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Barriers to urban mobility sharing in European cities: why people resist bike and e-scooter sharing systems

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Abstract

Over the past few years, urban shared micro mobility systems - such as bike and e-scooter sharing schemes - have been promoted in many European countries as means to foster a more just, sustainable, and healthier urban life. Accessing these systems might be more affordable for vulnerable and low-income social groups than other means of transportation, and therefore could foster social and labour market integration of groups such as youths and/or the unemployed, via affordable access to effective urban transportation. When the Covid-19 pandemic hit, emphasis on light and shared mobility systems was reinforced, and such schemes were promoted by several national and local governments as safer and feasible alternatives to public transportation and private cars. There is currently a scarcity of research on the use of these means of transportation during the Covid-19 period, but this article aims to address an even less examined research topic, namely the motivations of non-users. What are the resistance points from potential users who have access to these services but do not wish to reap their transport, environmental, and social benefits? The analysis provides results from a comparative and survey-based research carried out in 2021 in five European capital cities: Budapest, Lisbon, Rome, Vilnius, and Warsaw, and discloses the principal motivations of non-users of bike and e-scooter sharing systems before and during the pandemic period, when these means were strongly promoted for safety and health reasons.

Keywords

bike sharing, e-scooter sharing, European capitals, micro-mobility, Covid-19

Introduction

Light and shared urban micro mobility is one of the most obviously developing trends in transportation in Europe and beyond. It is driven by a diverse set of factors in response to changing conditions in urban development, such as the sustainable development of mobility towards low-carbon transport, the elimination of traffic congestion, and comfort and convenience. This trend also leads to the transformation of urban mobility practices around shared transport, which requires adaptation of residents' behaviour (Cohen, 2019). Travelers are motivated to choose modes of transport based on different inputs, rational or emotional, based either on observations or perceptions, often influenced by various cultural and social groups, and other individual factors, such as cost, time, comfort, convenience, safety, environmental concerns (Cairns et al. 2014; Cohen, 2019)

Bike and electric scooter sharing schemes (hereafter BSSs and ESSs) play an increasingly important role in the growth of urban micro-mobility. The introduction of such solutions in urban areas is driven by the need to increase the efficiency of urban transport systems, and a desire to reduce the environmental impact of traditional modes of transport. Shared mobility can complement public transport, providing alternative modes of transport for the "first and last mile", and reaching areas that are not well served by public transport. In some places BSSs and ESSs could even replace public transport, thus reducing CO2 emissions and, in the case of bicycles, also bringing additional health benefits (Crozet, Santos and Coldefy, 2019).

These trends and drivers were undoubtedly accelerated by the COVID-19 pandemic, which triggered a shift away from mass transit and towards individual shared solutions, with travellers choosing means of transport more compatible with social distancing. Many cities began to encourage cycling and walking by increasing cycle lanes, car-free zones, and wider pavements. In a survey of 106 European cities during the 2020 lockdown, Kraus and Koch (2020) reported that each city implemented an average of 11.5km of temporary cycle lanes, with each km resulting in a 0.6% increase in cycling.

The choice of transport mode, along with motivations for using BSSs and ESSs, are a common field of interest of academia, policy makers, and urban developers. However the mindset of non-users is also an important source of information for decision-making about these systems. Inputs from non-users would be valuable to help identify barriers to BSSs and ESSs – especially due to the relative scarce research in this field (Fishman, 2016) – and could provide important data to understand their resistance, and what could make them change their minds.

A lack of comparative research related to BSSs and ESSs non-users is especially true across urban contexts and different countries, and we intend to fill this gap with our comparative analysis between Budapest, Lisbon, Rome, Vilnius and Warsaw. In particular our research investigates the use of bike and e-scooter sharing before and during the pandemic. While this contribution discloses the major limitations and barriers to the use of these systems, important outputs of the comparative analysis have been published in Diogo et al. (2021), Sanna et al. (forthcoming 2022), and other areas of the analysis will be the subject of further contributions in the course of publication. The research project is part of the activities of the international research network Cost-Action "From Sharing to Caring: Examining Socio-Technical Aspects of the Collaborative Economy".

