

Why do citizens not prefer to use e-scooters? Views of the public in the Netherlands

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ABSTRACT

E-scooters, a burgeoning form of micromobility, are revolutionizing urban transportation systems globally, particularly in the post-pandemic world. The surge in e-scooter adoption introduces novel regulatory challenges for local authorities. Numerous recent studies cater to these policy needs by exploring e-scooter use. However, scant attention has been paid to non-users' perspectives, which is crucial to understand comprehensively the effect of e-scooters on urban environments. Issues such as accidents, parking problems, and others, which concern city-dwellers, require close attention. To address this research gap, we used a Q-methodology study to examine the diverse views among residents of the Netherlands. Twenty-one respondents ranked 34 statements pertaining to their disincentives to e-scooter use and elucidated their rankings in a follow-up survey. The study unearthed three distinct viewpoints: (1) "environmentalists" deem e-scooters as environmentally unfriendly, (2) "materialist" exhibit a preference for personal vehicle ownership over shared transport, and (3) "socializers" perceive e-scooters as unsuitable for larger groups. These findings set the stage for potential research directions and underline the importance of incorporating diverse public perceptions in micromobility policymaking.

1. Introduction

Micromobility, which refers to the utilization of lightweight vehicles for transportation, has been encouraged since the beginning of this century, primarily through the deployment of bike-sharing systems (Badia & Jenelius, 2023). Bicycles and e-scooters share numerous similarities, particularly when compared to electric bikes. Both are perceived to cater to similar user demographics, are eco-friendly, utilize parallel infrastructure, are subject to alike regulations, and neither necessitate a driving license or vehicle registration. Furthermore, both modes of transportation operate within similar speed and distance parameters. However, there are distinct differences concerning the vehicle's size and weight, the level of physical exertion required, and rates of ownership. These variables influence the intended use of these transportation mediums and the extent of safety equipment adoption (Christoforou et al., 2021). Indeed, given the recent emergence of e-scooters as a popular mode of transportation and their distinct characteristics from other micromobility options, there is a pressing need to understand more comprehensively the preferences, behaviors, and attitudes of e-scooter users.

The e-scooter-sharing industry is anticipated to witness substantial

growth worldwide, underpinned by projections for Asia and Europe from 2019 to 2027. Asia is expected to see an impressive revenue increase of 1,047 %, escalating from USD 50.9 million to a projected USD 584.1 million. Simultaneously, Europe's forecasted growth is an equally robust 301 %, with revenue expected to surge from USD 308.4 million to a substantial USD 1.2379 billion. These projections for Asia and Europe exemplify the global trend of rapid expansion and considerable economic potential in the e-scooter-sharing market (Statista, 2022b).

Electric scooters, celebrated for their portability and utility in navigating congested urban environments, have experienced a surge in popularity in the United States, despite the nominal rental rates as low as USD 1 per hour, raising significant safety concerns. With the absence of global data on e-scooter-related fatalities, reports of deadly incidents worldwide are disturbing, and a *JAMA Surgery* journal study further accentuated this concern, indicating a 222 % increase in related injuries from 2014 to 2018. More alarming is the severity of accidents, often involving substantial injuries, such as bone fractures (40 %), head trauma (32 %), and various cuts, sprains, and bruises (28 %). Coupled with the research highlighting that a mere 4 % of riders adhered to safety measures such as wearing helmets at the time of their accident, despite e-scooter companies' recommendations, this underscores a

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pressing safety deficit. This shortfall, amplified by the escalating number of e-scooters, has sparked calls for stricter safety protocol enforcement, potentially culminating in a ban, suggesting that a cultural shift toward consistent helmet usage during e-scooter rides could be imminent (Statista, 2022a).

Given the growing trend of e-scooter usage, it is important to consider not only users' perspectives but also those of non-users for a comprehensive understanding of e-scooters' potential effect on urban life. Accordingly, this paper aims to elucidate the viewpoints of citizens who opt not to use e-scooters. By highlighting their concerns, it can provide valuable insights for local policymakers, contributing to efforts to enhance the overall quality of life in urban environments.

