Owners (& frequent users) of e-scooters – who are they?

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Abstract. While shared e-scooters are still highly prevalent in many urban areas, we also see an increasing share of privately owned e-scooters on our roads. However, so far, not much is known about the users of such privately owned e-scooters. As there is reason to suspect that those who ride their own e-scooter differ considerably from occasional users of rental vehicles, the question is what the characteristics of those riders are and how their use of vehicles can be described. To address these questions, we analysed data from an online survey (99 usable data sets) and several focus group discussions (20 participants) with frequent users and owners of e-scooters. Results show that these frequent riders have a high degree of identification with the vehicle, and often use it as their main means of transport. The majority indicated that they used their e-scooter daily or almost daily, with commuting as their most frequent trip purpose. They are rather safety conscious, as is highlighted by their use of protective gear and the installation of additional safety equipment on their vehicles. The results indicate that a specific focus on frequent users is warranted, as they appear to be quite distinct from the user population that occasionally uses shared services. With the number (and share) of privately owned e-scooters continuously increasing, targeted approaches that facilitate their safe and efficient participation in traffic will be required.

Keywords: micromobility, user characteristics, usage behaviour.

1 Introduction

Although e-scooters have been available only for a few years, they have seen massive growth in usage since their introduction. Initially, this growth was mainly driven by shared e-scooters. The relative novelty of these vehicles, coupled with the shared mobility aspect, made them attractive mostly to occasional users, with infrequent use (once a month or less) being the rule rather the exception (e.g., Siebert et al., 2021). In line with this, the majority of trips taken by e-scooter were reported to be related to leisure activities (e.g., Deutscher Verkehrssicherheitsrat e.V., 2020; Portland Bureau of Transportation, 2019; Ringhand et al., 2021).

However, while shared e-scooters are still highly prevalent in many urban areas, we now see an increasing share of privately owned e-scooters on our roads (e.g., Haworth et al., 2021).

The fact that users decided to buy their own vehicles might be seen as an indication that the sharing services, for whatever reason, did not fulfil their mobility needs. However, little is known about who these individuals are, and what differentiates them from the occasional users of shared e-scooters. In more general terms, the question is what the characteristics of frequent e-scooter users are, and how their use of these vehicles can be described.

To address these questions, we analysed data collected in a project that looked into the safety of e-scooters and how it could potentially be improved (Anke et al., 2022). Within this project, we conducted an online survey and several focus group discussions with frequent users and owners of e-scooters. Among the information collected in these studies were the characteristics of frequent users (e.g., age, gender, degree of identification with the e-scooter as a mode of transport) as well as aspects of their e-scooter usage behaviour (e.g., frequency of use, trip purposes, travelled distances, use of protective gear).

2 Method

2.1 Online Survey

Structure and content. The online survey consisted of three parts. Part 1 included questions about the usage background and riding experience. The second part (not relevant for the analyses presented in this paper) addressed safety relevant aspects of e-scooter use, e.g. experiences with critical situations. The survey concluded with part 3 on socio-demographic information.

Implementation. The survey was created using Sosci Survey (Leiner & Leiner, 2021) and was freely accessible from 03.09.2021 to 30.09.2021. In the run-up to the publication of the survey, a pre-test was conducted with five people, the survey was revised according to the comments and underwent a final technical function test.

In order to reach as many frequent e-scooter riders as possible, the online survey was promoted via groups on the topic of "e-scooters" via blogs and social media channels. In order to increase the response rate, it was pointed out in the cover letter (mail contact with potential participants) and on the welcome page (page 1 of the survey) that participation could contribute to gaining knowledge about the still new means of transport. In addition, participants could win one of five 20€ vouchers. They also got the opportunity to compare their answers with those of the previous participants in a short evaluation of two items at the end of the survey.

Data preparation. At the end of the data collection period, 154 individuals had taken part in the survey. However, not all of them had completed the questionnaire. Participants that had not completed the last relevant page were excluded from further analysis. In addition, some response sets had a high proportion of missing values (participants skipping questions). These were excluded as well. If participants were unreasonably fast in completing the survey, we critically examined their responses for any obvious irregularities, and, if necessary, excluded them.