Literature review

As a general premise for this section, it should be mentioned that the scientific literature concerning the main drivers for the use of light sharing mobility systems has extensively covered BSSs, while very little has been written about ESSs, a much more recent service.

The convenience of bike sharing has been proven by several studies as the most important motivation for joining the service (Fishman et al., 2013; Ricci, 2015; Fishman, 2016). The proximity of bikes or sharing stations near the place of residence and frequent destinations such as the workplace seems to be vital in the decision to join bike sharing, as indicated by Raux, Zoubir and Geyik (2017) in their research into Vélo'v (Lyon's BSS). Two studies from Montreal's BIXI BSS further highlight the association with BSS use of bike proximity to origin and destination locations. In particular Fuller et al. (2011) estimated that 14% of residents living within 250 meters of a BSS station had used a shared bike, whereas only 6% had used BIXI when living further than 250 m of a BSS station; Bachand-Marleau, Lee and El-Geneidy (2012) estimated that the existence of a BIXI station within 500 meters of a respondent's residence increased the probability of using a shared bike by more than 300%. Travel time reductions are also found as one of the main perceived benefits of using a BSS (Ricci, 2015). For example, surveys of London's BSS users revealed that the main motivation to join the BSS was the system being faster than their previous transport mode (TfL, 2011). Furthermore, countrywide surveys of BSS users in the UK systematically revealed convenience and travel time savings to be the main reasons for joining the system, particularly among commuters (Bikeplus, 2017a, 2017b; Comouk, 2018). Joining and interacting with such a system is also strongly affected by convenience. Among the main barriers to use of a bike sharing in Brisbane (Australia) by identified Fishman, Washington and Haworth (2012), was the amount of time and effort needed to use the system, as well as the fact that the BSS was not available at night.

Factors such as environment sustainability concerns and personal health are also drivers that to joining sharing systems (Fishman, 2014). For instance, national UK surveys about BSSs consistently show both health and environmental concerns as among the top reasons for users shifting to bike sharing, with environmental reasons becoming more and more important over time (Bikeplus, 2017a, 2017b; Comouk, 2018).

Kim et al. (2017) provide psychological insights on the relationship between environmental concerns and the potential to adopt bike sharing. By analysing psychological factors that might impact BSS usage rates, the authors asked residents of Suwon (South Korea) if they were willing to pay for the promotion of the city's BSSs through taxes and were informed of the environmental and health benefits of the system. The research shows that the perception of the BSS's value was directly influenced by the awareness of the BSSs environmental and health benefits.

The affordability of BSSs is also often cited as a driving factor for users (TfL 2011; Ricci 2015; Fishman 2016; Bikeplus 2017a, 2017b; Comouk 2018), as some offer monthly or annual passes to their users that lead to substantial cost savings (Shaheen, Guzman and Zhang 2010). Additionally, the pleasure of cycling is valued by BSS users (TfL 2011; Fishman et al., 2015; Chen 2016), which could lead to positive impacts on users' subjective well-being (Ma et al. 2018).

Lastly, the Covid-19 pandemic introduced additional motivations for using light sharing mobility systems due to the infection fears and risks of using other modes of transport, particularly public transport (Sanna et al., forthcoming 2022). A recent study regarding the motivations for using BSSs during the pandemic found that BSSs users now value bike sharing to avoid public transportation and to maintain a social distance during their trips (Teixeira, Silva i Moura and Sá, 2021).

