



HAL
open science

Who is using e-scooters and how? Evidence from Paris

Zoi Christoforou, Anne de Bortoli, Christos Gioldasis, Régine Seidowsky

► To cite this version:

Zoi Christoforou, Anne de Bortoli, Christos Gioldasis, Régine Seidowsky. Who is using e-scooters and how? Evidence from Paris. *Transportation Research Part D: Transport and Environment*, 2021, 92, 10p. 10.1016/j.trd.2021.102708 . hal-03368187

HAL Id: hal-03368187

<https://hal.science/hal-03368187>

Submitted on 6 Oct 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



ELSEVIER

Transportation Research Part D: Transport and Environment

Volume 92, March 2021, 102708



Who is using e-scooters and how? Evidence from Paris

Author links open overlay panel [Zoi Christoforou](#)^{ab}
[Annede Bortoli](#)^a [Christos Gioldasis](#)^b [Regine Seidowsky](#)^b

a

University of Patras, Department of Civil Engineering, Panepistimioupoli Patron, 265
04 Patras, Greece

b

COSYS-GRETTIA, Univ Gustave Eiffel, IFSTTAR, F-77447 Marne-la-Vallée,
France

Available online 30 January 2021.

<https://doi.org/10.1016/j.trd.2021.102708> Get rights and content

Abstract

Micromobility vehicles, and especially free-floating electric scooters (FFES), have been thriving over the past couple of years, Paris being the most important market worldwide. In this paper, we first define micromobility. Then, we present the design and results of an extensive face-to-face road survey among e-scooter (ES) users in Paris ($N = 459$, $F(\text{men}) = 68\%$). Results indicate that ES users rarely own their proper microvehicle, are mostly men, aged 18–29, and have a high educational level. They are not less motorized than the general population and use ES occasionally. Their main motivation is travel time savings followed by playfulness and money savings. However, users seeking money savings are not frequent riders. They shifted mainly from walking and public transportation (72%) and few have increased their total mobility by making new trips (6%). Findings can be useful to researchers, policy makers, and FFES operators especially in the context of COVID pandemics.

Introduction

The rapid expansion of free-floating (i.e. dockless transportation vehicles) e-scooters (FFES) was first triggered in the United States in March 2017 (Dowling, 2018), with 33 cities having shared-ES services in August 2018, becoming 90 cities only 5 months later (Fong et al., 2019). The phenomenon then expanded across Europe. In April 2019, Europe counted almost 20 different FFES operators, while North America counted a dozen, South America half a dozen, and Asia, the Middle East, and Oceania 4 operators each (6-t, 2019). Between March 2017 and July 2018, US FFES companies funding increased exponentially (Dowling, 2018). One of them was evaluated at 2 billion USD by its investors (Ajao, 2019), while the two leading FFES companies reached 1 million rides each within 6 months after their launch, then 10 million rides within one year, and about 25 million within 18 months (Dediu, 2019a, Dediu, 2019b).

The microvehicle market had boomed in France even before the rapid expansion of FFES. Already in 2018, e-scooters (ES) became the first sale of the microvehicle market accounting for 110 million euros and representing a surge of +76% in terms of value and +129% in terms of volume compared to 2017. At the same time, non-electric scooter sales dropped by 20% within one year (Smart Mobility lab and FP2M, 2018). Between June 2018 and May 2019, thirteen ES operators penetrated the Parisian market totalizing a fleet of over 20,000 FFES and making Paris the biggest world market and a micromobility showcase (6-t, 2019). Paris municipal authorities expected the fleet to double by 2020 (Ville de Paris, 2019). Nevertheless, we ignore in this paper 2020 data due to COVID pandemics that put on hold FFES activities. However, an uptake is projected for 2021 as ES provide a good alternative to public transport (PT) where passenger congestion may facilitate virus propagation. Of course, ES growing popularity came at a price in terms of safety. In 2018, we observed a 23% increase in crashes involving microvehicles (Mongaillard and Alexandre, 2020).

On the one hand, microvehicles seem to be a promising solution to many urban mobility issues: they can potentially contribute to reduce private car use and mitigate its related externalities (congestion, emissions, noise, car accidents). Indeed, like other microvehicles and shared mobility services, ES may answer the first-last mile problem or even be used for door-to-door trips (Hardt and Bogenberger, 2019). They could thus have a positive effect on human footprint as they are potentially less harmful to the environment, especially if they

substitute private cars (Chang et al., 2016). In the case of Paris, they could also have a positive effect on congestion aboard transit vehicles that could be used instead for longer trips only. Congestion in PT vehicles is a serious problem of the Parisian network, especially during rush hours. In addition, ES are fun to ride and easy to use and store. Finally, they could play an enhanced role in the post-COVID mobility era as virus transmission is limited to the surface of handlebar grips and can be easily addressed by the use of appropriate materials, regular disinfecting, or glove use.