We also, unfortunately, had to exclude two data sets in which participants stated that they used a monowheel or an electric skateboard instead of an e-scooter. At the end, a sample of 99 respondents remained for analysis.

2.2 Online Focus Groups

Structure and content. Complementary to the survey, semi-structured script-based focus group interviews were conducted with frequent and experienced e-scooter riders. Similar to the survey, safety relevant aspects of e-scooter use, which are not subject to the analyses presented in this paper, were one of the main topics that were discussed. However, the focus groups also covered general aspects of usage behaviour (how often do riders use the e-scooter, for what types of trips, do they use protective gear etc.), as well as participant demographics. A script was developed that contained all the relevant topics as well as some guiding questions for these topics, in order keep the different focus groups as structured as possible.

Implementation. A first version of the focus group script was pre-tested on a single focus group with participants that had cycling and e-scooter riding experience. Based on the gathered insights, adjustments were made to the script and the schedule. At the same time, the focus group moderators were trained on the contents and structure of the script. They received information on how to deal with possible conflicts, and got some additional communication tips.

For the acquisition of participants, about 40 people were contacted who had given their consent to this in the online survey. Further acquisition took place via social media, calls or advertisements on eBay Classifieds, in e-scooter forums and a newsletter.

Due to the restrictions resulting from the COVID-19 pandemic, we opted for an online implementation. Six online focus groups were conducted in November 2021 using the Zoom video meeting service. During the discussions, two moderators guided the participants through the different parts of the script, with short breaks in between. At the end, the participants were asked for their feedback and information was given about the allowance (30€). The whole process took between two and two and a half hours.

Data preparation. The focus group discussions were recorded as video/audio files and then transcribed. The participants' statements were then coded using the MAXQDA software (VERBI Software, 1989-2021) with the help of a coding scheme, which was based on the contents defined in the script, and which was successively extended into subcategories. Central to the analyses presented in this paper were mostly information gathered during the introductory stage, including the participants' age and gender, the background for their e-scooter use, the trips they used it for, etc.

3 Results

3.1 Sample / General user characteristics

The final data set of the online survey included a total of 99 e-scooter users who use an e-scooter at least once a month. The characteristics of the sample are presented in detail in Table 1. The mean age of the participants was 37.8 years (*SD* = 12.1). The high proportion of male users (91%) is striking. While the vast majority of frequent users owned the vehicle they were riding, interestingly, one participant reported to use a company vehicle, which is certainly still a novel concept when it comes to e-scooters. Also worth highlighting is the fact that, while rental vehicles are available primarily in larger urban areas, frequent users / private owners can also be found in smaller towns and rural areas.

Table 1. Sociodemographic characteristics of survey sample.

	%	**N**
gender	**100**	**80**
female	6.3	5
male	91.3	73
diverse	2.5	2
age	**100**	**91**
< 18 years	2.2	2
19 - 30 years	29.7	27
31 - 40 years	30.8	28
41 - 50 years	20.9	19
> 50 years	16.5	15
place of residence	**100**	**96**
rural area (small town < 5,000 inhabitants)	10.4	10
small town (5,000 to 20,000 inhabitants)	19.8	19
medium-sized town (20,000 to 100,000 inhabitants)	22.9	22
large city (100,000 to 500,000 inhabitants)	25.0	24
small metropolis (500,000 to 1 million inhabitants)	8.3	8
large metropolis (over 1 million inhabitants)	13.5	13
e-scooter ownership	**100**	**99**
yes	97.0	96
no, use of company vehicle	1.0	1
no, use of rental vehicle	2.0	2

The characteristics of the focus group sample largely reflect those of the survey sample. Seventeen (85%) participants were male, three (15%) female, with a mean age of 36.7 years (*SD* = 9.5). Of the 20 participants, 17 owned an e-scooter, the other three used rental vehicles.