Research methodology

This contribution is based on the main outcomes of an online survey that aimed to reveal the driving factors and motivations of both BSS and ESS users and non-users, and to capture any changes induced by the pandemic in five European cities. In addition to outlining the socio-economic profile of the respondents, the survey the availability and potential accessibility of sharing services, transport habits before and during the pandemic, major motivations for using or not using the services, etc. The questionnaire was administered between April and June 2021, via social media (mainly neighbourhood, commuter, and urban life Facebook groups) and mailing lists.

The survey had at least for four unique aspects. It: (i) compared the use of BSSs and ESSs simultaneously; (ii) focused on both users and non-users, (iii) covered five EU capital cities simultaneously, administered in local languages; (iv) covered both pre-pandemic and pandemic periods.

996 people responded to the survey. After a process of data cleaning and validation, 797 observations were included in the convenience sample for analysis as shown in Table 1. The highest number of observations were in Rome – about twice as many as the other cities. Gender distribution was almost equal in Warsaw, favoured the female gender in Rome and Vilnius, and was biased on the male side in Budapest.

Table 1. Respondents per city (absolute values and percentage) and gender distribution (percentage)

City	Number of respondents	Respondents (% tot)	Female	Male	Other	Total
Budapest	133	16.69	45.1	54.1	0.8	100.0
Lisbon	129	16.19	40.3	58.1	1.6	100.0
Rome	281	35.26	53.0	46.6	0.4	100.0
Warsaw	128	16.06	48.4	50.8	0.8	100.0
Vilnius	126	15.81	59.5	40.5	0.0	100.0
Total	797	100.00				

Source: elaboration of the authors

The research deals with very different geographical contexts: the cities targeted are deeply dissimilar in terms of population, social-political and historical backgrounds, geographical features, urban transportation systems, policies, and traditions.

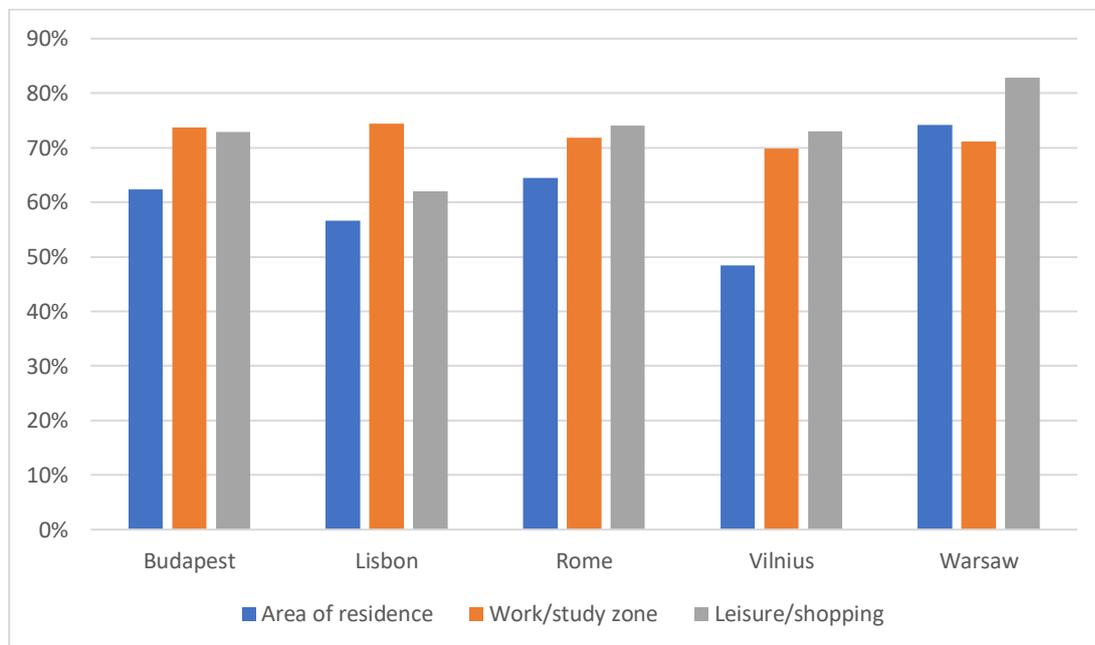
Each of the analysed cities already operated pre-pandemic public and private bike and e-scooter sharing systems. In reaction to the pandemic, some of these cities adopted ad hoc urban policies

or interventions (e.g., fiscal) as discussed in Diogo et al. (2021) to foster the use of safer transportation modes