This paper is structured as follows. Section 2 provides a comprehensive review of the relevant literature on e-scooter usage and non-usage, highlighting key findings and gaps in current research. Section 3 describes the research methodology employed in this study, detailing the use of Q-methodology to capture the diverse perspectives of non-users. Section 4 presents the research findings, including statistical results and the identification of distinct viewpoints among respondents. Finally, Section 5 discusses the implications of these findings for urban transportation policy and practice, and concludes by offering suggestions for future research directions.

2. Literature review

Recent studies in the transportation literature attempt to understand e-scooter use. For instance, according to Christoforou et al. (2021) findings, e-scooter users in Paris, typically with high educational levels, rarely own microvehicles and tend to use e-scooters only occasionally, while Mouratidis (2022) examined the factors to profile e-scooter users in addition to other shared mobility users. Tuli et al. (2021) modeled the determinants of shared e-scooter usage by analyzing data from an e-scooter pilot program. Aman et al. (2021) analyzed 12,026 reviews to identify factors associated with e-scooter rider satisfaction. Based on technology acceptance models, Karli et al. (2022) tested the antecedents of e-scooter behavioral intention. Kimpton et al. (2022) contributed to the literature by showing how weather influenced the appeal and distance of e-scooter trips. Moreover, Nikiforiadis et al. (2023) investigated preferences and attitudes of university students for e-scooters.

Besides understanding the e-scooter usage factors, some researchers also examined the risks associated with the e-scooter use such as e-scooter-related injury crashes (Tian et al., 2022) and e-scooter riders' psychosocial risk features (Useche et al., 2022). Moreover, Gioldasis et al. (2021) identified three risk factors as (i) riding after having consumed alcohol, (ii) riding after having consumed drugs, and (iii) using the smartphone while riding. Although research identifying risk factors associated with e-scooters enhances our understanding of what deters their use, non-users' perspectives remain notably underexplored. James et al. (2019) explored perceptions of e-scooter parking and safety by non-riders and riders in Rosslyn, Virginia, highlighting significant differences in safety perceptions between riders and non-riders. This study found that non-riders were much more likely to perceive e-scooters as unsafe and a nuisance on sidewalks compared to riders (James et al., 2019). Similarly, Kazemzadeh and Sprei (2022) proposed a framework for an electric scooter level of service (eSLOS), addressing various factors such as safety, accessibility, and user satisfaction. This framework aimed to provide a systematic approach to evaluating and improving e-scooter services, highlighting the importance of user and non-user perspectives in shaping service quality and adoption (Kazemzadeh & Sprei, 2022). The factors that dissuade these individuals from e-scooter usage have not been thoroughly examined, resulting in a significant gap in our comprehensive understanding of both e-scooter adoption patterns and perceptions of their broader implications for urban environments.

Gössling (2020) investigated media representations of e-scooters and their impact on public perception. The study identified common themes

in media narratives, such as safety concerns, environmental impacts, and the novelty of e-scooters, which shaped public opinions and attitudes towards e-scooters. Addressing the knowledge gap in understanding these perceptions is essential, as it could provide local policymakers with a broader picture of public sentiment. This broader understanding could influence potential regulations and shape the future of urban mobility in a more balanced and inclusive way (Gössling, 2020).

Other studies looked into the non-use of e-scooters and the associated barriers. For instance, a study conducted in Munich found that safety concerns, environmental considerations, and the cost of using e-scooters were significant factors deterring non-users from adopting this mode of transport. The study revealed that e-scooters were primarily perceived as leisure objects rather than viable transport options, and their introduction had not significantly reduced car usage (Sellaouti et al., 2020). Parking issues also played a crucial role in non-user perceptions of e-scooters. Klein et al. (2023) examined the challenges of e-scooter parking and how improper parking affected non-users' willingness to adopt this mode of transport. The study highlighted that improperly parked e-scooters often blocked sidewalks and public pathways, causing inconvenience and safety hazards for pedestrians (Klein et al., 2023).

