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Comparing the bad media-fuelled reputation of e-scooters with real-life user and non-user perceptions: Evidence from Sweden

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ABSTRACT

E-scooters, one of the most rapidly growing forms of micromobility globally, entered our cities as an innovative first and last-mile travel mode looking to complement public transit and reduce short car trips. However, there are many voices openly suggesting that e-scooters, despite representing still a very low modal share, have instead been the source of traffic accidents, transport system disruption and public space anarchy. Despite a wealth of e-scooter research appearing lately, knowledge gaps about e-scooters' current reputation and how this matches actual user and non-user perceptions do exist. Our two-phase mixed method approach means to fill in these gaps by examining the intriguing context of Sweden, a country hosting more than 30 million e-scooter trips on an annual basis but recently enforcing new stricter rules for their regulation. This paper contributes to the state of the art by contextualising the current reputation of e-scooters in Sweden through a discourse analysis of local press items and by analysing an attitudinal survey that ran in Stockholm and Gothenburg with almost equal numbers of e-scooter users and non-users. First our news item analysis identifies six reputation-defining themes: *cityscape fit; traffic safety and irresponsible user behaviour; rules, regulations and exploits; business; sustainability; and convenience* and concludes that e-scooters' portrayal in Sweden is very negative. There are approximately five negative comments in the press for every positive one. Our survey offers statistical evidence that there are significant differences in the evaluations of users and non-users when it comes to seven perceived e-scooter qualities (*safety; speed; eco-friendliness; cost; convenience; fun; health and wellbeing)* and two policy practicalities (*regulations clarity; and parking provision*). Users' perceptions are always more positive from those of non-users, but they do agree with them that safety, eco-friendliness, cost, health and wellbeing are areas of concern for e-scooters. Both groups see value in enhanced regulation clarity and better parking provision. Non-users however, to some degree, do recognise that e-scooters offer fast, convenient and pleasant mobility services making this the tripole where image change and positive rebranding could start from.

1. Introduction

Micromobility is a rapidly emerging transport phenomenon (Attard, 2022) that challenges and disrupts conventional urban mobility systems by introducing and facilitating the use of microvehicle fleets primarily for shorter inner-city journeys (Oeschger et al.,

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2020; Stehlin & Payne, 2022). Enabled by the utilisation of GPS technology, wireless connectivity tools and smartphone applications (Hosseinzadeh et al., 2021), e-scooters, defined as one-person light-weight electrically powered standing scooters, have an interesting but still under-studied role in the fast-paced mobility eco-system of today (Dozza et al., 2022). This is because e-scooters, unlike other novel (e-)vehicles, like self-balancing and non-self-balancing boards and skateboards, have been established as the new mainstream mode of flexible urban mobility for numerous cities. This is achieved despite their unorthodox and somewhat rushed incorporation in built environments and their heavily debated and sometimes controversial role in sustainable travel behaviour terms (Nikitas, 2023).

Despite a wealth of promised benefits including reductions in car traffic, air pollutants and vehicle emissions, noise nuisance, energy consumption, social exclusion and the consolidation of a new first and last mile alternative capable of allowing public transit to reach further destinations and audiences (Christoforou et al., 2021; Gebhardt et al., 2022; Javadinasr et al., 2022; Sanders et al., 2020) e-scooters have also brought to the cities adopting them a unique set of challenges and complications. They have been called a divisive street mode for that (Speak et al., 2023). Thus, reactions from users, non-users, policy-makers, transport providers, practitioners and academics have not been all positive; they are rather mixed (James et al., 2019). Media and social media, in particular, seem to constantly report on the problems associated with e-scooter use (Aman et al., 2021). They tend to deliver a message framing them as a destructive and unsafe mode of transport whose hype does not actually correspond to their true value.

The reputation of e-scooters is important because it is a key for their acceptance (Ratan et al., 2021), and acceptance or acceptability in turn, as in any novel transport intervention, is a key for their successful implementation (Nikitas, 2018) or long-term viability (Nikitas et al., 2016). Public perception therefore might be the most significant challenge for e-scooters to overcome (Gössling, 2020). If public perception is not in favour of e-scooters, it may not only mean bad business, but it could also increase the challenge of integrating them appropriately (or even at all) into our cities. Thus, policy-makers and city planners need to identify, contextualise and understand the on-going debates about e-scooters and implement corresponding policies and regulations designed to harness and maximise their social and environmental benefits (Tuli et al., 2021) allowing them to reinstate their reputation accordingly.