Availability and barriers to the use of BSS and ESS services: a comparative analysis

The questionnaire provides evidence that bike and e-scooter sharing services are available to the majority of respondents in each analysed city. Shared e-scooters seem to be marginally more available than shared bikes in each city except Warsaw.

Figure 1. Availability of bike sharing systems in the studied cities



Legend: Percentage of respondents with BSSs available near their area of residence, work/study zone or other frequent destinations (leisure, shopping, etc.).

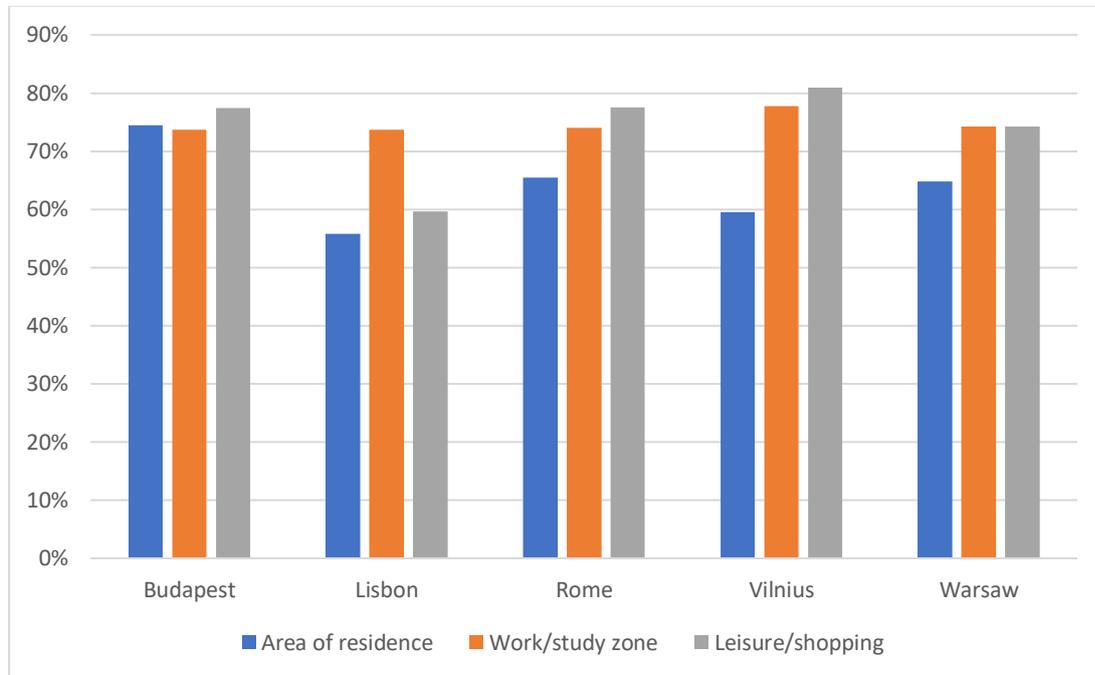
Source: elaboration of the authors

61.9% of respondents can find shared bicycles in the area where they live, which increases to 72.1% in the area where they work/study, and to 73.5% in areas they visit for leisure, shopping, etc. Data are even few percentage points higher for ESSs.