A case in point is the recent decision the mayor of Paris made to halt e-scooter operations, a decision driven by the results of a public referendum. Although the referendum witnessed low participation, that is, approximately 7 % of the eligible voters, it yielded a decisive outcome with 89 % in favor of the cessation (Reuters, 2023). This instance underscores the ongoing evolution of policymaking as municipalities grapple with integrating emerging personal mobility technologies into their urban infrastructures. Despite considerable research in recent years, there remains a knowledge gap regarding the factors influencing citizens' preferences for or against e-scooter usage. A comprehensive understanding of these motivations is crucial not only to highlight the benefits and drawbacks of e-scooters but also to inform the development of appropriate local initiatives. Therefore, this study principally aims to elucidate the perspectives of e-scooter users in the Netherlands by employing Q-methodology.

3. Research methodology

This study aims to elucidate the common perspectives among citizens in the Netherlands concerning their reasons for not utilizing e-scooters. For this purpose, we used Q methodology that combines qualitative and quantitative methods and provides a scientific foundation for systematically studying subjectivity (Brown, 1993; Stephenson, 1935; Van Exel & De Graaf, 2005). Although Q-methodology originally stemmed from psychology, it has found a significant place in transportation research, demonstrated by a burgeoning number of published studies spanning a wide array of transportation-related topics, for instance, different motives for car use (Steg et al., 2001), middle-distance travel preferences (Van Exel et al., 2011), preferences of adults with certain types of disabilities on public transportation services (Falkmer et al., 2015), aviation planning policy (Kivits & Charles, 2015), effects of automated vehicles (Milakis et al., 2018), road pricing schemes (Krabbenborg et al., 2020), and bus passenger satisfaction (Ganji et al., 2021).

In Q-methodology studies, respondents participate in an exercise known as "Q-sort," where they rank a compilation of opinion statements. This process uncovers their viewpoint on the subject being examined (Smith, 2001). These rankings undergo correlation analysis, with the correlation between individual rankings interpreted as a measure of viewpoint similarity. Subsequent by-person factor analysis enables identifying significant clusters of correlations, interpretable as distinct viewpoints. Hence, Q-methodology provides a descriptive landscape of a "population of viewpoints," delineating their congruities and disparities.

Contrasting with conventional survey research, Q-methodology

typically relies on smaller, purposefully chosen respondent samples (usually between 25 and 40), who execute a large number of “tests” (comprising a full ranking of 30–50 statements). Consequently, and aligning with the nature of qualitative findings, the results of a Q-methodology study can be generalized to the subject area from which the opinion statements were sourced. However, they may not be extended to the population as a whole, as is the norm in survey research. This indicates that while logical extrapolations about the nature of opinion and shared perspectives on a specific topic are possible, no inferences can be drawn about the number of people associated with each identified viewpoint or their probable characteristics. In essence, Q-methodology aims not to quantify but rather to explore the spectrum of viewpoints on a particular subject, providing an in-depth understanding of the nature of opinions and shared perspectives (Stenner & Watts, 2012; van Exel et al., 2015).

In this study, to uncover common viewpoints, we followed the standard Q-methodology process of five stages: the creation of pertinent statements (Q-set), the identification of participants (P-set), the organization of these statements regarding importance (Q-sort), the execution of factor analysis to capture and investigate various perspectives; and finally, the construction of conceptual models that represent these viewpoints. Fig. 1 shows the steps followed in this study.

3.1. Development of the Q-set

The first step of the Q-methodology is to prepare the Q-set by identifying all possible statements that may reflect existing opinions about the research topic (Krabbenborg et al., 2020). Usually, between 30 and 60 statements are included in the Q-set so that it is manageable for participants to evaluate. They should cover all aspects of the research topic (Foltýnová et al., 2020). Several sources were used to prepare the list of statements. It is essential that the statement set be thorough, balanced, and generally representative of the issues under discussion on this subject in the literature and among the target population to allow all respondents to express their viewpoints (Truijens & van Exel, 2019). To accomplish this, we identified from existing theoretical models concerning e-scooter use behavior potentially pertinent issues to discuss such as Theory of Planned Behavior (Ajzen, 1991) and Technology Acceptance Models (TAMs), that is, TAM (Davis, 1989), TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), and UTAUT 2 (Venkatesh et al., 2012). Moreover, we incorporated