In Sweden, e-scooters are on the news very often; it is clear that they have news value. As an example, the headline *"The killer fled on an e-scooter"* has been used at least three times during 2021–2022 in Swedish mass media, by three different news outlets reporting on three different shootings. While shootings have a news value in themselves, it is hard to see that the escape vehicle would have been mentioned in the headlines if it was a car.

So, while there is apparently interest about e-scooters in Sweden, from this very characteristic example alone, it is possible to hypothesise that e-scooters are portrayed by the press in an underwhelming and possibly unfair way. But do e-scooters really have a bad reputation according to mainstream media that indeed reflects and affects people's perceptions or is this just another myth lacking substance? What are the themes that may to some degree define reputation?

In this paper, we aim to explore the reputation of e-scooters in Sweden as this is primarily crafted by the local media, understand the public perceptions of users and non-users reflecting and affecting living with e-scooters in Sweden and compare the two so that we can draw a more accurate picture of the Swedish e-scooter opinion landscape. Thus, there are two research questions governing the present study.

RQ1: What is the reputation of e-scooters in Sweden according to the local media?

RQ2: How does this compare with the perceptions of e-scooter users and non-users (and how usage is affected by perceived e-scootering qualities)?

How e-scooters are portrayed in mass media will be analysed first. The analysis of news items is a legitimate technique of opinion research governed by two hypotheses concerning the relationship between the newspapers and the reading public: the press moulds readers' attitudes but equally the press also reflects these attitudes (Woodward, 1934). In other words, the media both identify the issues meriting attention, while shaping the perspectives in which these issues are seen, and picking up on public concerns (Gössling, 2020). There are no studies analysing media coverage of e-scooters with the exceptions of Gössling (2020) and Lipovsky (2021) but ours is the first study that uses such an analysis as part of a mixed method research approach. This is not surprising considering the newness of the e-scooter phenomenon. We combine this work with the analysis of selected, thematically comparable items, from a questionnaire designed to capture public perceptions of e-scooters in Sweden's largest cities, Stockholm and Gothenburg.

Henceforward, the paper provides in Section 2 a critical literature review setting out the background of our mixed method approach that is described in detail in Section 3. Section 4 presents our news item analysis followed by our questionnaire analysis. This allows the immediate comparison of media-generated reputation against actual public perceptions for selected themes identified by both methods. This is followed in Section 5 by a discussion trying to contextualise the bigger picture of the Swedish e-scooter culture and provide policy-makers and mobility providers with recommendations about the right way forward. Section 6 presents our conclusions, study limitations and future research.

2. Literature review

Since the mid-2010s, the number of e-scooters, due to their techno-friendly character that can now be appropriately facilitated in our smart city era and their relatively modest investment cost, has increased exponentially in several cities worldwide especially in Europe and USA (Campisi et al., 2022). E-scooters' promised benefits include possible reductions in private car use and thus mitigation of car-related externalities referring to motorised congestion, greenhouse gas and CO_2 emissions, city noise and traffic accidents (Christoforou et al., 2021). Being provided through shared mobility systems has not only drastically accelerated the success of e-scooters but enabled them to be, at least in theory, a robust new first- and last-mile service provision that can potentially encourage synergies with public transport systems (Nikiforiadis et al., 2021). E-scooter programmes can also increase access to mobility for those without car access or not well-served by public transit (Wang et al., 2022) and is a new business sector employing many people.

E-scooters, with average top speeds of 20 km/h in Europe, add extra complexity however in the already over-complicated and dynamic urban transport system as they compete over space with pedestrians, cyclists and motorised vehicles (Gössling, 2020). As Gibson et al. (2022) highlights '*e-scooter riders blur the boundaries of modal status, transport categories and spaces of mobility*'. One example of this complexity and blurring of boundaries is that e-scooters are currently being used not only in vehicles' roadways but also in pedestrians' sidewalks something that differentiates them from e-bikes that very infrequently, if ever, run on dedicated pedestrian sidewalks (Tzouras et al., 2022).

