions relating to, respectively, barriers to e-scooter use in general, private e-scooter use and rental use. Our discussion here relates closely to the qualitative evidence presented in Chapter 5, as it relates to the ways in which people experience, or anticipate experiencing, e-scooters.

Considering the barriers to e-scooter use in general, Figure 18 shows the factors of road safety, the weather and the need to carry items as being the primary obstacles to use, being selected by 59%, 47% and 44% of the sample, respectively. The next most prevalent barrier identified was that of personal safety, which was selected by around a third (30%) of the whole sample. Examining the data at a higher level of resolution provides further insight into potential differences in concerns across different sections of the population.

The first of these findings relates to age, and Figure G3E shows that the proportion of people uninterested in e-scooter use gradually increased with age(***[7]). No further patterns were observed between barriers and age group, and this may be explained by uninterested people not having given potential issues the same level of consideration as those potentially open to e-scooter use. Additionally, older participants were also less likely to agree with the statement 'e-scooters are for people like me', as shown in Figure G6E, which may also explain their reduced level of consideration for e-scooter use.

7 See Box 1, page 2

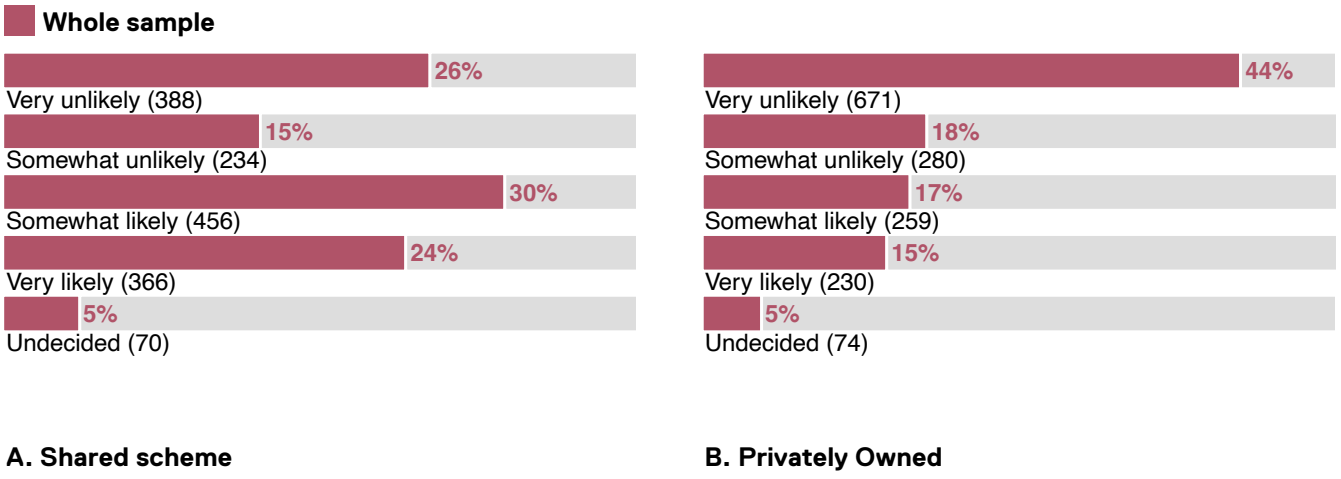


Figure 16 Likeliness of using an e-scooter under the described scenario (N=1514)

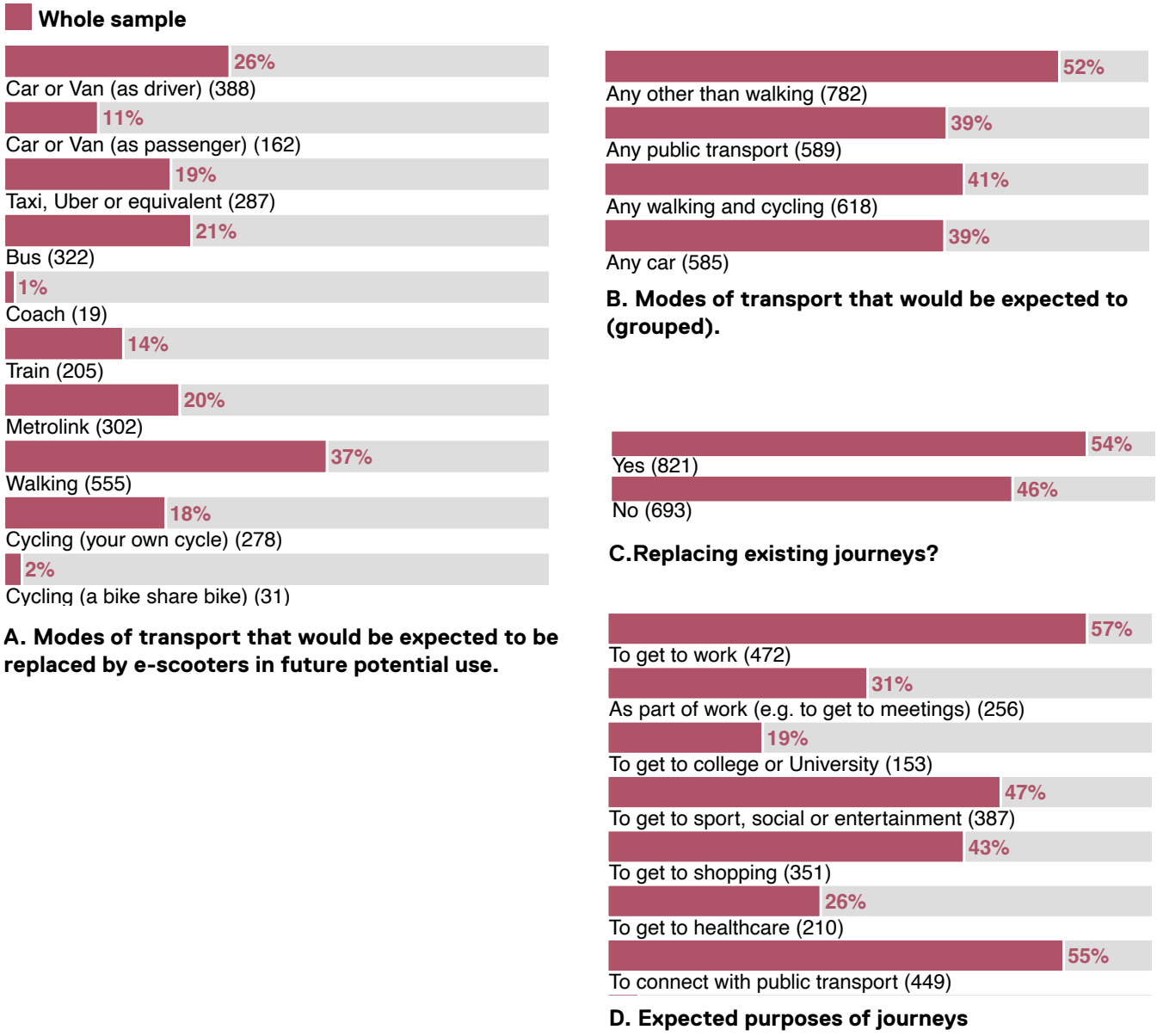


Figure 17 Expected use of e-scooters under the scenario (N=1514)

Figure G3B presents these answers broken down by gender. Examining each of the items individually, however, we can see a clear discrepancy in the concerns of each gender, with female respondents more likely to identify road safety(***), personal safety(*), route planning(***), knowledge(***), the need to carry items(*) and the weather(**) as barriers to potential e-scooter use. As discussed in Chapter 5, issues relating to road and personal safety are more likely to be a concern for women. It is conceivable that knowledge of suitable routes is related to being able to anticipate and plan for situations in which people may feel at risk.

Health also appears to be a factor (Figure G3C). People with an illness were less likely to be interested in e-scooter use. This appears to be driven by an increased prominence of issues relating to road safety, personal safety, knowledge, the need to carry items and the weather. Perhaps unsurprisingly, the most marked difference between the groups was that 30% of people with an illness identified disability as a barrier, in comparison with 1% of those with no illness.

Differences are also observable between people who cycle and those who do not, with those who cycle more likely to be interested in e-scooter use. These differences are broken down in Figure G3D, which suggests that they relate to an increased uncertainty about route planning(***) and the weather(***) amongst those who do not cycle. This is perhaps to be expected, with those who cycle already having experience of these issues with their current mode of transportation.