3.2 Use of / Identification with different modes of transport

When asked about their main means of transport, about 41% of the participants in the online survey indicated that the e-scooter was indeed the most important mode for them (Fig. 1). For one third of the participants, it was the car.

When asked with what mode of transport they would identify the most, about one quarter of the survey participants indicated that they indeed felt like primarily being an e-scooter user, while about one third considered themselves car drivers (Fig. 2). When, in a separate question, asked specifically to what degree the considered themselves being an e-scooter rider, more than three quarters (78%) of the respondents indicated the highest possible level of identification (5 on a scale from 1 to 5).

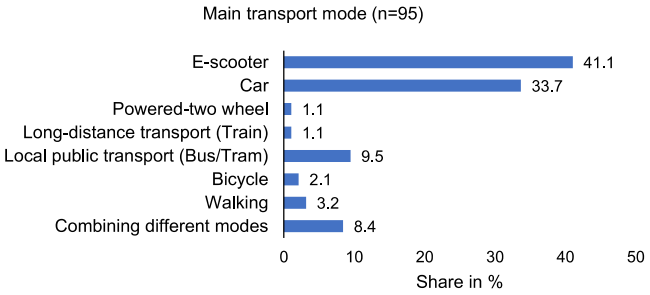

Fig. 1. Relative frequencies of responses to question "What mode of transport do you mainly use?".

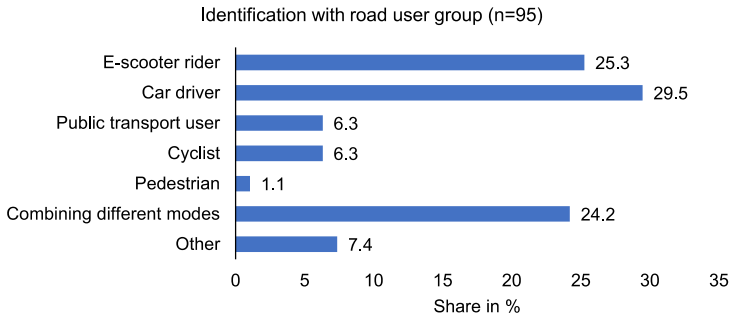

Fig. 2. Relative frequencies of responses to question "With what road user group do you identify the most?".

3.3 Travel purposes, frequency of use and distances

The majority of participants in the online survey indicated that they used their e-scooter daily or almost daily. For more than half of them, their most frequent trip by e-scooter was longer than 5 km. The purpose of this most frequent trip with the e-scooter was the journey to work or school for nearly half of all respondents (Fig. 3). At the same time, riding the e-scooter for purposes of leisure (either with a specific destination, or just for the joy of riding as such) was the most typical / frequent trip purpose for nearly one third of the participants.

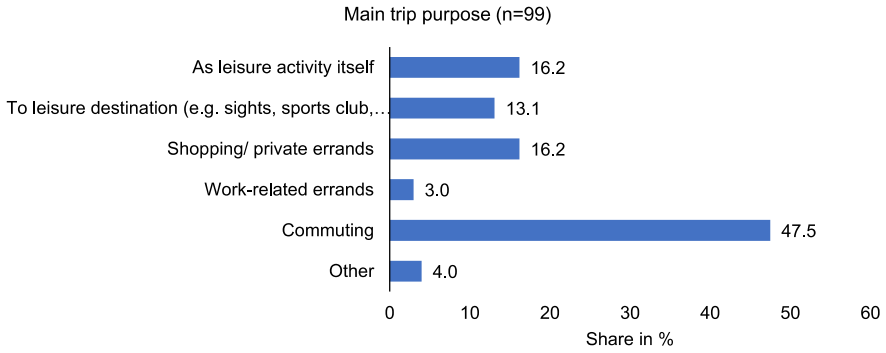

Fig. 3. Relative frequencies of responses to question "For what purpose do you ride e-scooters most often?".