findings from James et al. (2019), who highlighted the safety concerns and nuisances perceived by non-riders, which informed our statements on physical safety and the social impact of e-scooters. Kazemzadeh and Sprei (2022) provided insights into the importance of safety, accessibility, and user satisfaction, which we used to craft statements addressing the perceived ease of use and overall satisfaction with e-scooters. Gössling (2020) discussed the media’s influence on public perception, guiding our inclusion of statements on environmental impacts and public attitudes. Klein et al. (2023) explored parking challenges, informing our statements on the availability and convenience of e-scooter parking. Sellaouti et al. (2020) examined non-use barriers, such as safety and environmental concerns, which we incorporated into our statements on alternative transportation preferences and e-scooter regulations. Finally, Sanders et al. (2020) identified benefits and barriers to e-scooter usage, shaping our statements on user perceptions and behavioral intentions. Additionally, we considered the news about the problems created e-scooter use in cities. At the end of this procedure, we constructed a set of 34 statements organized around three main categories, containing a large variety of aspects related to the decision not to use e-scooters (see Table 1). In parallel with González-González et al. (2023) opinion, we decided this number represented the range of participants’ viewpoints without subjecting them to an excessive number of statements to sort. See (Table 2).

3.2. Selection of the P-set

The participants selected to assess the Q-set statements are referred as the P-set (González-González et al., 2023). A large participant sample was not required because the Q-method aims to identify the various opinions on a subject rather than the relative importance of these opinions across various demographic groups. The Q-method can be effective with a smaller number of participants (Van Exel & De Graaf, 2005); therefore, a range of 10 to 40 is recommended as a sample size (Dryzek, 2005).

Regarding the typology of participants, some authors suggest that to provide well-informed opinions, they should be familiar with the topic (Kougias et al., 2020). Following this recommendation, we applied a snowball sampling technique, which is widely used in social science research (Biernacki & Waldorf, 1981). Referral sampling is another name for the method, which involves selecting a starting group of respondents who may assist in selecting more participants for the study sample (Joseph et al., 2009). This method helps to obtain thorough findings quite rapidly.

In light of the information above, we started by asking students and



Fig. 1. Data Flow Chart of the Research Methodology.

Table 1
Categories of the Q statements.

Statement category	Main questions to cover
Planned behavior and technology acceptance	<ul style="list-style-type: none"> How easy (e.g., comfortable) and useful (e.g., fast) are e-scooters regarding hardware and software? Is the value of using e-scooters worth comparing their prices (including the insurance)? How motivated are citizens to use e-scooters?
Society and environment	<ul style="list-style-type: none"> How safe is it to use e-scooters, both physically (e.g., for accident risk) and virtually (e.g., for data sharing)? Do e-scooters have an effect on the environment (including the landscape pollution)? Do e-scooters have an effect on others (e.g., cyclists or pedestrians)? How healthy or hygienic are e-scooters?
Availability and restrictions	<ul style="list-style-type: none"> Do the citizens prefer available alternatives (e.g., walking or using e-bikes or shared cars) to e-scooters? Are e-scooters available everywhere? Are the citizens allowed to ride e-scooters after using alcohol or without a driver’s license? Are there available parking slots for e-scooters?

Table 2
Characteristics of the Sample.

Gender	%
Women	47.6
Men	28.6
Prefer not to say	9.5
No response	14.3
Age	
18–35	47.6
35–70	38.1
No response	14.3
Total	100

professionals in the authors’ network in the Netherlands to recommend individuals in their network who were aware of e-scooters but did not prefer using them. As a result, we recruited 21 respondents for our P-set based on their voluntary participation.

We gathered data from a computerized web-based application called Q Method Software (<https://qmethodsoftware.com/>) since it eliminates any potential human error due to manually entered data (Lutfallah & Buchanan, 2019). Moreover, it reduces the human interaction between researcher and participant, which could be a COVID-19-related concern.