When comparing users with deciders and avoiders, we can see that, perhaps unsurprisingly, avoiders were more likely to see a lack of interest to be a limiting factor(***). Avoiders and deciders were more likely to cite road safety as a barrier(***). The same is true of personal safety(***), although to a lesser extent.

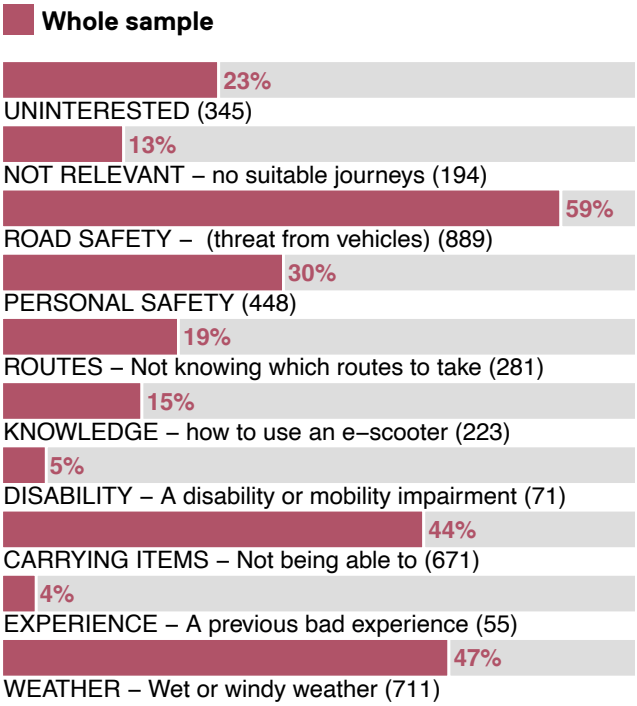


Figure 18 Percentage of respondents selected each potential barrier to e-scooter use (closed list) (N=1514)

Barriers to rental use

Considering the identified barriers to rental use specifically, the primary factors identified by respondents were cost and the operational area, which were selected by 47% and 44% of the sample, respectively, as indicated in Figure 19A. Other notable barriers were access to a helmet and concerns about battery life, which were identified by 28% and 23% of the sample, respectively.

Some interesting observations can be made with regard to the role of age in relation to barriers. Figure G4E suggests a relationship between age and concerns for cost, with these concerns decreasing as age increased(***). This is notable because, as illustrated above, younger people seem to have greater interest in e-scooter use. Cost, therefore, may prove to be a significant barrier for younger potential users.

Considering the role of gender in these differences, Figure G4B shows battery anxiety(***) and knowledge of routes(***) to be greater concerns for female respondents in comparison with males. As above, it is conceivable that access to a helmet relates to road safety and that battery anxiety relates to personal safety, since people may be concerned about having to stop in an unexpected place.

Figure G4C shows hygiene, the need for a driving licence, the need for a helmet, battery anxiety, knowledge and digital access to be of greater concern for individuals with an illness.

Differences also emerge when comparing people who cycle with those who do not. Figure G4D demonstrates that people who do not cycle were more likely to envisage their e-scooter use being limited by concerns about hygiene(***) and battery anxiety(***) in comparison with their cycling counterparts.

Barriers to private use

Considering the barriers identified to private e-scooter use specifically, Figure 20 identifies illegality and cost to be the primary obstacles for respondents, being selected by 59% and 51% of the sample, respectively. The next most significant barrier appears to be the need for storage, which was selected by 26% of the sample.

Examining the data more closely, differences also emerge between sections of the sample. Considering the role of gender in perceptions, Figure G5B shows women to have greater concern about cost(*), storage and battery life.

Considering the role of age, the concerns are similar to those associated with rental e-scooter use. As indicated in Figure G5E, cost was revealed to be of greater concern for younger individuals, which decreased as age increased(***).

In terms of the role of physical health, the only notable differences were that people with illnesses were seemingly more concerned about the need for storage and battery life, as illustrated in Figure G5C.

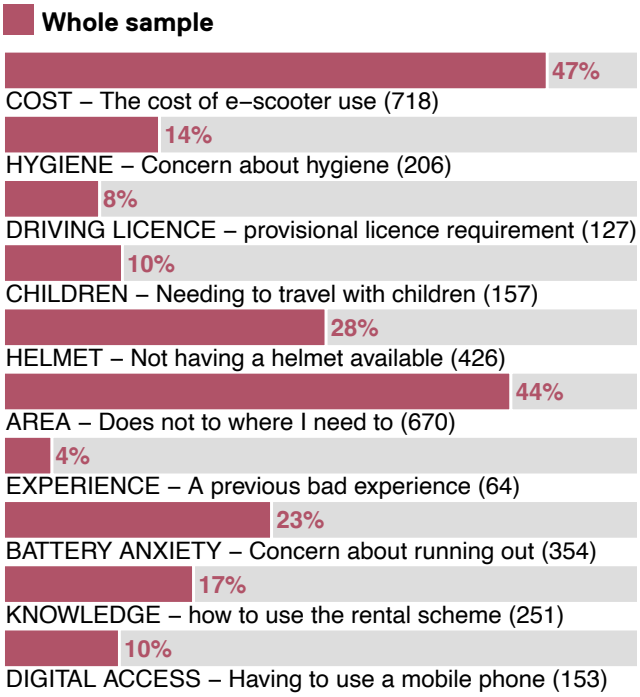


Figure 19 Percentage of respondents selecting each potential barrier to shared e-scooter use (closed list) (N=1514)

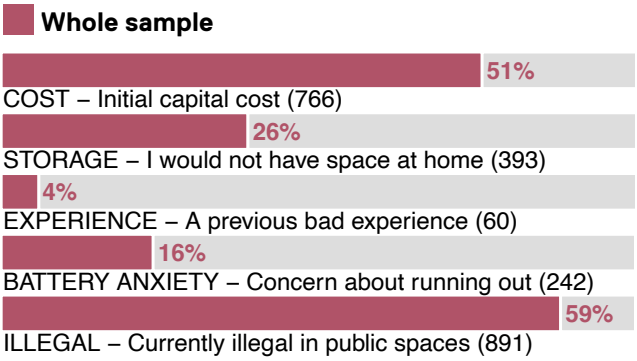


Figure 20 Percentage of respondents selecting each potential barrier to use of privately-owned e-scooters (closed list) (N=1514)

Differences also emerge when comparing people who cycle with those who do not, as shown in Figure G5D. People who do not cycle were seemingly more concerned about cost(***), the need for storage(*), a previous bad experience(***) and battery anxiety(**). Interestingly, people who cycle were more likely to say that the illegality of e-scooters would limit how much they use them(***).

8.3 Looking to the future

We explored preferences relating to how and to what extent respondents would like to see e-scooters being used in the future. A majority (68%) of the sample agreed with the statement 'In the future, there should be an e-scooter rental scheme operating across Greater Manchester' (Figure 21A). Examining this more closely, we see that it was current Lime users, younger people and people with an illness that were more likely to agree with this statement. One participant stated: *'Not only would I love and strongly support e-scooters becoming legal in general, but also a specific scheme in Greater Manchester'* (Comment – Survey 3).

There was support from users and potential users of the scheme for expanding the current geofence into Manchester city centre, as the current geofence ends at the border of Salford and Manchester. Many participants saw an opportunity for future e-scooter journeys if they were able to travel between Salford and Manchester using the scheme: *'Please expand Salford into the centre of Manchester! I work in Media City and would love to use the scheme to get to my home in the city centre'* (Comment – Survey 3).

There was evidence of support for the scheme to be expanded across Greater Manchester: *'I live between Manchester and Oldham, if there was ever a scooter scheme covering this area, I would definitely use it'* (Comment – Survey 3). One user stated they would like to see an expanded rental scheme but felt that the quantity of e-scooters would need to be limited in busy areas:

> Would love a rental scheme that stretches to the whole of Manchester, however I do agree that in busy areas, such as the town centre, there should be a ban due to the volume of people in the area. (Comment – Survey 3)

> For short (3-4 mile) journeys that are too far to walk, where driving shouldn't be an option, and where the tram/bus is either inconvenient or for which I have concerns about Covid, an e-scooter is the by far the best option. If we had a similar scheme in Greater Manchester, then I would likely regularly use them. (Comment – Survey 3)

The designation of the operational area will therefore have an impact on usability and limit the population for whom the e-scooters can be useful. It can therefore also affect social inclusion, particularly if the choice of coverage excludes areas in which lower-income households tend to be located: *'I do wonder whether they've tried to [fence] us around some of the rougher areas to stop people taking into the council estates, which a bit wrong to me…'* (Interview 13). This quote, from the early stages of the scheme when the geofence was smaller, illustrates the ways in which such a scheme could be perceived.