Recent research shows that e-scooters meet some important needs for personal mobility and have generated enough demand to be financially viable (Kim et al., 2022) to a degree that cities demanded the strict regulation of their very numbers. At the same time, according to Kopplin et al. (2021) e-scooters are primarily viewed as entertainment rather than a utilitarian mode of transport, they have somewhat limited potential to replace cars, and could only be seriously considered for short-distance trips (<2 km). Typically ridden by male, relatively young, well-educated individuals, and local residents (Wang et al., 2022), e-scooters have been found on multiple occasions, despite their pro-environmental underpinning and potential, to disproportionately substitute walking and cycling over short distances (Sanders et al., 2020) and replace public transport trips (Laa & Leth, 2020).

On the one hand, this means that micromobility, in general, and e-scooters, in particular, have the potential, if not regulated and used appropriately, to cannibalise walking and cycling, the two most sustainable forms of transport (Gebhardt et al., 2022). While on the other hand, they create a public transport paradox; although e-scooters could provide first- and last-mile connections to public transit and act as a strong complement and feeder service, they can also have substitutional or replacing impact on transit trips (Cao et al., 2021). Actually, according to Ziedan et al. (2021), a study that modelled 1.4 million shared e-scooter trips in Nashville, during a typical weekday, utilitarian e-scooter trips are associated with a 0.94 % decrease in bus ridership, while social e-scooter trips are associated with weekday bus ridership increases of 0.86 %. The net effect of e-scooters thus on weekday bus ridership is estimated to be − 0.08 %, which is nearly zero. Wang et al. (2022) notes that the public transport trip substitution effect is primarily driven by transit demand and quality at the city-level; cities with strong public transport culture and good infrastructure are less likely to see these effects.

A second key challenge with e-scooters reflects their ability to deliver safe services for their users and not creating a new layer of significant accident risks for their non-users. After their burst of popularity, growing safety concerns about e-scooter riding resulting from their involvement in severe crashes led many cities to ban or temporarily suspend them (Ma et al., 2021). Rider inexperience and the inexperience of other road users in interacting with e-scooters may be contributing to accidents (Haworth et al., 2021a). E-scooter riders are also perceived as having higher rates of risky (or reckless) behaviours than people cycling (Useche et al., 2022a, 2022b). When it comes to illegal riding and irresponsible driving behaviour *per se*, common themes are the inappropriate age of the rider (i.e., younger than 18), riding under the influence, riding while distracted, and riding in locations beyond the geofencing or usage regulations allow for (Heydari et al., 2022). Pedestrians getting injured by e-scooters is also a common theme; this is the most vulnerable road user group since they move in a slower pace than e-scooters in environments where they need to co-exist (Cicchino et al., 2021). Pedestrians who are most prone to e-scooter generated injuries include individuals with vision and/or hearing impairment, young children, older people, and pedestrians distracted by mobile devices (Sikka et al., 2019).

A third very serious concern with e-scooters relates to their parking and their overall disruptive fit to the cityscape. E-scooters' improper use, especially for the majority of the existing systems, where scooters can be picked up and dropped off almost anywhere, may lead to situations were these microvehicles are left unattended blocking walkways and sidewalks something that creates road user barriers, safety hazards and aesthetically displeasing environments (Bozzi & Aguilera, 2021; James et al., 2019). According to Zakhem and Smith-Colin (2021) illegal parking has developed to one of the most significant issues faced by cities that have adopted dockless shared e-scooters. It is not rare nowadays for many cities to have piles of e-scooters on their pavements or streets but the actual rate of micromobility parking obstructing other road users' sidewalk travel is apparently on average much lower than that of motor vehicles according to multiple studies (e.g., Brown et al., 2020; Fang et al., 2018). Gössling (2020) indicates that many of the e-scooter debates are indeed focusing on cluttering, parking on sidewalks and in pedestrian areas, and vandalism, which is easy especially for e-scooters left randomly in open public space.

As a whole, the rapid rise of shared e-scooter systems outpaced the ability of the cities and regions to formulate policy and guidelines (and provide additional infrastructure) that would ensure their safe, harmonious and equitable co-existence with pedestrians, cyclists and motorised vehicles on streets (Mitra & Hess, 2021). Practitioners in general struggle with these new mobility systems appearing in urban landscapes ill-prepared to host them, while policy-makers are often left trying to catch up instead of proactively regulating (Nikitas, 2023). More specifically, e-scooter policy and governance are yet to address in full: the uncertainty of technological disruption; the space competition with other light mobilities; the permeation of private interest into the public sphere and its definitive role and responsibilities; and the extent of government intervention in balancing the competing/contradictory interests in a mobility arena defined by fast-paced societal changes (Field & Jon, 2021).