3.3. Q-sorting and interpreting the viewpoints

The participants’ first task was to divide the Q-set statements into two groups based on whether they agreed or disagreed with the statements. Then, the respondents were shown a Q-grid, a fixed quasi-normal distribution for the card-sorting exercise. This chart is a forced pyramid-type distribution that facilitates the sorting task (Curry et al., 2013). Each participant placed the 34 statements across boxes in the Q-grid according to a scale ranging from most important (+4) to least important (–4), as shown in Fig. 2. The statements were translated into Dutch with the translation–retranslation method with the help of student assistants at the center where the authors work. After completing the Q-sort assignment, each participant was represented by a Q-sort (i.e., a complete ordering of the Q-set statements). Finally, respondents provided information about their preference for not using e-scooters through a questionnaire, as Hackert et al. (2019) applied.

4. Research findings

4.1. Statistical results

The correlation between the Q-sorts was conducted and principal component analysis (PCA) was used to identify the components that identified related participant response configurations. The PCA showed

seven factors among the responses with eigenvalues > 1 and a total explained variance of 73.557 % (see Table 3). The first factor presented the highest explained variance with 27.560 % of the total and an eigenvalue of 5.788. The composite reliability of the factors were higher than 0.80 and the correlations between the factors were low to moderate and ranged between 0.01 and 0.33 (see Table 4).

After factor rotation using the Varimax method, a total of 11 individuals were significantly loaded (p value < 0.05) on Factor 1, of which three were purely loaded. Factor 2 presented three significant individuals with two of them loading purely and significantly. Factor 7 significantly grouped two individuals, in both cases with pure loadings. In contrast, Factors 3, 4, 5, and 6 presented only one individual with a pure and significant loading. Because Q studies use the criterion of a factor having two or more significantly fully loaded individuals to be considered a valid frame (Rajé, 2007), Factors 3, 4, 5, and 6 were not included in the subsequent study, while factors 1, 2, and 7 were regarded as indicating frames to be examined.

4.2. Views of not using e-scooters

The characterizing statements (i.e., those with a rank score of – 4, –3, +3 or + 4 in the idealized Q-sort) and the distinguishing statements (i.e., those ranked statistically significantly different in a factor as compared to all other factors) of each factor were considered when the four factors were first interpreted. Then, we refined the check and interpretation of the factors using the qualitative data from the interviews of respondents who were substantially (p < 0.05) connected with a factor.

4.2.1. Viewpoint I. Environmentalists believe that e-scooters are bad for the environment

The two most important statements (#24, #7 with score + 4; see Table 5) emphasize that the streets are like scooter dumps causing landscape pollution and bikes or e-bikes are better alternatives to use. Walking or cycling are healthier (#22 with score + 3) and e-scooters harass pedestrians and cyclists (#30, #31 with scores + 3).

In contrast, the most disregarded statements in the 1st factor are consistently statements #8 and #26 (with score – 4). Respondents who share this viewpoint do not see themselves as too old to use e-scooters. Therefore, they can use them if they would like but they do not prefer it. Additionally, they do not prefer to drive a car. It can be interpreted that they are against motor vehicles because they believe they pollute the environment. Even though e-scooters are not motor vehicles, they even pollute it. Due to their concern for not even aesthetically polluting the environment, those in this group are referred to as environmentalists.

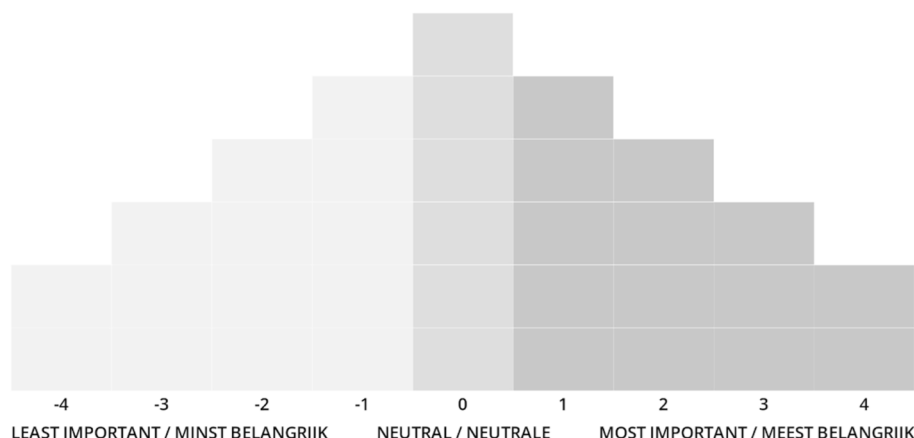


Fig. 2. Score sheet used for ranking the statements.