There was concern about the expansion of the e-scooter scheme across Greater Manchester. Some felt that the scheme's dockless design and casual use model might mean similar, problematic outcomes to the Mobike bike share scheme in Manchester a few years earlier: *'Is it that same principle… Because they're going to end up in the canal again, aren't they?'* (Interview 11).

One participant therefore questioned the longevity of the e-scooter scheme: *'I guess I wonder whether it was a flash in the pan thing, a bit like Segways. They had a moment, didn't they?'* (Interview 27). During a reference group with community leaders in Salford, one participant questioned whether e-scooters were the right kind of transport investment when compared with other active modes available, in this case particularly citing e-bikes as an example: *'I just wondered why we're having trials of scooters. I don't see that they have any advantages over e-bikes and lots of disadvantages'* (Reference Group – Community Organisations).

Concerns were expressed about the impact of e-scooters on pavements and shared spaces and the potential risk to people walking. These are discussed in Section 7.4.

Many participants viewed the e-scooter trial scheme as a positive new addition to Greater Manchester's transport system. Figure 22D shows that over half (59%) of survey respondents agreed with the statement 'E-scooters will make Greater Manchester a more attractive place to live'. Examining the data more closely, it was men (Figure G7B) people with an illness (Figure G7D), current Lime users (Figure G7F) and younger people (Figure G7E) who were more likely to agree with this statement. One participant saw them positively, even though they were unsure if they would use the e-scooters again: *'I'm really glad that they're there. I'm quite glad that it's become clearer that they should be on the road, but I don't want to be on the road!… I'm richer for them being available'* (Interview 47).

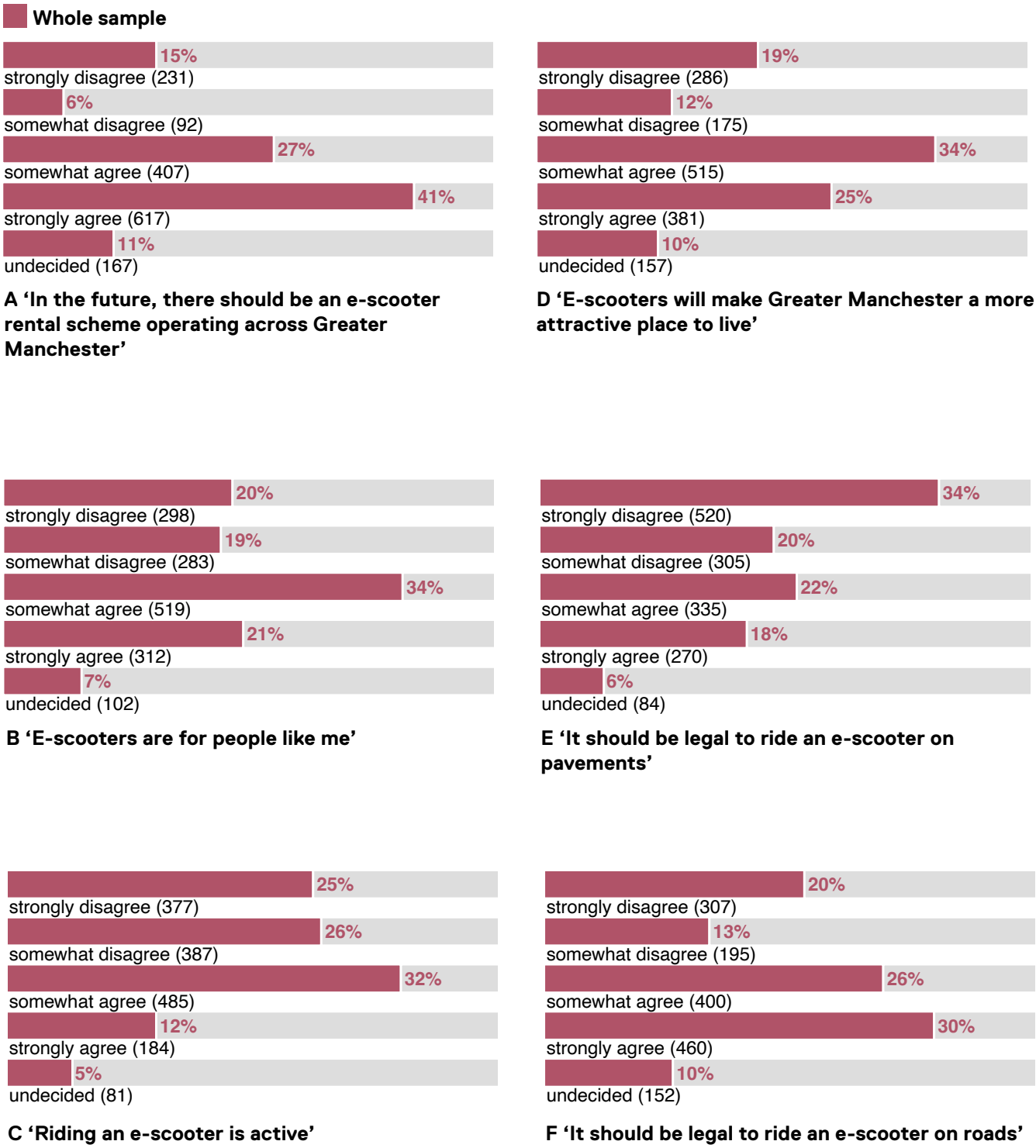


Figure 21 **Levels of agreement with statements (N=1514)**

This outlook broadly reflects two themes: the perceived environmental and health benefits that e-scooters provide by offering an alternative to private car use and, in turn, the potential to increase engagement with active travel infrastructure and encourage more dedicated space to be provided:

> I like things like e-scooters because obviously they don't produce petrol fumes in the same way. (Interview 21)

> We need to make more roads in city centre car free so that they can be used for pedestrians, cyclists and e-scooter riders. This will tackle air pollution and climate change, encourage more active travel and make room to have street trees - a win all around for health and well-being and protecting the climate. (Comment – Survey 3)

> Anything that reduces car use is a good thing e-scooters offer greater flexibility than shared public transport, which has fixed stops, and would be a great way to reduce car use especially in and around the main cities & towns of GM. (Comment – Survey 3)

A number of respondents made connections with other cities they had visited, where they had seen benefits:

> I would love to see them in use more and more and cutting down the number of cars on the road, single car use, pollution from cars, etc. I know they can be dangerous, so there need to be well-considered speed limits, but I have been impressed with their common use in other cities (in Europe) and hope they can similarly come into use in GM. (Comment – Survey 3)

The question of the future legality of e-scooters is something that divided the sample. We asked if it should be legal to use e-scooters on roads (Figure 21F): over half (56%) somewhat agreed or strongly agreed, a third (33%) disagreed and a minority (10%) were undecided. When asked if it should be legal to ride e-scooters on pavements (Figure 21E), 40% agreed, 54% disagreed and 6% were undecided. Whilst this indicates majority support for allowing riding on roads and banning pavement use, there is a spread of opinion. Older people were less likely to agree with legalising e-scooters. This applies to roads and pavements: the latter case may reflect their greater vulnerability when sharing spaces with e-scooters. Females were less likely to support legalisation, and the difference here between females and males is most pronounced in the case of road use. This may reflect the greater extent to which females evidence concern about safety in traffic. This raises the question whether restricting pavement use might deter those most concerned about road safety.

9. Conclusions

9.1 Introduction

Lime's shared e-scooters arrived in Greater Manchester in autumn 2020, and the scheme has since then expanded to cover a larger spatial area and to offer more vehicles. As the area has grown, so has the number of potential starting points and destinations, as well as the potential to connect with other forms of transport at, for example, bus stops and train and Metrolink stations. Over the same period, privately owned e-scooters have continued to be evident on roads and in other public spaces, and to the casual observer there has been a rapid increase in the presence of both private and shared e-scooter use.