These results are in line with the findings from the focus groups. There, too, participants reported that the main purpose of use was commuting to work, also for long distances and in combination with long-distance and regional transport. Leisure related trips did play a certain role as well. The following are sample quotes from the focus group discussions:

"I use the e-scooter mainly to - once a) overcome the last mile, which now relates to the [name of a city] transport provider [...]. Secondly, of course, the commute to work or the trip to sports, or actually to go shopping, that also regularly. I actually ride almost every day."
(male private vehicle user, 39 years)

"... that only since April this year I have been using the thing then also for commuting to work. [...] I travel by train [...]. The big advantage of the scooter for me is that it folds up and fits under the seat, unlike a bicycle. In [city 1] it's another 10-12 kilometres to my workplace. That's the commuting distance. So [city 2] from the flat to the main station, and then [city 1] main station office and return. That's the most common or almost daily route. Otherwise, well, sometimes in my free time I go somewhere in [city 2] and fool around in the city, or sometimes I go out to my parents' house, who also live in the countryside, where the bus goes three times a day. The scooter is also very useful there and of course also for shopping in the city, just put a bigger backpack on and you've almost done your weekly shopping."
(male private vehicle user, 39 years)

3.4 Perceived safety and use of protective equipment

The results of the online survey show that the frequent e-scooter riders feel relatively safe in traffic when they ride e-scooters (Fig. 4).

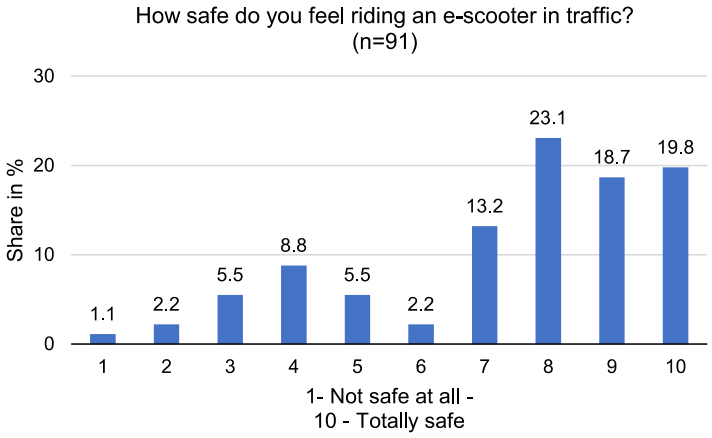

Fig. 4. Relative frequencies of responses to question "How safe do you feel riding an e-scooter in traffic?".

About half (50.5%) of the surveyed riders stated that they use a helmet and/or other protective equipment when riding an e-scooter (36.4% helmet only, 12.1% helmet and additional equipment, 2.0% equipment without helmet). In addition, the respondents had the opportunity to provide more detailed information on other protective equipment they used. They mentioned:

- gloves (6x),
- additional light (2x),
- protectors (1x),
- signal clothing (1x),
- long clothing (1x) and
- reflectors (1x).

In the online focus group, eight out of twenty participants stated that they use a helmet, including one of the rental vehicle users. Other protective equipment reported in the focus groups was similar to that reported in the online survey:

- gloves (3x),
- safety boots (2x),
- day-glow jacket (2x),
- reflectors (3x),
- long clothing (1x),
- additional light (1x) and
- coloured brake cables (1x).

During the discussions, it became clear that the aspect of visibility played a prominent role, as the following quotes illustrate:

"And I got myself reflective silicone cables for the wiring so that I can be seen better from the side."
(male private vehicle user, 35 years).