Table 3
Factor loadings (N = 21).

Participants	Factors						
	1	2	3	4	5	6	7
1	0.32	0.177	-0.043	-0.108	0.052	0.815**	0.027
2	0.694*	0.13	-0.087	0.348*	0.344*	0.14	0.029
3	0.119	0.705**	0.181	0.266	0.301	-0.061	0.275
4	-0.251	-0.106	0.312	0.381*	0.035	0.67*	0.039
5	-0.011	-0.011	-0.092	0.077	0.1	0.125	-0.774**
6	0.474*	-0.316	-0.018	0.524*	0.045	0.077	0.381*
7	0.629*	0.168	0.296	0.337*	0.063	-0.126	-0.076
8	0.405*	-0.122	-0.055	0.67*	0.292	0.107	-0.014
9	0.088	0.848**	-0.062	-0.079	-0.256	0.097	-0.017
10	-0.02	0.335	-0.083	0.835**	-0.06	-0.063	0.108
11	0.623*	-0.167	-0.289	0.18	-0.401*	0.272	0.031
12	0.825**	0.091	0.017	0.192	0.108	0.238	-0.058
13	-0.082	0.322	0.1	0.156	-0.12	0.333	0.745**
14	0.681**	0.065	0.269	0.121	0.247	-0.109	0.307
15	0.317	0.487*	-0.279	0.122	0.365*	0.121	0.208
16	0.849**	0.131	0.047	-0.126	-0.104	-0.015	-0.063
17	0.365*	-0.066	0.782*	0.063	-0.051	0.063	0.007
18	0.439*	-0.022	0.158	0.537*	-0.083	0.236	-0.246
19	0.069	-0.061	-0.049	0.029	0.828**	0.048	-0.188
20	0.428*	-0.036	0.245	0.444*	0.004	0.409*	-0.105
21	-0.074	0.028	0.776**	-0.053	0.016	0.086	0.162
Eigenvalue	5.788	2.229	1.911	1.67	1.473	1.317	1.059
% exp. variance	27.560	10.616	9.1	7.951	7.014	6.273	5.043

* Statistically significant (p value < 0.05).

** Purely and significantly loaded (p value < 0.05).

Table 4
Correlations among factors.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Factor 1	0.96						
Factor 2	0.21	0.89					
Factor 3	0.22	0.05	0.89				
Factor 4	0.33	0.27	0.04	0.89			
Factor 5	0.14	-0.1	-0.06	0.11	0.80		
Factor 6	0.26	0.15	0.2	0.17	0.11	0.89	
Factor 7	0.01	0.3	0.17	0.17	-0.16	0.14	0.89

Note. The numbers in the diagonal represent the factors' composite reliabilities.

4.2.2. Viewpoint II. Materialists prefer to own vehicles instead of sharing them

The two most important statements that represent this viewpoint are the statements #7 and #8 (with score + 4; see Table 5). Accordingly, respondents who share this viewpoint prefer to drive their own car or their own bikes. Moreover, they prefer to use their own scooters (#10 with score + 3). Therefore, we interpret that these people prefer to own the vehicles rather than use shared ones. They also believe that e-scooters are open to any damage (#32 with score + 3) and these sharing platforms are expensive (#4 with score + 3). These beliefs reflect their materialistic views.

In contrast, there is also the strongest opposition to the statements regarding avoiding them rather than owning vehicles. They have a driver's license (#21) and they do not believe that e-scooters are bad for the environment (#15). These results provide enough evidence to call them materialists who prefer to own their vehicles instead of using e-scooter-sharing platforms. Given this context, it is plausible that materialists in cities like Barcelona, where most e-scooters are privately owned, would indeed prefer to own an e-scooter rather than use a shared one.