In our research, we have contributed to the evaluation of the UK trials through an investigation of the Greater Manchester trial scheme. We have provided insights on e-scooter use and how it varies across demographic groups, as well as the reasons why people are choosing to try out and use these vehicles. We have explored how people are using them, the journey purposes and the connections they are making with other modes of transport as part of their mobility routines. We have also presented evidence on the challenges of sharing roads and pavements. Finally, we have identified the barriers that are likely to deter people from using e-scooters and limit the development of share schemes and considered the way these differ across demographic groups. In this chapter, we present a summary of our findings and identify key themes and implications arising from our analysis.

9.2 E-scooter use

Lime's own data provides a summary of rates of ridership over the course of the trial and shows increasing take-up as the rental scheme has expanded over Rochdale and Salford. As we discuss in Section 3.2, our sample adds to this, providing a sense of who is using the e-scooters, why, and for what purposes.

Broadly speaking, our findings are in line with those outlined in the literature and discussed in Chapter 2. Males are more likely than females to be e-scooter users and less likely to see themselves using an e-scooter in the future. Younger age groups are more likely to use and see themselves using e-scooters, as are people without a long-term health condition that affects their mobility. Males, younger people and people without such a health condition are also more likely to agree with the statement 'e-scooters are for people like me'.

Although some research has suggested that e-scooters are more likely to be used by wealthier people, our sample indicates the opposite: although the relationship is not as clear as with age, we found that people in the lower household income groups were more likely to be users.

We explored the relationships between e-scooter use and the ways people otherwise get around. We found that people who cycle as part of their regular activities were less likely to have used an e-scooter than those who do not cycle. Our data also indicates that those who neither cycle nor drive, and are therefore likely to be dependent on walking and using public transport, were more likely to have used an e-scooter than those who drive and/or cycle. This implies that e-scooters could be creating opportunities to make journeys for which transport might not otherwise have been available.

9.3 Mobility practices

We wanted to understand e-scooters within the context of mobility practices and to understand the ways in which people use e-scooters to connect with other modes of transport and to make journeys they would otherwise have made by other modes. As we discuss in Chapter 6, we found that most respondents had used an e-scooter to make at least one journey from A to B, as opposed to simply using e-scooters for fun or recreation.

As would be expected, respondents used e-scooters for a range of purposes, including work, education, shopping, healthcare and sport, social or entertainment events. As discussed in Chapter 2, the literature has generally found that e-scooters are replacing journeys that would otherwise have been made by active modes. Our data suggests that this is a large part of e-scooter use, but there is evidence of, and potential for, modal shift.

- Two-thirds (67%) of respondents had made at least one journey they would have made by a mode other than walking.
- A quarter (25%) of respondents had replaced a journey they would have made by private car, either as passenger or driver, and, if we include taxis and ride-hailing in this group, it reflects around half of our users (49%).
- 38% of Lime users had used an e-scooter to connect with a form of public transport.

Respondents have used e-scooters to connect with public transport, and have found them useful on occasions when they experienced delays or missed connections. E-scooters were also valuable when public transport was not available, and they were a less expensive alternative when taxis or ride-hailing might otherwise have been used. Respondents gave examples of using e-scooters for shift work at times when public transport was not available and when they would otherwise have used a taxi.

The relationship with walking is complex. In some cases, respondents had simply replaced walking journeys with a mode that was faster and required less effort, but in other cases, they had made e-scooters part of their walking routine, a supplement for times when they were running late, or did not feel like walking or because an e-scooter would be fun.

9.4 Deciding to use e-scooters

The reasons behind e-scooter use can also be understood in relation to other modes and practices. In Chapter 6, we have seen that e-scooters can be less expensive than public transport and taxis and, in some cases, available where public transport does not go. They can be more reliable than public transport, although we note that there are limitations on this in relation to finding and parking an e-scooter and also to battery life. The shared element can provide a degree of flexibility, enabling people to make journeys by foot with the option of picking up an e-scooter to make some of the journey. E-scooters are also faster and involve less exertion than walking. They may also enable shorter journey times than when using public transport in some cases, particularly when making multileg journeys. Some respondents compared the level of exertion with cycling and noted that they were less likely to perspire than when cycling.

Enjoyment

We should not forget or discount fun and enjoyment as a motivation for e-scooter use, as discussed in Chapter 4. This is something that we have seen as a journey purpose, i.e., scooting for recreation or as part of a shared experience with friends, as well as part of decision-making in relation to journeys from A to B. In the latter case, fun might be part of the motivation for using an e-scooter, even if the primary purpose of the journey is something else.

Personal safety

Another reason for e-scooter use, and one that appears to be gendered, relates to personal safety, as discussed in Section 7.3. In reflecting on their decision-making around mobility, some interviewees reflected that they chose e-scooters over walking and public transport because they could move more quickly through spaces and avoid waiting at interchanges. In some cases, an e-scooter was an alternative choice to a taxi or ride-hailing at night, and one that was less expensive. This is not necessarily straightforward, however, as one respondent felt they would feel more exposed when riding an e-scooter, drawing unwanted attention to themselves, and another noted that e-scooters are often more expensive than a taxi or ride-hailing for group travel. We saw examples of respondents weighing up the risks and benefits of, on the one hand, feeling at less risk of harassment when moving quickly and, on the other, feeling unsafe moving in traffic.

Health conditions

We also heard from people who had chosen to use e-scooters or saw them as relevant because they had a condition or vulnerability that affected their mobility. Respondents with health conditions that affected their mobility were more likely to give 'physically undemanding' as a reason for using e-scooters.

9.5 Paying for e-scooters

Cost is an important element of transport decision-making, and perceptions of the costs of e-scooter use should therefore be understood in the context of other choices available, as we describe in Section 5.4. In some cases, particularly when travelling alone rather than in a group, e-scooters were seen to be more cost-effective than public transport, taxis and ride-hailing. An important consideration is, however, predictability: there is a set of factors that mean that the cost of e-scooter journeys can be difficult to predict given that they are charged per minute.

These factors include unfamiliarity with the vehicle; knowledge of routes that are likely to be suitable; the time spent finding a parking space, particularly when making a journey for the first time; issues with batteries that may mean having to find a virtual dock at which to swap to a different e-scooter; and other unpredictable elements of journeys such as junctions and traffic lights. For those needing to budget carefully, then, the certainty of a bus, tram or train fare may be preferable, even if e-scooters might work out slightly less expensive in the long run.

There are also further issues that relate to recent developments and may affect attitudes to expenditure. Firstly, some people are now working from home more often and travelling to workplaces only a few times per week. This means that transport costs are a smaller part of the household budget and therefore potentially less of a concern. It could also mean that season tickets or subscription arrangements can be less advantageous. Secondly, with rises in fuel prices and the cost of living, people are looking for ways to cut costs, and this may be a reason to try out e-scooters.

9.6 Experiences and challenges

Finding and parking

As discussed in Chapter 5, respondents shared with us some of the challenges they experienced when using e-scooters. A prominent issue related to finding and parking e-scooters. Some respondents had had difficulty finding parking places and found not only that this was inconvenient but also that it could result in higher costs. Some had had issues with battery life and reliability of charge, noting that it was difficult to estimate how far an e-scooter would take them or if they would have to find a virtual dock en route to swap to a different e-scooter.

Operational area

The operational area and geofence also affect experiences, limiting where people can travel to and therefore, in turn, the usefulness of the shared scheme as a mode of transport. People also found that they came up against 'no-go zones', at which e-scooters stopped or slowed down, affecting journey times and therefore convenience and, ultimately, cost. In our exploration of views on future e-scooter schemes for Greater Manchester (Section 8.3), greater reach and connectivity is something respondents were keen to see.

Road safety

Road safety, as discussed in Section 7.1, was the most prominent barrier to further e-scooter use, and only 33% of our e-scooter users and 13% of non-users said they were confident riding e-scooters on roads. Respondents felt that they would have more confidence on cycle lanes and traffic-free routes. In our sample, confidence on roads and cycle lanes was clearly gendered, with males more likely than females to say they were confident on roads and on-road cycle lanes. We also found that people who already cycle for some of their journeys were more likely to be confident riding an e-scooter on roads in particular and on any surface other than pavements. Female respondents were significantly more likely to say that concerns over road safety and personal safety would limit how much they use e-scooters, and this resonates with existing literature on e-scooters and active travel discussed in Chapter 2. We also found that females were more likely to say their e-scooter use would be limited by them not knowing which routes to take and by anxiety relating to battery life. Both of these considerations, we would argue, relate to safety.