While there is a substantial perceived availability of light sharing mobility services, there is low uptake. An in-depth analysis of the periods of subscription (or non-subscription) to bike-sharing services revealed that the majority of respondents (61.10%) did not subscribe to the service while 20.2% used them, but only before the start of the pandemic in March 2020, and then abandoned them. The remaining 13.55% of respondents used BSSs both before and during the pandemic, and a residual 5.14% subscribed to the service only “during the pandemic (after March 2020)”.

Similar responses were given for ESSs, where a large proportion of respondents (72.65%) never subscribed to the service, while 14.43% used one before the pandemic (March 2020) and then abandoned it. The remaining 6.65% of respondents used e-scooter sharing both before and during the pandemic and 6.27% subscribed to the service only after the pandemic had started.

Figure 2. Availability of e-scooter sharing systems in the studied cities



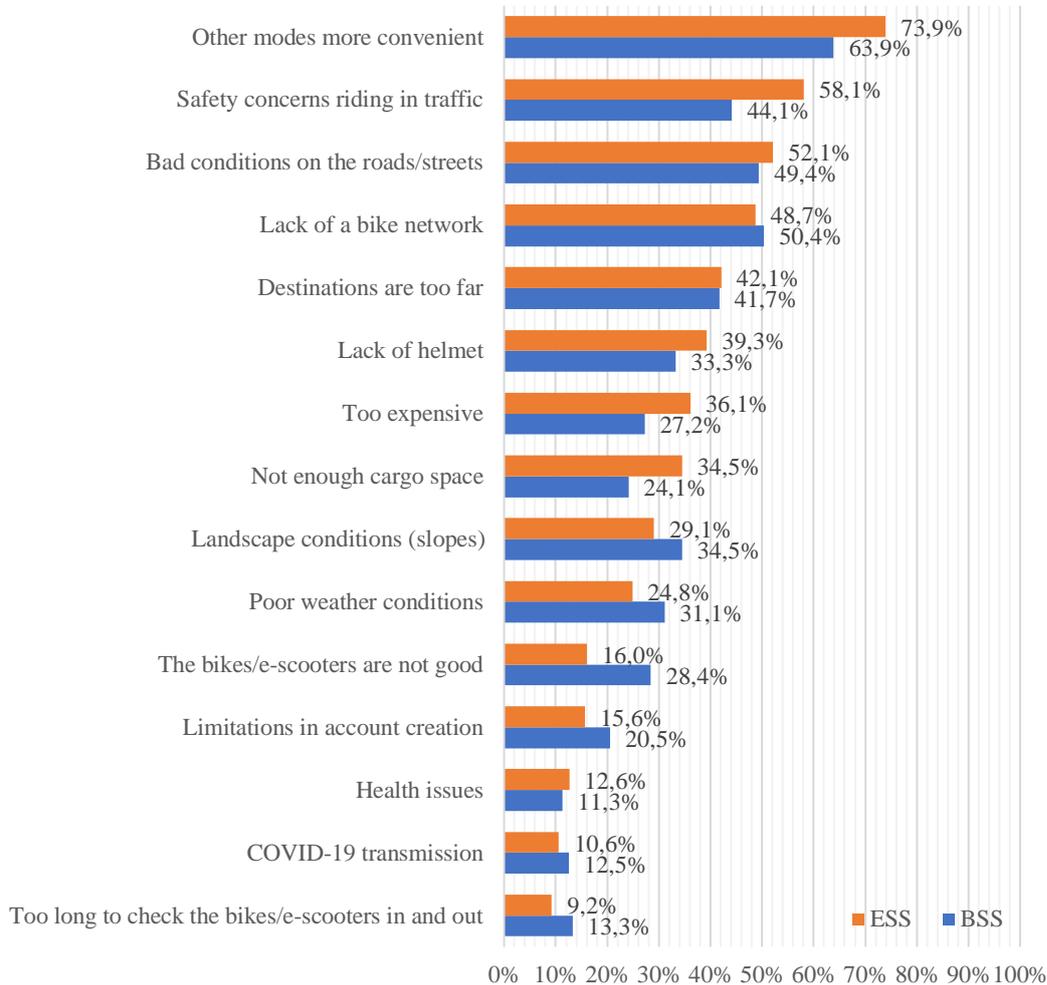
Legend: Percentage of respondents with ESSs available near their area of residence, work/study zone or other frequent destinations (leisure, shopping, etc.).