4.2.3. Viewpoint III. Socializers find e-scooters useless for large groups

The statements characterizing Factor 7 that represent the 3rd viewpoint are #8 and #20 (with score + 4; see Table 5). Therefore, the people with this viewpoint believe that there are not enough e-scooters for everyone in their travel group (#20), thus there is an availability

problem. Perhaps these people prefer to travel in large groups and e-scooters do not allow them to do so. Consistent with this problem, they prefer to drive their own cars (#8).

In parallel with the positive statements, their opposition (with score - 4) show that they do not have legal restrictions such as a driver's license (#21) and consuming alcohol (#27) then using vehicles. In light of these statements, those who hold this viewpoint can be described as socializers who enjoy travelling in large groups, which is not possible with e-scooters.

5. Discussion and conclusion

Despite the increase in research on e-scooter usage, our understanding of this mode of transportation remains limited (Christoforou et al., 2021). As e-scooters become increasingly prevalent in urban mobility landscapes, the importance of continued and expanded research in this area is underscored. Specifically, our knowledge about non-users' views of e-scooters is limited. To fill this gap, in this paper, we have outlined the non-users perspectives of e-scooters to gain a deeper understanding of the effect of e-scooters on urban life. Our research revealed three viewpoints: (1) environmentalists believe that e-scooters are bad for the environment, (2) materialists prefer to own vehicles instead of sharing them, and (3) socializers find e-scooters useless for large groups.

Individuals who view e-scooters as contributing to both visual clutter and environmental pollution hold the first perspective identified in this

Table 5
Statement rank scores general public.

Statements	Viewpoints		
	I	II	III
1 Using the mobile app is difficult	-1	+2	+1
2 The e-scooters offered on the platforms have defects	0	+1	-1
3 Everywhere is within walking distance	+1	0	+3**
4 e-Scooter sharing platforms are expensive	+2	+3**	-3
5 It's not safe to ride e-scooters	+1	-3	-1
6 I prefer to ride shared bikes or e-bikes	0	-1	0
7 I prefer to ride my bike or e-bikes	+4**	+4**	+1
8 I prefer to drive my car	-4	+4**	+4**
9 I prefer to drive shared cars	-3	-2	-1
10 I use my own scooter or e-scooter	-3	+3**	+2
11 I am afraid of falling off the scooters	-2	-1	+3**
12 I am afraid I will have an accident with e-scooters	-2	-1	-1
13 It is difficult to ride e-scooters	+1	-2	+3**
14 Using e-scooters is boring	-1	-2	-3
15 E-scooters are bad for the environment	+1	-4*	-2
16 I am worried that my data on the eSSPs will be used without my permission	+2	0	0
17 It is not easy to park e-scooters properly	+1	+2	0
18 I cannot find e-scooters nearby	-2	+2	+1
19 There is not enough battery left in e-scooters	0	-1	-2
20 There are not enough e-scooters for everyone in my travel group	-1	0	+4***
21 I do not have a driver's license to use e-scooters	-3	-4	-4
22 It is healthier to walk or cycle	+3**	+1	+1
23 E-scooters are at high risk of being stolen while I leave them for a while	0	+1	-1
24 Streets in the city are like scooter dumps that create landscape pollution	+4**	+1	+2
25 Scooters are not hygienic	-1	+2	+2
26 I am too old to use e-scooters	-4	-3	+1
27 I cannot use e-scooters after using alcohol	+2	0	-4
28 Payment on eSSPs is difficult	-2	0	0
29 E-scooters are not physically comfortable enough	-1	-3	-3
30 E-scooters harass cyclists	+3**	0	0
31 E-scooters harass pedestrians	+3**	-2	0
32 E-scooters are open to any damage	+2	+3**	-2
33 E-scooters are not fast	0	-1	-2
34 I'm afraid of doing damage to the e-scooters that insurance will not cover	0	+1	+2

*distinguishing statement for the viewpoint ($p < 0.05$).

**most characteristic statement for the viewpoint.

study. Although research on the environmental effect of e-scooter usage remains sparse, these findings align with extant studies suggesting e-scooters paradoxically exacerbate environmental pollution more than traditional transportation modes do such as buses, cycling, and walking (Bozzi & Aguilera, 2021). This amplified pollution results from a combination of unsustainable production practices, the reliance of rental companies on petrol-based vehicles for fleet management, and the brief lifespan of e-scooters. Regarding landscape aesthetics, James et al. (2019) and Zakhem and Smith-Colin (2021) underscore the problem of improper parking of e-scooters, a point also echoed in our findings, leading to visual pollution in urban settings.