Safely sharing space

As discussed in Chapter 2, issues around sharing space, particularly with pedestrians, have been prominent in news coverage of e-scooters. We found a relatively high rate of concern amongst our respondents, with a majority reporting that they had had some problematic experiences, whether being passed too close by an e-scooter rider, experiencing a 'near miss' or being blocked or inconvenienced by a parked e-scooter. The concern stemmed from the speed and quietness of the e-scooters and also related to reported incidences of people riding without consideration for other road and pavement users. Older age groups and those with a health condition that affected their mobility were more likely to indicate that they had had these experiences. Respondents were concerned about parked e-scooters adding to pavement clutter but also noted the many other pressures on space, such as pavement parking.

Whilst it is to some extent encouraging that the level of reported injuries from a collision with an e-scooter or from tripping over a parked e-scooter is much lower than expressed perceptions of risk, it is important not to discount these cases, especially if the increasing presence of e-scooters results in people feeling less confident using pedestrian spaces.

Regulatory environment

There is an indication that people do not have a good understanding of the regulations that relate to e-scooter use. Even in the case of shared e-scooters, which are legal to ride within the designated area, respondents were unsure whether they should be using them on pavements or roads and where restrictions might apply. Given that the use of privately owned e-scooters is illegal in public spaces, it is unsurprising that there is no guidance on where best to ride them. This absence of information and guidance could mean that people are unsure where to ride them, feeling that they are not welcome anywhere. Although our sample was divided on the question of legalisation, there was a large minority who agreed that it should be legal to ride e-scooters on roads and, to a lesser extent, on pavements. Legislation could help to give guidance to e-scooter users, provide reassurance to other road and pavement users and equip law enforcement to focus on dangerous practices. In addition to regulatory approaches, there are opportunities for more effective provision of information and delivery of training.

9.7 Environmental impact

The full environmental impact of e-scooters or the Greater Manchester scheme is beyond the scope of this report. We noted in Chapter 2 that there is a range of factors to consider that include manufacturing impacts, battery life and the procedures employed to charge and (re)distribute e-scooters across the operational area. A substantial part of the potential environmental gain, in terms of energy use and therefore carbon emissions, is the extent of modal shift, and this is the change that is most likely to have an impact on greenhouse gas emissions and air quality in Greater Manchester.

If e-scooters are mostly replacing journeys that would otherwise have been made by foot or bike, then this is likely to reflect an increase in energy use. If, on the other hand, e-scooters are being used instead of private cars, then there is an argument that e-scooters could reduce the energy intensity of those journeys and therefore, in time, of the transport system. We did not set out to precisely record modal shift, but we do have an indication

of the types of modal shift occurring. The findings demonstrate potential for modal shift from car use and from taxis and ride-hailing in particular.

9.8 Social impact

We have seen that the e-scooters are being used to make journeys that would not otherwise have been made and to connect with work, education, healthcare and social life. Whilst the creation of new journeys might be a negative in carbon terms, if a new mode of transport is helping people participate in society, then that is a positive social impact. Related, and much more positive in environmental terms, is the potential for e-scooters to provide a more affordable alternative to taxis and ride-hailing. If this makes shift work less expensive, then this can help social inclusion. We have also seen that e-scooters can be useful for those with mobility impairments and other health conditions that affect how they get around. It is also interesting that those participants in our survey who own neither a car nor a bike were more likely to have used an e-scooter, as this implies that they could be filling a mobility gap. Taken together, these factors could result in a positive impact in relation to social inclusion.

Conversely, there is a risk that e-scooters continue to have an impact on pavements and shared spaces when ridden or parked. The detrimental social impact extends not only to potential injuries that result from collisions but also to perceptions of danger that cause people to limit how much they use pedestrian spaces. These issue will relate in particular to blind, visually-, hearing-, and mobility-impaired people.

Gender

The relationship with gender is complex. There is an indication that e-scooters could enable people to feel safer when travelling through public spaces or to avoid waiting at public transport interchanges at night, and our data suggests that this is particularly relevant to women. However, in our sample, female respondents were less likely to use e-scooters and to see themselves using one. They were less likely to see e-scooters as being 'for people like me', less likely to agree that there should be a Greater Manchester-wide scheme and less likely to think e-scooters would make Greater Manchester a better place. We found that males were more likely than females to have made a journey from A to B, as opposed to having used an e-scooter for fun or recreation.

Barriers to e-scooter use that seemed to be a concern to female respondents in particular included road safety, knowing which routes to take and having a helmet available. We have argued that these could all relate to safety and that knowledge of routes could equally relate to personal safety. Battery range anxiety was also more of a barrier for females than males, and this could relate to concern about running out of charge in an unfamiliar location. Other barriers that related more to females than males were carrying items and exposure to the weather.

Age

Older people were less likely to use or see themselves using e-scooters and less likely to agree that e-scooters would make Greater Manchester a more attractive place to live. They were also more likely to say they would feel unsafe around an e-scooter. These findings resonate with other research, discussed in Chapter 2, which has generally found that e-scooters appeal to a younger population. It could be argued that this need not be a problem if there are other modes of transport in the mobility mix that provide for older people. Whilst this makes some sense, it would not detract from the need to ensure that e-scooter users are not affecting the experiences of older and more vulnerable people to the extent that they feel unsafe using pavements and shared spaces.

9.9 Shared and privately owned e-scooters

In our study we have focused, in both the design and participant recruitment, on the Lime e-scooters and their users. We have, however, endeavoured to contextualise the use of the share scheme within the wider use and provision of e-scooters. As we explore further in this section, we feel it is important to consider these modes of use together.

Firstly, they have appeared on our roads at roughly the same time. This means that it is e-scooters per se that are novel, not merely the sharing scheme. This can be contrasted with bike share, in which the mode of use is new and interesting, whilst cycling itself is familiar. Secondly, we suspected that private and shared use would have different advantages, be subject to different constraints and therefore potentially be used for different purposes. Thirdly, we have seen that people have expressed concerns about safety when sharing spaces with e-scooters. In these situations, we cannot expect people to differentiate between privately owned and shared scooters: it is the vehicle itself that is the perceived threat.

Looking across our data, we can explore the relationship between private and shared use further. There are some characteristics that apply to e-scooters per se, whether shared or privately owned. These include speed, compactness, the enjoyment associated with riding them and the low level of exertion. It should perhaps be noted in relation to the first of these that shared e-scooters have their speed capped, so there is a slight difference between the two modes of operation.

There are other features that apply only to shared e-scooters, such as the flexibility of being able to pick up and drop off a vehicle and not having to store one at home or park it and risk the theft of one's own property. This affords shared e-scooters a particular relationship with other modes in that they can be combined with public transport and can be used for part of walking trips, whether in a planned or spontaneous manner. As we

have seen, shared e-scooters are therefore a potential replacement for some journeys made by point-to-point services such as taxis and ride-hailing.

The most prominent barrier – road safety – relates to all e-scooter use. Battery anxiety relates to both shared and private e-scooters, although it could be argued that users will have more control over the batteries of their own e-scooter than one provided through a sharing scheme. Challenges around finding and parking e-scooters and the associated implications for convenience and cost apply only to shared e-scooters, but those with their own e-scooters would instead have the challenges of storage at home and parking at their destination.

The geofence is something particular to shared e-scooter use: private e-scooter owners would not be constrained in terms of where they could ride to or find themselves entering 'no-go' or speed limit zones. They are of course not legally allowed to ride on any public land, including roads and pavements, but this rule is not being adhered to, and, if private e-scooter use is legalised, there is no mechanism through which a geofence could be applied. Concerns about per-minute costs stemming from uncertain journey times would not affect e-scooter owners, but they would instead have capital outlay and ongoing maintenance and charging to consider.

In relation to sharing space, we have noted that people cannot necessarily recall if the encounters they have experienced have been with shared or privately owned e-scooters. This point notwithstanding, it is important to note that the shared use model allows a greater level of regulation and harmonisation of standards in relation to vehicle speed, lighting and braking and that the speed of shared e-scooters is currently capped below what some privately owned e-scooters are capable of. In addition, geofencing can be used to constrain the use of shared e-scooters, limiting their speed in some areas and preventing their use entirely in others. Our interviewees and the research team have, however, observed the Lime e-scooters being ridden on pavements in Salford, so it is possible that the space conflicts are arising from the shared scheme. The issue with e-scooters being left on pavements and potentially in the way of people walking is specific to the shared scheme.