3. Method

3.1. Local case

Sweden is one of the Scandinavian countries. It borders Norway to the west and north, Finland to the east, and is connected to Denmark in the southwest by a bridge–tunnel. Sweden is the third-largest country in the European Union in area and has a population of 10.5 million. It has a low population density of 25.5 inhabitants per km^2 (66/mi^2), with around 87 % of its inhabitants residing in urban areas in the central and southern half of the country. Sweden's two largest cities are its capital city Stockholm (1.5 million) and

Gothenburg (600,000); these two localities are the focal points for this research.

Stockholm has Sweden's only Metro system and Sweden's first electric tram system. It was home to Stockholm eBikes a scheme that was introduced in spring 2022 and closed in May 2023 due to problems with bikes, batteries and the app; an earlier bike-sharing scheme discontinued in 2018 due to, among others, low ridership numbers. Gothenburg has a century-old extended tram system and a recently refurbished and arguably successful, enjoying according to Nikitas et al. (2016) more than 90 % public acceptance rates, bike sharing scheme that was originally introduced in 2010. Both cities have high quality public transport systems including electrified bus rapid transit and ferry and local boat services. They both have a well-established cycling- and pedestrian-friendly culture that is supported by serious active transport infrastructure investments; for example, Stockholm and Gothenburg have 750 km and 793 km of cycling roads respectively. Shared mobility modes are popular and long established in both cities; each of them has Uber and Lyft service coverage and their own dedicated car-sharing and car-pooling schemes including Stockholm's Aimo share which is a scheme 100 % electrified.

Stockholm has, as of early 2023, eight shared e-scooter providers: Voi, Lime, Tier, Bird, Bolt, Moow, Link and Dott. They provide dockless shared e-scooter services accessed by each company's mobile app for an average of 10 SEK (unlocking fee) and then 3 SEK/min. They are not part of the smartcard public transit provision in Stockholm. The number of e-scooters on Stockholm's streets reached an all-time-high of 23,000 vehicles in the summer of 2021. That was reduced when Stockholm's traffic office introduced a limit of 1,500 scooters per provider with an annual fee of 1,400 kronor ($140) per vehicle. Stockholm has now a maximum of 12,000 legally registered e-scooters and for the year 2021 alone is the home of 20.4 million trips.

Gothenburg has, as of early 2023, four shared e-scooter providers: Voi, Lime, Tier and Bolt. They provide dockless shared e-scooter services accessed by each company's mobile app the two first for 10 SEK (unlocking fee) and then 3 SEK/min, the third one for 10 SEK (unlocking fee) and then 2.25 SEK/min and the final one provides services on demand only. They are not included in the smartcard public transit provision of Gothenburg. There are now a maximum of 4,400 legally registered e-scooters, which is a sharp, recently legislated, decrease compared to the city's forecast of 15,500 e-scooters. According to official city statistics, Gothenburg in 2021 alone has seen 5.15 million e-scooter trips.

For both cities monthly subscriptions and 24-hour passes are also available; these cost approximately 549 SEK and 129 SEK respectively (Voi prices). According to national and city-specific modal share statistics e-scooter travel corresponds to less than 2 % of the total trips recorded in the two cities.

These e-scooter services are geolocated meaning that they: show the spots closest to the user's position to pick up a scooter; provide en route tracking to help the user access secure stopping points; suggest preferred parking lots, to earn the user points and discounts and promote balanced parking provision; and use geofencing to immobilise scooters going outside permitted zones. The providers' advice is for their users to ride in bike lanes, follow the local rules and regulations and wear a helmet. By Swedish law from September 2022, e-scooter users are forbidden from riding e-scooters on pavements (if bike lanes are not available, road lanes should be used) and from parking them on pavements and bike lanes unless these are allocated parking lots.