Second, individuals with materialistic tendencies tend to perceive the acquisition and ownership of goods as serving both practical and identity-related purposes. These goods not only satisfy functional requirements but also play an integral role in shaping and reflecting the individual's personal values and lifestyle (Shrum et al., 2013). With materialism fostering a sense of control over possessions and a strong attachment to physical objects, it can logically be deduced that materialistic individuals might resist the idea of sharing (Belk, 2007). This argument aligns with the second perspective unearthed in this study, suggesting that materialists may prefer private vehicle ownership to sharing modalities such as e-scooters. This preference may be fueled by concerns over misuse or other users' lack of care in the sharing system, underscored by prevailing hygiene considerations.

The third perspective uncovered in this research highlights a desire among individuals for group mobility. This is particularly insightful given the observed decrease in total shared e-scooter trips during the pandemic period (Dean & Zuniga-Garcia, 2023). It can be inferred that following lockdown measures, individuals have shown a preference for social group activities, which micromobility options such as e-scooters do not ideally facilitate.

The findings presented here complement and augment previous limited studies, aligning with concerns about traffic safety associated with e-scooter as well as barriers related to the availability of working equipment when needed (Sanders et al., 2020). By considering non-users' perspectives, this research further enriches the understanding of the challenges and complexities surrounding e-scooter adoption and their broader influence on urban environments.

Although Q-methodology offers the unique benefit of merging qualitative and quantitative research techniques, it is important to acknowledge that it is not devoid of limitations. One particular drawback is its sensitivity to individual judgments, which can lead to inconsistencies in the responses. To navigate these potential disparities, the application of various multi-criteria decision-making methods such as the analytic hierarchy process (AHP) and the best-worst method (BWM) can be valuable during data collection. These methods can aid respondents in systematically prioritizing their statements, thereby enhancing the robustness of the collected data and contributing to a more reliable analysis (Ganji et al., 2021).

To delve deeper into this subject, future research could consider aspects such as the respondents' prior e-scooter usage experience, the duration of their use, and in contexts with high tourist influx, even the perspectives of short-term visitors could be incorporated. This would provide a more comprehensive understanding of e-scooter perceptions and usage patterns, informing more effective policy and planning decisions.

Based on our findings, we propose several policy recommendations aimed at addressing the diverse perspectives of non-users and enhancing the integration of e-scooters into urban environments. It is not our intention to suggest that everyone should use e-scooters, but rather to create a balanced approach that respects different preferences and mitigates the concerns identified.

First, to address environmental concerns raised by the "environmentalists" viewpoint, local governments and environmental agencies should implement stricter regulations on e-scooter production to ensure sustainable practices. Encouraging the use of eco-friendly materials and processes, as well as establishing designated parking areas, can help reduce visual clutter and environmental impact.

Second, to cater to the "materialists" who prefer to own vehicles, policymakers and e-scooter companies should develop policies that balance the benefits of shared and privately owned e-scooters. Creating incentives for responsible usage and ownership, alongside measures to ensure hygiene and proper maintenance in shared e-scooter systems, can address their concerns. Additionally, these policies should foster a sense of ownership and care among users, which might alleviate some materialistic individuals' reservations about shared systems.

Lastly, to accommodate the "socializers" who find e-scooters unsuitable for large groups, urban planners and community organizations should design infrastructure that supports group mobility options. This includes creating bike lanes and parking areas that can accommodate group activities. Furthermore, promoting e-scooter sharing programs that cater to group travel needs, including options for larger groups and families, can enhance the appeal of e-scooters for social activities.

These policy recommendations aim to address the diverse perspectives of non-users and enhance the integration of e-scooters into urban environments. By considering the concerns and preferences of non-users, policymakers can create more balanced and inclusive transportation policies.

CRediT authorship contribution statement

Taşkın Dirsehan: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Software, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

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

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