It makes sense, then, to consider not only the value of an e-scooter sharing scheme per se but also the value of e-scooters *and* of a dockless sharing scheme. This points to some questions. Are there aspects of the scheme that could apply to other shared modes? Is the value of e-scooters in connecting with public transport specific to e-scooters or would the same apply to bike share? Is it the electric motor and low exertion that are attractive, and would this also be the case, perhaps to a lesser extent, if e-bikes were available? Is there something about the design of an e-scooter itself that is more attractive to potential users?

9.10 Key Points

Who is using e-scooters?

People are continuing to make use of the e-scooter share scheme in Salford. The end of Covid-19 restrictions and the increasing operational area have meant that more people can now make use of the e-scooters for a wider range of journeys.

As we have seen from the start of this study in spring 2021, use and potential use vary between demographic groups. Older age groups are comparatively less likely to use and see themselves using e-scooters, and this is also the case for females and people with a long-term health condition that affects their mobility.

What factors limit e-scooter use?

There is a set of barriers that tend to limit e-scooter use, and experiences of these vary by social group. Road safety and personal safety are prominent among these barriers, and older people, women and those with a health condition are more likely to be concerned about these in relation to e-scooter use.

Our analysis also suggests that e-scooter use relates to the mobility choices available to an individual and that those who have access to neither a car nor a bicycle are more likely to make use of the share scheme. This suggests some potential for a positive effect on social inclusion, although we have seen that some people will find the requirement for a provisional driving licence to be a deterrent.

What motivates e-scooter use?

We have seen that curiosity is a prominent driver of e-scooter use, as we might expect with a new scheme and a novel mode of transport. We have seen that this curiosity translates into the use of e-scooters for various journey purposes including work, education, healthcare and social life. Relatedly, enjoyment and fun are clearly factors that influence use. These motivations are not necessarily ends in themselves but are also elements of decision-making when making journeys: choosing an option that will be enjoyable does not mean the journey is 'just for fun'.

How does e-scooter relate to other transport?

People are using e-scooters for part of their journeys, in some cases replacing walking and cycling journeys and in other cases making journeys they would not otherwise have made. This is not necessarily a case of simple substitution: people are seeing roles for e-scooters when running too late to walk, when wanting a less 'sweaty' alternative to a bike, or when planning a journey on foot with the option of picking up an e-scooter for the return leg. There are also cases of switching from and connecting to public transport and using e-scooters for part of bus, tram and train journeys.

Concerning modal shift and the associated environmental impact, it is interesting that almost half of our users had made some journeys by e-scooter that they would have made by car, taxi or ride-hailing and that there appears to be a particular role for e-scooters for those point-to-point journeys that taxis and ride-hailing offer. As these journeys were sometimes made when public transport was unavailable, such as when doing shift work, there is a potential social inclusion benefit from this modal shift. Given the relatively early stage of the trials and the limited, albeit expanding, operational area, we could expect that there is an untapped market for e-scooter journeys.

How do people find the cost of e-scooters?

The cost of e-scooter use can be understood in relation to other modes and to what people are used to spending and prepared to spend on transport. Particular aspects of the shared scheme mean that the per-journey cost might be difficult to predict. Paying per minute means that not knowing the quickest route, waiting at junctions and heavy traffic can affect journey times. Additionally, and specific to this particular model of use, issues with e-scooters relating to battery reliability and finding parking places can add minutes, and therefore cost, to a journey.

Do e-scooters have social benefits?

A potential social inclusion benefit relates to those for whom walking and cycling might not (always) be practical but who would like some affordable independent travel. This includes people with health conditions that might limit mobility. Notwithstanding this potential, our analysis indicates that people with a health condition that affects their mobility are less likely to use an e-scooter or to see themselves using an e-scooter and this relates to the set of barriers outlined above.

We have learned that people can value e-scooters as a way of travelling more quickly through spaces at night and avoiding waiting at public transport nodes. It is females in particular, but not exclusively, that refer to these potential advantages relating to personal safety. There is however a complex relationship between personal safety and road safety: people need to feel confident using e-scooters on roads and shared spaces before they consider using these vehicles to make them feel safer from attack or harassment.

Do e-scooters create tensions in shared spaces?

We have seen that the concerns – prominent in the media – about the impact of e-scooter use on shared spaces are reflected in the experiences of our respondents, a majority of whom had felt unsafe around e-scooter riders or had had to move out of the way of one. Whilst a much smaller number had suffered injuries as a result, we should by no means discount these, especially as a sense of danger might deter some people, particularly more vulnerable people, from using shared spaces.

This is particularly problematic for blind people and those with visual, hearing and mobility impairments. The implication is that there is a need for the development of clear guidelines on where and how e-scooters should be ridden and consistent enforcement of rider behaviour and e-scooter features, such as breaks and lights.Recent developments have affected mobility practices, and there are implications for e-scooter use.

Have practices changed since Covid-19 lock downs?

E-scooters are attractive to those who are concerned about limited social distancing on public transport, but this is likely to be something that had more relevance in the early stages of the trial. The experience of Covid-19 has also affected working practices, with partial working at home now common. This has implications for transport cost calculations. Since these have been substantially reduced for some, this may mean people are less concerned about small differences in per-journey cost. It is also possible that season ticket deals are therefore less attractive, as they are often predicated on frequent travel. Finally, and conversely, the current cost of living crisis, which is affecting energy and transport costs, means that people will be looking for ways to cut costs and reduce petrol consumption.

Are the issues different for privately-owned and shared e-scooters?

There is value in a nuanced discussion that recognises the similarities and differences between shared and privately-owned e-scooters in terms of their use value as well as the implications for other road and pavements users. Across these observations, we see some qualities that relate to e-scooters as a whole, such as their speed, compactness and relative affordability, as well as the sense of enjoyment that people refer to.

Alongside these qualities, shared e-scooters offer the advantages of a shared point-to-point service, including the flexibility to pick up and drop off, to pay per use and to avoid having to store or risk parking a personal vehicle. Private ownership will appeal to those who want their own vehicle, to avoid per use costs and, as it currently stands, avoid being restricted by a geofence. Rental e-scooters also tend to be more robust models, at least in comparision with the cheaper end of the range available for purchase, and to be subject to regular maintenance as well as requirements relating to lights, brakes and speed limits.

Some of the advantages and use cases that people have shared relate to the sharing element in particular. It is therefore conceivable that some of our findings relate to shared micromobility as a whole, rather than e-scooters in particular. The advantages of being able to connect with public transport and pick up an e-scooter when doing shift work, for example, might equally apply to bike and e-bike share services. The question, then, is to what extent e-scooters bring some particular advantages, such as enjoyment or a low requirement for effort, that give them a distinct value in the mobility mix.

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A Method

Approach

The study employed a combination of qualitative and quantitative social research methods: three online surveys, 13 reference groups and 49 in-depth interviews (Table A1). It sought to understand experiences and perceptions regarding e-scooters in Greater Manchester and to identify who is using and might use e-scooters, why (and why not), how, and for what purposesw. It placed the scooters within a broader context that takes account of other road users, the wider community and vulnerable people. By involving people who have used e-scooters alongside those who have not, we have been able to identify what factors might be limiting e-scooter use and understand the ways in which e-scooters may be affecting other road users.

In particular, the research aimed to create an evidence base on:

- who is using, or considering using, e-scooters and how these groups could be categorised;
- reasons for using e-scooters and potential barriers to their (further or more extensive) use;
- the purposes for which e-scooters are being used;
- the relationship of e-scooting with other modes of transport and how this may encourage intermodal travel and drive patronage to more sustainable modes;
- the nature of the e-scooting experience and its relationship with the urban context, including physical infrastructure, traffic and interactions with other road users;
- perceptions of e-scooters by users and non-users in relation to convenience, impact, safety, the public realm and interactions with others;
- the distribution of the above factors across demographic groups including gender, ethnicity, socio-economic status and levels of vulnerability and the implications of this for uptake and social inclusion; and
- the influence of the Covid-19 pandemic and associated policy responses on use of, and perceptions relating to, e-scooters.

The study is not intended as an evaluation of Lime's scheme in Salford as such. Rather, it has taken this scheme as a case study that enables us to better understand the potential role of e-scooters as part of mobility practices.

The study ran from spring 2021 to autumn 2022, and interim reports were produced in May 2021 (Sherriff et al., n.d.) and January 2022 (Sherriff et al., 2022). In order to understand the evolution of e-scooter use as the trial develops and expands, an iterative approach was taken. This means we took the opportunity to use the results of each stage to feed into the design of the next.