3.2. Media text analysis study

To answer RQ1, "*What is the reputation of e-scooters in Sweden?*", an analysis of news items coming from well-regarded media outlets was performed. This type of data is worth studying because it represents the mainstream and dominant discourse; these texts can be considered as the voice of the society or of its majorities at least since they are characterised by ubiquity, intensity of usage, public attention and political influence. Discourse analysis of newspaper and media texts as described by Mautner (2008), is able to capture impact (e.g., how an intervention like e-scooters may change, according to the author of such a text, the design of a city or its transport priorities). Discourse is not only socially constituted but also constitutive and through the dissemination to large audiences its power to shape widely shared constructions of reality is significantly enhanced, making it a critical data source for social scientists (Mautner, 2008). News item analysis, looking to to discern key discursive frames or themes (Joss et al., 2017), is a legitimate analytical technique used by many transport studies before (e.g., English & Salmon, 2016; Te Brömmelstroet, 2020; Zijlstra & Vanoutrive, 2018), including one global study on e-scooters *per se* by Gössling (2020) and one capturing the French e-scooter landscape (Lipovsky, 2021). Gössling's work analysed media items for ten cities examining conflicts over e-scooter introductions, while Lipovsky's work looked into articles from two newspapers Le Figaro and Le Monde between June 2018 and September 2019 to assess e-scooters' early steps in France.

Two of Sweden's most impactful media outlets were selected as sources to sample articles from. The newspaper "Aftonbladet" is the largest Internet news outlet in Sweden and has national coverage. Svt.se is the online news outlet from Sveriges Television (The Swedish public service national television). Since we found that national media had a tendency to cover primarily the capital city issues we added a third outlet with a Gothenburg-centric perspective to enrich our analysis: Göteborgs-Posten.

Aftonbladet's own search engine was used to search for articles including the term "Electric scooters" (or "elsparkcyklar" in Swedish). Out of 426 articles in total, the first published article each month was sampled as well as the article closest to the 15th of each month. If there was no article a particular month, that month was excluded. This was to get a sample distributed over time, and to get a manageable number of articles to analyse. We used the same principles for Göteborgs-Posten and recovered 367 search hits. A similar strategy was used to sample SVT.se, but here the articles were located via searches on Google, since SVT.se does not have a search engine on its site. Google searches were made for "site:svt.se elsparkcyklar" for each month, and the first and third hit were sampled each time, since Google sorts their results on relevance and not chronologically. Altogether 243 articles were sampled, 80 from Aftonbladet, 72 from SVT and 91 from Göteborgs-Posten. The 243 articles consisted of 220 news articles and 23 opinion pieces. The search covered articles published between 23 November 2018 and 31 December 2022.

The sampled articles were analysed using primarily the key principles of thematic analysis adapted (and narrowed down) to suit the

secondary data nature of this study as per Nikitas et al. (2019), Liu et al. (2020), Alyavina et al. (2020) and Michalakopoulou et al. (2021). Thematic analysis has proven to be a cutting-edge qualitative tool to analyse discourse that allows conducting research in a precise, consistent and exhaustive manner through recording, systematising, and disclosing the study results with enough detail to enable the reader to determine the credibility and validity of the process (Nowell et al., 2017). The analysis was data-driven (i.e., no theme or code presumption) and included: defining the new items corpus; reading the articles, understanding their content and context and identifying codes; searching, reviewing and defining themes; and generating findings. The thematic mapping approach for our discourse analysis is also chosen because it enables us to make meaningful comparisons with the 'survey themes'.

More specifically, we read the articles to familiarise with the discourse, identified common underpinning thematic codes in each of the texts read and organised these into thematic families (e.g., traffic safety, business, sustainability etc.). Our work however went beyond the typical boundaries of a thematic approach *per se* employing also a quantitative component to our analysis, as described in Joss et al. (2017), measuring the occurrence (frequency) of key thematic codes coming up in our text analysis. Also, of particular interest was the 'tone' and 'colour' with which the articles *portrayed* e-scooters, i.e., if they valued or discredited e-scooters in any way, and if so how (e.g., dangerous, expensive, convenient etc.).

Table 1
Thematic Map of the News Items Analysis.