Source: elaboration of the authors

Examining the motivations of the non-users it is interesting to determine why, despite the fact that the majority of respondents declared they could access ESSs and BSSs, they do not use them. It is interesting to note that motivations can mainly be attributed to external factors that are out of the control of the respondents, and mainly stem from infrastructural settings. As shown in figure 3, the main reasons are: (i) other modes of transportation are more convenient; (ii) safety concerns of riding in traffic (iii) bad conditions on the roads/streets; (iv) the lack of a bike network; (v) respondents’ preferred destinations are too far by bike or e-scooter.

Other minor external factors that prevent adoption include landscape or poor weather conditions, which are also difficult to overcome, but there are other, less frequently mentioned barriers that might be eliminated by some adaptation implemented either by the user or the BSSs/ESSs provider, such as helmets, price, or the quality of the shared bikes or e-scooters (Figure 3). Covid-19 transmission is not a major concern, with only 13% of the respondents mentioning it against BSSs, and 11% against ESSs. The same applies to other health issues, again one of the least mentioned barriers to shared bike and e-scooter use (11% and 13%).

Figure 3. Reasons for not using bike or e-scooter sharing



Reasons for not using BSS (N=415) and ESS (N=499) ranked according to respondents' rating of agreement with a range of options. For an easier reading, only the combined percentage of the two highest ratings - strongly agree and agree - is shown.

Source: elaboration of the authors

The general ranking of the barriers to use BSSs or ESSs are very similar in the five cities, but with a few notable outliers based on contextual individualiations:

- In Budapest the insufficient quality of bikes was mentioned as the third most important barrier, at twice the share of the five-city average (55% in Budapest), however, the survey was carried out immediately before the change of the shared bikes of the main Budapest BSSs, *MOL-Bubi*, which was developed due to these quality concerns.
- In Lisbon landscape conditions (hills) were mentioned more (50%) compared to the five-city average (35%), as well as issues in account creation (30% vs an average of 20%).
- In Rome infrastructural issues such as poor road conditions and the lack of a bike lane network were mentioned above average (66% vs 50% on average and 64% vs 50% on average), as well as landscape conditions (48% vs 35% on average).

- In Vilnius poor weather conditions were more of a barrier (mentioned by 43% vs 31% of the five-city average) as well as the quality of shared bikes (mentioned by 33% vs 28% on average), the time (too long) to check the bikes in and out (18% vs 13% on average). However, Vilnius respondents have much less frustrations regarding the safety concerns in traffic (mentioned by 18% vs 44% on average).
- In Warsaw an excessive procedure to check bikes in and out was the greatest source of frustration (32% vs 13% on average).

Conclusions

Sustainable urban micro mobility modes, most notably bike and e-scooter sharing services, are on the rise in European cities, which is an increasingly popular topic for both academic and applied policy research. However, the focus often lies on the users of these schemes, while non-users and their reasons are often underrepresented. This contribution intended to examine this overlooked aspect to support both academic and policy research and urban mobility and transportation planning, with inputs on the barriers to a further increase in the use of BSSs and ESSs.

The analysis revealed that the main reasons of non-users are exogenous factors over which users have no control. These are mainly: economic; infrastructural (such as bad road conditions) or the lack of a bike network; or a perception that destinations are too distant to be reached via BSS or ESS. Barriers over which users have more influence BSSs and ESSs are shown to be less important. This finding points out that the further development and spread of BSSs and ESSs in European cities primarily depends on the ability and promptness of city planners to improve the urban transportation network, and to rethink overall urban transportation policy.

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