Table A1 Stages of data collection - (*) some overlap between surveys

	Stage 1	Stage 2	Stage 3	Total
Surveys				
Dates	2nd March to 28th March 2021	19th July to 18th August 2021	23rd March to 24th May 2022	
Responses	741	199	1514	2454(*)
Interviews				
Dates	22nd March to 23rd March 2021	11th August to 20th October 2021	4th April to 22nd June 2022	
Count	11	20	18	49
IDs	1 to 11	12 to 31	32 to 49	
Reference groups				
Count	7	5	1	13

Reference groups

Thirteen reference groups were conducted (Table A2). The purpose of the reference groups was to identify key themes relevant to a range of different cohorts. These discussions were useful in designing the survey questions and informing discussion points for the interviews. Whilst for each group a particular cohort was sought, the participants were selected to provide a range, across the set of reference groups, in terms of gender, ethnicity and people who had used and not used e-scooters. Open questions were posed to the groups to guide conversation, and open discussion was encouraged. The reference groups were conducted online, were recorded, and lasted approximately one hour each.

Online surveys

Table A provides a summary of the fieldwork completed. The first online survey was live from 2nd until 28th March 2021 and was completed by 741 people. The second online survey was live from 19th July to 18th August 2021 and was completed by 199 people. The third survey was live from 23rd March to 24th May 2022 and received 1514 responses.

The surveys were designed to provide information on the extent of e-scooter use, journey purposes, reasons for choosing e-scooters and the relationship between e-scooter use and other modes of transport. The surveys started with a set of questions intended for those who had used an e-scooter as part of the Salford trial and moved on to questions that sought a more general level of information from users and non-users. These questions, which were informed by the discussions in the reference groups, were related to factors likely to limit e-scooter use, issues likely to be important when deciding whether to use an e-scooter and concerns about the potential impact of e-scooters. We used closed lists to enable people to quickly tell us about their experiences and intentions and to facilitate statistical analysis. We ensured that there were opportunities to add 'other' options and to provide free comments, something we felt to be particularly important in a newly evolving field of mobility in which we have only an initial understanding of the factors likely to shape motivations, barriers and journey purposes.

The first and third surveys were promoted widely using internal news and staff and student communications in different schools at the University of Salford, TfGM's social media platforms and Lime's database of customers registered in Greater Manchester. Twitter and Facebook were used to reach different groups, including Salford communities, BBC staff at MediaCityUK and people involved in walking, cycling and other transport campaigning and policy. Photos and prompts were used to attract attention in the crowded social media sphere and also to make it clear that we wanted a range of views and experiences, not only those of e-scooter riders and people who saw e-scooters in a positive light. The second survey was promoted via email to a subset of people who had completed the first survey. Totalling 516, this cohort had consented to be approached about further research. Participants were each sent one invitation email, with two follow-up reminders.

To encourage a large and diverse sample (i.e., not limited to those particularly interested in e-scooters), respondents to each survey were offered the opportunity to be entered into a £100 prize draw.

Table A2 Reference groups (sequential numbers)

	Stage 1	Stage 2	Stage 3
Mobility Researchers	1	8	13
Transport Planners	2	9	
Community Organisations	3	10	
Older People	4	11	
Road Users	5		
Women	6		
Disabled People and Other Vulnerable Road Users	7	12	

Interviews

Some 49 interviews were carried out. The purpose of the interviews was to explore in more depth the themes arising from the survey, sometimes in a general sense and in some cases in relation to specific themes that survey participants had raised in their survey responses. The interviewees were selected to provide a range across gender, age and ethnicity and to include people who had and had not used an e-scooter. We sought to create an evidence base of perceptions, experiences and views around e-scooter use and its potential contribution to travel practices and impact on the area. The free text comments provided in the survey responses were useful for identifying people who had had particular experiences that would add to this evidence base.

The interviews were conducted by video call or telephone, and each lasted approximately 30 minutes. Short summaries of each interview were created (Appendix B).

Analysis

Qualitative analysis was performed using QSR NVivo software. This allowed the research team to bring together the interview transcripts, to create codes that represent particular themes (e.g., safety, motivation, gender, age) and to use the dataset to explore the different ways in which participants talked about these issues. Quantitative analysis of the responses to the closed questions in the surveys was conducted using R Stats (R Core Team, 2013). Crosstabulations were calculated (e.g., mode of transport for both males and females), and charts were produced to visualise these relationships. This enabled the team to look at patterns and correlations and to produce descriptive statistics. In order to identify relationships that were statistically significant, inferential statistics were then calculated.

B Lime in Salford

The information in this Appendix has been supplied by Lime in order to inform our analysis, provide a record of changes in pricing over the course of the trials in Greater Manchester, and to facilitate comparisons with other services and modes of transport. Please note that pricing may vary by market and the details below are relating to the Greater Manchester e-scooter trials and are correct at the time of publication.

Pricing

- The majority of riders use the standard pay-as-you-ride (PAYR) tariff of £1 to unlock the vehicle and 17p per minute of use thereafter. This tariff was originally 15p per minute since launch in autumn 2020, but was slightly increased due to recent increases in energy costs.
- This is accompanied by the Lime Access concession scheme that offers 50% discounts on all trips (both the unlock fee and per-minute fee) for emergency and NHS workers, jobseekers, travel concession pass holders, and students. This has been available since the launch of both schemes.
- In addition to the PAYR tariff, Lime offers several Ride Passes that provide bundles of riding minutes for fixed costs: 60 minutes for £4.99, 100 minutes for £7.99 and 240 minutes for £18.99 - offering discounts of around 50% compared to the PAYR tariff. Minutes do not need to be used all at once and these Ride Passes offer the best value for money.
- With Lime's monthly subscription offer, Lime Prime, riders can pay £8.99 a month to waive all unlock fees.
- Both Ride Passes and Lime Prime allow riders to reserve a vehicle for up to 30 minutes in advance and can be used on any Lime vehicle. For example, a rider could purchase a Ride Pass in Salford and it could be used to both rent a Lime e-scooter in Salford and a Lime e-bike or e-scooter in London.
- Lime previously offered Ride Passes that offered time-limited rides within 1 hour, 24 hour and 3 day intervals.
- Lime previously offered 'Ride Passes' that provided unlimited 30-minute rides within 24 hours for £11.99 and a Monthly Unlock Pass which waived unlock fees (per minute fees still applied) for £7.99.

More Detail and Example Costs

Pay-as-you-ride (PAYR)

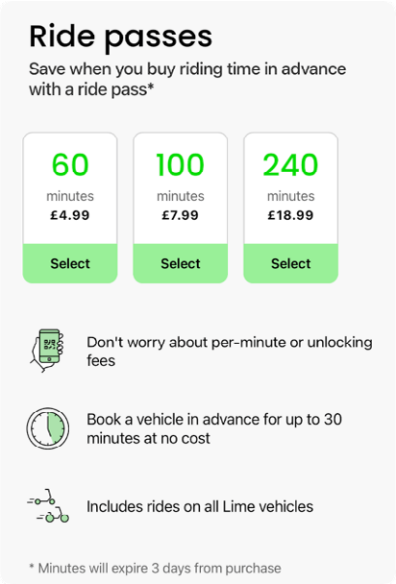
- The most popular tariff
- £1 to unlock, then 17p per minute of use
- Examples:
  - 10-minute trip = £2.70
  - 20-minute trip = £4.40

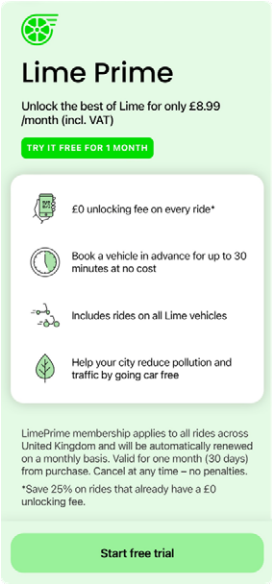
Lime Prime

- No unlock fees (25% of the per minute rate is applied for any rides made using a discount code that already has a £0 unlock fee)
- Reserve a vehicle up to 30 minutes in advance
- Can be cancelled at any time - no penalties
- One-month free trial, then £8.99 / month