Theme	Portrayal / Code	Times	Typical Message/Quote	Polarity
Cityscape Fit	Too many; cluttering	49	"They are everywhere and are annoying"	Negative
	Illegal or irresponsible parking	30	"People just throw them on the ground"	Negative
	Working well in the city	1	"In Norrköping E-scooters are working well"	Positive
Traffic Safety & Irresponsible User Behaviour	Negative traffic safety: parking	22	"Bad parking is dangerous for visually impaired"	Negative
	Negative traffic safety: driving	51	"People are getting injured in scooter accidents"	Negative
	Neutral report on traffic safety	8	"How dangerous are scooters compared with bikes?"	Neutral
	Positive report on traffic safety	3	"Not as dangerous as we thought"	Positive
	Users are driving recklessly	29	"E-scooter drivers can't behave, it is used for play"	Negative
Rules, Regulations & Exploits	Unclear rules & regulations	20	"No one knows who is responsible for what"	Negative
	Report on new rules	34	"E-scooters not allowed in the subway"	Neutral
	Instructional/educational "how to drive"	5	"These are the traffic rules for e-scooters"	Neutral
	Positive consequences of new rules	5	"The parking problem will be reduced"	Positive
	No consequences of new rules	3	"The parking problem is still around despite new rules"	Negative
	You can make scooters go faster than allowed	1	"Easy to breach speed limits with them"	Negative
	Scooters can be hacked and controlled remotely	2	"They can be manipulated by easy hacks"	Negative
	Children can easily rent them although not allowed	1	"It is possible to register an older age than one's real age"	Negative
Business	Business news	30	"E-scooters to be launched in city ×"	Neutral
	Irresponsible service providers	12	"Service providers do not care about the problems, only money"	Negative
	Responsible service providers	9	"Service providers are preventing potential problems"	Positive
Sustainability	Replaces walking, not car driving	7	"Scooters promised to replace cars, but they do not"	Negative
	May replace car driving	2	"Scooters have the potential to reduce car use"	Positive
	An overall sustainable alternative	7	"Better than cars"	Positive
	Hardware failure	3	"E-scooters break down quickly"	Negative
	Scooters are wasted	10	"Scooters are dumped in the canal"	Negative
Convenience	Generally useful	9	"They can simplify everyday life"	Positive
	Easy to access	4	"Easy to find one near you"	Positive
	Easy to use	6	"Register via app and off you go!"	Positive
	Fun to use	3	"They are fun to drive!"	Positive
Miscellaneous	Scooters catching fire	3	"Scooter catches fire while being charged"	Negative
	Scooters set on fire during riots	1	"Scooters set on fire after the game"	Negative
	Customer data leaks	4	"E-scooter rental customer databases have leaked"	Negative
	E-scooters reduces bike theft	1	"People rent a scooter instead of stealing bikes"	Positive
	Crime accessories	18	"The killer fled on an e-scooter"	Negative
	Repair of scooters	1	"This company specialises in scooter repairs"	Positive
	New technology or functionality	3	"Scooters to emit warning sound when parked"	Neutral
	Celebrity spotted on E-scooter	1	"Drake seen on E-scooter in Stockholm"	Neutral
	People riding E-scooter in bad weather	1	"Citizen spotted driving to work on scooter despite snowstorm"	Neutral
	Citizens' negative opinions	1	"A majority wants scooter numbers regulated"	Negative

Total Portrayals: 400
Positive Portrayals: 51 / Neutral Portrayals: 82 / Negative Portrayals: 267
Portrayals = the times a thematic code was mentioned

3.3. Questionnaire

To answer RQ2, *"How does reputation as depicted by media compare with the perceptions of e-scooter users and non-users in Sweden (and how usage is affected by perceived e-scootering qualities)?"* we are using key results from an online quantitative questionnaire. The questionnaire was developed, for an international project, aimed at primarily understanding the perceived safety of e-scooters by people in Sweden but contained many questions beyond and above this safety aspect that allowed us to make meaningful and value-adding comparisons with the media-generated reputation data. Respondents were recruited through a social media-enhanced recruiting strategy targeting adults living in Stockholm or Gothenburg. The data collection focused specifically on those two cities because these are the two Swedish municipalities with a plethora of established e-scooter options for some years now. Because of that they offered the unique opportunity for the Swedish context of two significant pools of users and non-users with direct or indirect e-scooter engagement via riding the scooters themselves in the first case or by having to co-exist with them in the other. Our purposive and snow-balling sampling approach was sufficient in capturing e-scooter user and non-user adult populations that would allow for generalisable results in both cities.