On the other hand, ES could potentially substitute active modes like walking and cycling and, thus, generate negative effects to public health and to the environment (Berge, 2019, Civity, 2019). The lifespan of FFES and the end-of-life of these vehicles, especially their electric batteries, are two main environmental issues currently questioned (Bishop et al., 2011). Another raising issue is public space sharing. The latter concerns road pavement and sidewalks used for ES circulation and, also, for ES parking. The curbside is nowadays recognized as a strategic place for mobility optimization, that needs to be “managed”, i.e. “dynamically allocate[d] and price[d]” (Schweiger, 2019, Gössling, 2020). So far, cities have been dealing with this emerging mode of transport with the trial and error method (Gössling, 2020). Finally, important safety concerns arise as evidence on e-scooter related accidents become available (Kobayashi et al., 2019, Nellamattathil and Amber, 2020, Sikka et al., 2019, Siman-Tov et al., 2017), while rules and legislation still remain unclear in many cases (vehicle certification, right-of-way, speed limits, obligatory safety equipment, insurances, and so on).

In spite of the apparent interest of these questions, few data and relevant studies have been published mainly due to commercial confidentiality and FFES competition issues (Schweiger, 2019). As a result, public authorities and the scientific community have little knowledge on ES users and usages. This knowledge is however critical to (i) the understanding of this phenomenon, and (ii) the elaboration of evidence-based policies capable of mitigating possible negative effects while encouraging all positive ones. In view of the above, we designed and undertook an extended survey among ES users in Paris in order to shed light to a simple question: who is using ES and how? The survey was conducted by face-to-face road interviews in May-June 2019. The focus of the questions was on user profile (age, gender, occupation, etc.) and travel habits (frequency of use, distance covered, travel purpose, modal shift, etc.). The final sample includes 459 valid answers and covers almost all FFES operators as well as privately owned ES. We further explored survey results and specified 3 logit models to better understand the factors influencing ES ownership, trip frequencies, and durations.

The remainder of this paper is organized as follows. First, we offer a literature overview on shared-mobility and ES user profiling research efforts (Section 2). Secondly, we present our methodology and interview sites (Section 3). Section 4 provides an overview of results through descriptive statistics. Section 5 presents model results and relevant discussion. Finally, Section 6 provides general conclusions and discussion on future steps.

Section snippets

Defining micromobility

The term “micromobility” is widely used and mostly refers to Personal Mobility Vehicles. Existing definitions of the term are few in number and rather (i) vehicle- or (ii) business-oriented. Shaheen and Cohen (2019) mention that “micromobility includes various service models and transportation modes that meet the diverse needs of travelers, such as station-based bike-sharing (a bicycle picked-up from and returned to any station or dock) and dockless bike-sharing and scooter sharing (a bicycle

Site and survey design

The Paris region covers an area of 12,011 km² comprising Paris inner-city (105 km² for 2.1 million inhabitants), the “inner suburbs” (657 km² for 4 million inhabitants), and the “outer suburbs” (11,249 km² for 5 million inhabitants) (IAURIF, 2019.). Inner-city density is of 21,500 inhabitants/km² making Paris the 9th denser city in the world (WorldAtlas, 2018). Paris is 20% less dense than Manhattan, but respectively twice and three times as dense as New York City and San Francisco (U.S. Census

Sample characteristics: Who is using ES?

In total, 459 answers were analyzed. Sample statistics are presented in Table 2. Respondents were 2/3 men and 1/3 women, while the average Parisian population is gender-balanced (INSEE, 2019). 97% of the respondents live in France: 56% in Paris inner-city, 13% in the close suburbs, 11% in the rest of the Parisian region, and 20% elsewhere in France. The 3% visiting users came in majority from Italy (43%), US (21%), and Switzerland (14%). We note here that the percentage of foreign tourists is

Modeling mobility choices

In this section, we will try to further explore observed mobility choices and identify the underlying factors behind the differences between owners of ES and FFES riders, frequent (class ‘2’ and ‘3’ of the relevant variable in Table 3) and non-frequent ES users (class ‘1’), longer and shorter ES trip choices. For this reason, we develop three binary logit models. In line with the previous analyses, three models were specified for the following choices:

1.
Ownership: own an ES versus use an FFES;
- 2.

Discussion and conclusions

Knowledge on ES usage and user profiles remains scarce. In this paper, we presented the first results from a face-to-face road survey among ES users. The survey was conducted in Paris, France (May – June 2019), where micromobility is thriving over the past couple of years. According to our sample, ES users rarely own their proper microvehicle, are mostly men aged 18 to 29, and have a high educational level. These findings are consistent with studies about bike-sharing systems. Male

CRedit authorship contribution statement

Zoi Christoforou: Conceptualization, Data curation, Formal analysis, Methodology, Writing - original draft, Writing - review & editing, Funding acquisition. **Anne de Bortoli:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Visualization, Writing - original draft. **Christos Gioldasis:** Conceptualization, Methodology, Formal analysis, Data curation, Writing - original draft, Writing - review & editing. **Regine Seidowsky:** Conceptualization, Funding acquisition.