"What also comes to my mind is what I use to travel in the dark season that we are starting to have now: I usually, actually always have a backpack on my back. And I have a red light on the back of the bag on the side, just on the left side. A flashing light. Because I think that the low red light of the scooters is not seen in traffic anyway. So that makes no sense at all. That's why I have another one a bit higher up and hope that I'll be seen a bit better that way."
(male private vehicle user, 37 years)

3.5 Tuning of the e-scooter

About two-thirds of the surveyed e-scooter owners can imagine tuning their vehicle (27.4%), or have already done that (33.7%). This high proportion in favour of (illegal) modifications is also reflected in the statements collected during the focus groups. Interestingly, (increasing) speed was not the sole focus of such modifications. The adjustments mentioned in the focus groups are presented below in paraphrased form:

- tuning for speed (9x),
- retrofitting of turn signals (or in one case turn signals had just been ordered) (4x),
- additional mirror on handlebars (3x), or even second mirror (1x),
- change of light settings for continuous lighting (2x),
- handlebar extension in the sense of an extension to mount indicators, mobile phone holder, light etc., to be seen better and to have a better grip (1x),
- other tyres mounted, in the sense of winter tyres (1x),
- setting the "international mode", which enables a cruise control function and thus also contributes to better handling of the right-turn situation (1x).

4 Discussion

Aim of the analysis presented in this paper was to describe frequent users and owners of e-scooters, and identify differences to as well as commonalities with occasional users of rental vehicles. Results show that our participating riders had a high degree of identification with the vehicle, and often used it as their main means of transport. The majority indicated that they used their e-scooter daily or almost daily, with the commute their most frequent trip purpose.

When comparing our survey participants' demographics to those of an earlier project (Ringhand et al., 2021), in which we observed and interviewed e-scooter users on Berlin roads, some differences become apparent. While less than one in ten (9%) of the participating frequent users were female, we observed a ratio of about one out of four (24%) on the street. Age-wise, our frequent users were slightly older (38 years) than those interviewed in the field (30 years).

Given that 94% of the vehicles observed in Berlin were rentals, it is reasonable to assume that the differences in demographics would somewhat reflect general differences in user characteristics between frequent riders (primarily of their own vehicles) and occasional users (of rental vehicles).

Corresponding differences were also found with regard to other aspects of vehicle usage. Among the respondents in the field study, around 27% were using the e-scooter for the first time, while only 16% indicated to use an e-scooter on a (nearly) daily basis. Not surprisingly, usage was much more frequent among our sample of frequent e-scooter riders. More importantly, the majority (90%) of the on-street respondents indicated that their e-scooter ride was leisure related, in line with previous findings on users of rental vehicles (Orozco-Fontalvo et al., 2022). This trip purpose only played a secondary role for our frequent riders, while the commute was clearly the most relevant use case.

Among the findings that stuck out was the fact that a considerable share of participants lived in smaller towns or even villages. Accordingly, relevant usage contexts might not solely be urban or suburban areas, which are typically served by providers of shared vehicles. Considerations regarding the integration of e-scooters (and other forms of micromobility) into the traffic and transport system should therefore not only focus on those larger cities that currently struggle to accommodate the large fleets of rental vehicles. In fact, privately owned e-scooters might actually be considered a reasonable approach to tackle the first / last mile issue in less urbanised areas that cannot reasonably be addressed by rental vehicles.

It is important to note that frequent riders and private owners seem to be very safety conscious. Not only do they use protective gear to a much larger extent than the average user (Huemer et al., 2022). They also actively modify their vehicles by adding equipment that is supposed to increase the vehicles' safety. This approach might, to some degree, be linked to trip purposes and usage contexts (longer commutes, in parts potentially on rural roads), potentially resulting in a higher exposure to safety critical events. In principle, however, this finding indicates that many negative preconceptions regarding e-scooters that can be found should not be generalised to all users. Indeed, during the focus group discussions, frequent users repeatedly tried to emphasise the gap between themselves (described as serious, experienced and responsible users) and the others (described as those who don't know what they are doing and have no respect for the rules).

While our dataset was comparatively small and somewhat limited, our results indicate that a specific focus on frequent users seems warranted, especially given their usage patterns that seem to deviate substantially from those of occasional users. It becomes clear that frequent users and private owners of e-scooters are a different kind than the user population that we saw initially for shared services. With the number (and share) of privately owned e-scooters continuously increasing, targeted approaches that facilitate their safe and efficient participation in traffic will be required.

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