60-minute Ride Pass

- No unlock fees
- Reserve a vehicle up to 30 minutes in advance
- £4.99 - effectively 8.3p per minute
- Examples:
  - 10-minute trip = £0.83 (70% discount compared to PAYR)
  - 20-minute trip = £1.66 (62% discount compared to PAYR)





100-minute Ride Pass

- No unlock fees
- Reserve a vehicle up to 30 minutes in advance
- £7.99 - effectively 8p per minute
- Examples:
  - 10-minute trip = £0.80 (70% discount compared to PAYR)
  - 20-minute trip = £1.60 (64% discount compared to PAYR)

240-minute Ride Pass

- No unlock fees
- Reserve a vehicle up to 30 minutes in advance
- £18.99 - effectively 7.9p per minute
- Examples:
  - 10-minute trip = £0.79 (71% discount compared to PAYR)
  - 20-minute trip = £1.58 (62% discount compared to PAYR)

Lime Access and Lime Aid

In addition to the PAYR tariff and Ride Passes, Lime also offers 50% discounts on all rides (including both unlock fees and per minute fees) for emergency and NHS workers, jobseekers, travel concession pass holders, and students. Riders can sign up online to provide proof of their eligibility:

- Jobcentre Plus Travel Card
- Blue Light Card (for emergency service workers)
- Student Card (NUS student card or institution specific)
- Care Leavers Photocard
- Travel pass for Older People
- The Women's Concessionary Travel Scheme
- Travel Pass for people with disabilities
- Other eligible key worker IDs and passes
- Other free or discounted travel cards for the Greater Manchester area

For more information and to sign up:

fountain.com/ limebike/apply/ united-kingdom-uk-lime-access

During the pandemic, Lime also offered key workers 10 free rides per month through their Lime Aid scheme. As COVID-19 restrictions have lifted, this scheme has been phased out in favour of Lime Access which offers better value for money.

Discount codes

Lime shares with riders discount codes from time to time. These have included free unlocks for Clean Air Day, discounted trips to travel to and from polling stations during local elections, reduced fees during bus strikes, and free rides for students during freshers' weeks. Riders can receive £4 of ride credits for inviting their friends to Lime, who will also receive £4 ride credit.

Lime also now offers riders with a 25% trip discount when they take a selfie in the app of them wearing a helmet, prior to starting their trip.

Lime's Previous Fare Structure

The following pricing model was superseded by the above current fare structure in Autumn 2022:

- Originally, Lime offered one-hour, 24-hour and 3-day Ride Passes costing £7.99, £11.99 and £25.99 respectively.
- These passes waived unlock fees and allowed riders to reserve a vehicle for up to 30 minutes in advance.
- Lime Prime has been available since summer 2021

Lime Vehicles

In Salford, Lime has deployed its latest Gen4 e-scooter since summer 2022, replacing the Gen3 scooter which had been used since launch in 2020.

Lime's e-scooter design has undergone several iterations and overhauls since the company was founded in 2018 and as the industry has matured. Lime now designs and manufactures its own vehicles in-house, giving them greater control over software and hardware upgrades and allowing them to respond proactively to any issues without the need to seek third party manufacturer support. The current Gen4 models includes several significant upgrades and some key design features are summarised overleaf.

Lime also offers other low-speed, zero-emission vehicles (LZEV) including their Gen4 e-bike, which is available in London and across Lime's other schemes globally. Lime have also recently launched a pilot of Citra, a light electric vehicle designed for trips of up to 5 miles with a maximum speed of 20mph, which is currently being piloted in the US.

	PAYR	60-minute	100-minute	240-Minute
		No unlock fees Reserve a vehicle up to 30 minutes in advance		
Per minute cost	17p	8.3p	8p	7.9p
10-minute trip	£2.70	£0.83	£0.80	£0.79
20-minute trip	£4.40	£1.66	£1.60	£1.58

Lime Gen2.5 e-scooter

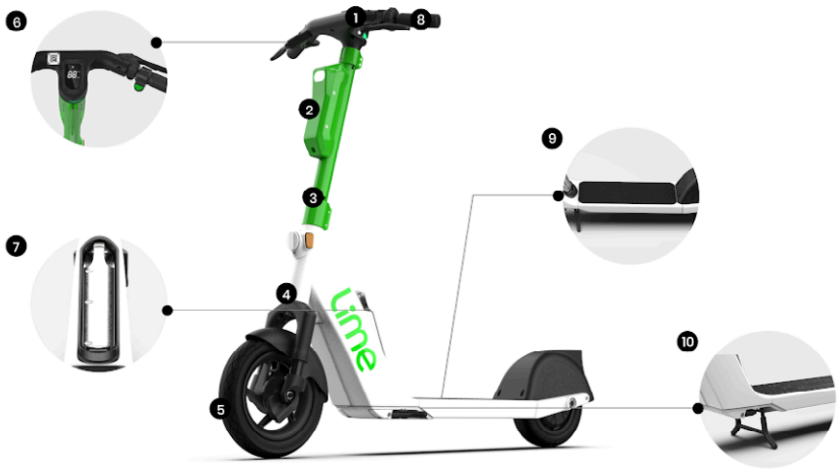
Lime Gen3 e-scooter

Lime Gen4 e-scooter

Lime

GEN 4 SCOOTER

The safest, smoothest, most sustainable Lime scooter yet.



1 **Swept Handlebars**
Angled for maximum ergonomic comfort

2 **Best-in-Class Firmware**
Proprietary, industry-leading firmware including immediate geofencing response

3 **Strong Aluminum Frame**
Sturdier and longer-lasting frame to improve vehicle lifetime with IP67 waterproofing

4 **Enhanced Suspension**
Mountain bike-inspired front suspension for a smoother ride

5 **Wheels**
Pneumatic tires to tackle the toughest road conditions with 12" (30 cm) front and 10" (26 cm) rear

6 **Tap-and-Ride**
Wireless option helps riders tap and ride

7 **Swappable Battery**
Long-range lithium-ion batteries with 25-mile (40-km) range

8 **Dual Handbrake**
Comparable to bike handlebars, it is more intuitive and gives riders greater control

9 **Lower Deck**
Lower center of gravity for a sturdier ride while making it easier to step on and off

9 **Double Kickstand**
Increased vehicle stability when parked

Dimensions: 52" L x 23" W x 45" H (132 cm L x 59 cm W x 115 cm H) **Curb weight:** 60 lbs (27 kg)

Rules and regulations applying to Greater Manchester e-scooter trials

The use of Lime e-scooters in Greater Manchester is subject to regulations set at a national level by the Department for Transport, as well as local restrictions set by Salford City Council and Transport for Greater Manchester.

Department for Transport Requirements

- As per Department for Transport requirements, riders must hold at least a provisional driving license or international equivalent. This is verified in the Lime app using a secure verification process.
- All rental e-scooters must conform to rigorous standards and testing conducted by the Department for Transport. Lime e-scooters have been approved for use in the UK since the launch of UK e-scooter trials. Lime has additionally been a fully accredited member of CoMoUK, the UK's leading shared mobility charity, since launching e-bikes in 2018 and since launching e-scooters in 2020.
- The use of privately owned e-scooters in public spaces remains illegal. Privately owned e-scooters may only be used on private land and with the landowner's permission.

Local Restrictions

- Lime e-scooters in Greater Manchester can currently only be used within the service area in Salford, shown in Figure 2 of this document. Due to the way in which e-scooter trials have been authorised by the Department for Transport, it is not currently possible to use rental e-scooters in other parts of Greater Manchester such as Manchester, Stockport or Trafford.
- The location and extent of the service area, low-speed zones, and no-ride zones are defined and approved by Salford City Council and Transport for Greater Manchester, in consultation with relevant local stakeholders and Lime.
- In Greater Manchester and London, Lime e-scooter riders must start and end their rides within designated Mandatory Parking Bays. These are marked both in the Lime app with a parking pin icon, as well as with on-the-ground markings. Riders who do not park their vehicle in these bays after completing their trip may receive warnings, fines, and eventually account suspensions for repeat offenders.
- Though the national speed limit for rental e-scooters is set at 15.5 mph - the same as for electrical assisted pedal cycles - Lime has implemented a 12 mph limit across all its UK e-scooter schemes. Geofenced low-speed zones are also in place that automatically slow scooters down in certain areas. In Salford, the low-speed zone limit is set at 6mph. No-ride zones have also been implemented in which the e-scooter motor will automatically cut out and the rider will receive a notification to exit the no-ride zone.

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