Acknowledgements

This research is part of the ORNISIM project (www.ornisim-ifsttar.fr) that is supported by La Fondation Maif (<https://www.fondation-maif.fr/>). The authors would like to particularly thank La Fondation Maif President, Mr Marc Rigolot, for his continuous help and constructive comments. They would also like to thank all IESEG and U-Patras students and PhD candidates who were involved in the preparation, translation, and realization of the survey.

References (58)

- S. Bai *et al.*

[Dockless E-scooter usage patterns and urban built environments: a comparison study of Austin, TX, and Minneapolis, MN](#)

Travel Behav. Soc.

(2020)

- H. Becker *et al.*

[Measuring the car ownership impact of free-floating car-sharing—a case study in Basel, Switzerland](#)

Transp. Res. Part D: Transp. Environ.

(2018)

- J.D. Bishop *et al.*

[Investigating the technical, economic and environmental performance of electric vehicles in the real-world: a case study using electric scooters](#)

J. Power Sources

(2011)

- K.B. Campbell *et al.*

[Sharing riders: How bikesharing impacts bus ridership in New York City](#)

Transp. Res. Part A: Policy Practice

(2017)

- C.C. Chang *et al.*

[A cost-benefit analysis of the carbon footprint with hydrogen scooters and electric scooters](#)

Int. J. Hydrogen Energy

(2016)

- T. Eccarius *et al.*

[Adoption intentions for micro-mobility–Insights from electric scooter sharing in Taiwan](#)

Transp. Res. Part D: Transp. Environ.

(2020)

- E. Fishman *et al.*

[Factors influencing bike share membership: an analysis of Melbourne and Brisbane](#)

Transp. Res. Part A: Policy Practice

(2015)

- V. Gitelman *et al.*

[Exploring the characteristics of potential and current users of mobility scooters, among older people in Israel](#)

Transp. Res. Part F: Traffic Psychol. Behav.

(2017)

- S. Gössling

[Integrating e-scooters in urban transportation: problems, policies, and the prospect of system change](#)

Transp. Res. Part D: Transp. Environ.

(2020)

- C. Hardt *et al.*

[Usage of e-scooters in urban environments](#)

Transp. Res. Proc.

(2019)

Cited by (7)

-

[Assessing a priori acceptance of shared dockless e-scooters in Iran](#)

2021, Transportation Research Part D: Transport and Environment

- •

[Measuring urban regional similarity through mobility signatures](#)

2021, Computers, Environment and Urban Systems

- •

[**Listen to E-scooter riders: Mining rider satisfaction factors from app store reviews**](#)

2021, Transportation Research Part D: Transport and Environment

- •

[**Influence of the built environment on E-scooter sharing ridership: A tale of five cities**](#)

2021, Journal of Transport Geography

-
-

[**Identifying and selecting key sustainable parameters for the monitoring of e-powered micro personal mobility vehicles. Evidence from Italy**](#)

2021, Sustainability (Switzerland)

-

[**Mobility trends before and after the pandemic outbreak: Analyzing the metropolitan area of Barcelona through the lens of equality and sustainability**](#)

2021, Sustainability (Switzerland)

[View all citing articles on Scopus](#)

Recommended articles (6)

- Research article

[**Assessing cycling social feasibility in a medium-size Patagonian city**](#)

Transportation Research Part D: Transport and Environment, Volume 92, 2021, Article 102720

- • Research article

[Environmental performance of shared micromobility and personal alternatives using integrated modal LCA](#)

Transportation Research Part D: Transport and Environment, Volume 93, 2021, Article 102743

- • Research article

[Planning car-lite neighborhoods: Does bikesharing reduce auto-dependence?](#)

Transportation Research Part D: Transport and Environment, Volume 92, 2021, Article 102721

- • Research article

[The relationship between E-scooter travels and daily leisure activities in Austin, Texas](#)

Transportation Research Part D: Transport and Environment, Volume 95, 2021, Article 102844

- • Research article

[What type of infrastructures do e-scooter riders prefer? A route choice model](#)

Transportation Research Part D: Transport and Environment, Volume 94, 2021, Article 102761

- • Research article

[Spatial analysis of shared e-scooter trips](#)

Journal of Transport Geography, Volume 92, 2021, Article 103016

-

[View full text](#)

© 2021 Elsevier Ltd. All rights reserved.