More specifically, in total 576 people participated in the study. Of these 330 answered the questionnaire in full. For the completeness, validity, and consistency of the work we decided to include in our analysis only the 330 fully completed questionnaires. From our final sample, 151 respondents were classified as users of e-scooters, while 179 were non-users. Most of the users used rental scooters, but 43 participants owned their own e-scooter, something that brings on board a perspective very rarely if ever communicated in transport literature before. Unfortunately, however there is no register (no legal requirement for that) of the total number of private e-scooters in any of the two cities to allow for further comparisons and generalisations.

Our online survey was administrated and accessed via our institutional portal powered by LimeSurvey. All the answers were integrated to SPSS 28, a powerful social science statistical programme that we used to perform our statistical analysis. We use descriptive statistical analysis, crosstabulations and regression modelling. We use the variables that allow us to make meaningful and direct comparisons with the themes deriving from the discourse analysis something that gives homogeneity, continuity, rigour and validity to our mixed method approach. We do not therefore dive into the safety-specific questions and variables of the survey since this would derail this study from its true call that is about contextualising the truth behind the bad (or not) reputation of e-scooters in Sweden.

4. Analysis and results

4.1. Discourse analysis and thematic mapping

The 243 sampled articles were analysed with a focus on their content and tone. Regarding the content *per se*, six key themes were identified that were relevant to e-scooters: *cityscape fit; traffic safety and irresponsible user behaviour; rules, regulations and exploits; business; sustainability; and convenience*. These are presented in Table 1. A seventh theme called *miscellaneous* is simply packaging some interesting but relatively unique topics and is reported for the purpose of research completeness showcasing the vast variety and diversity of reputation-generating viewpoints; this is not however a genuine 'theme' that emerges from our thematic analysis approach that considers repetition of topics underpinning the theme as a prerequisite for its emergence.

For the completeness of this qualitative analysis, we also present the codes coming under each umbrella theme. Also, representative quotes for each of these codes *per se* are presented since we needed to ensure our reader, per best practice guidance (Braun & Clarke, 2006), that the extraction and interpretation of findings were based on the raw data rather than on the researchers' subjective impressions (Nikitas et al., 2018). Other subjects more loosely connected to e-scooters, such as crime ("the killer fled on an e-scooter") were also identified and are packaged as ''miscellaneous'' in the seventh theme.

Within each theme, the tone and type of portrayal of e-scooters was also analysed. The purpose was to capture the prevailing Swedish media narrative when presenting e-scooters something that affects, reflects and underpins reputation. Thus, although this is not a quantitative analysis *per se*, in our approach we specifically measured how many times different thematic codes underpinning our corpus occurred and how these were portrayed (positive/neutral/negative). These were classified accordingly in Table 1 under the column 'Times' to offer a more precise overview of the media narrative. The very inclusion of code occurrence (frequency) metrics including a qualitative portrayal clarifying in what light the 'code' was used (positive/neutral/negative) is what makes this media text analysis broader than a thematic analysis *per se*; thus our classification of the research as discourse analysis with a thematic mapping underpinning.

It should be noted that an article could include many portrayals of different topics. Most articles analysed were overall negative, but some were more neutral and included both positive and negative portrayals. Also, we acknowledge that the analysis above does not intend to always specify and dig into the who it is that is portraying scooters in a certain way (e.g., a reporter, a politician, a police officer, an annoyed citizen or an e-scooter rental firm representative) although this was reported on occasions as part of the article narrative. What we tried to uncover and synthesise is the overall reputation of e-scooters from the day they became a news item until now. The analysis also does not differentiate negativity, positivity or neutrality degrees *per se*; for instance, an article could state that scooters "are extremely dangerous" and another that they "could probably be dangerous" but both are evaluated as negative.

For clarity purposes it should be noted that the writers, of the items analysed, seemingly operate from specific discursive practices originating in special interests and aims which may involve inclusions and exclusions. Also, discourse is historical and dynamic in the sense that texts acquire their meanings by being situated in specific social, cultural and ideological contexts, and time and space.

During the analysis, it became clear how much media focus on e-scooter *rentals* and not on privately owned e-scooters. Although many articles do not explicitly state that, what they are describing is related to rental, it is frequently implied. In only two of the

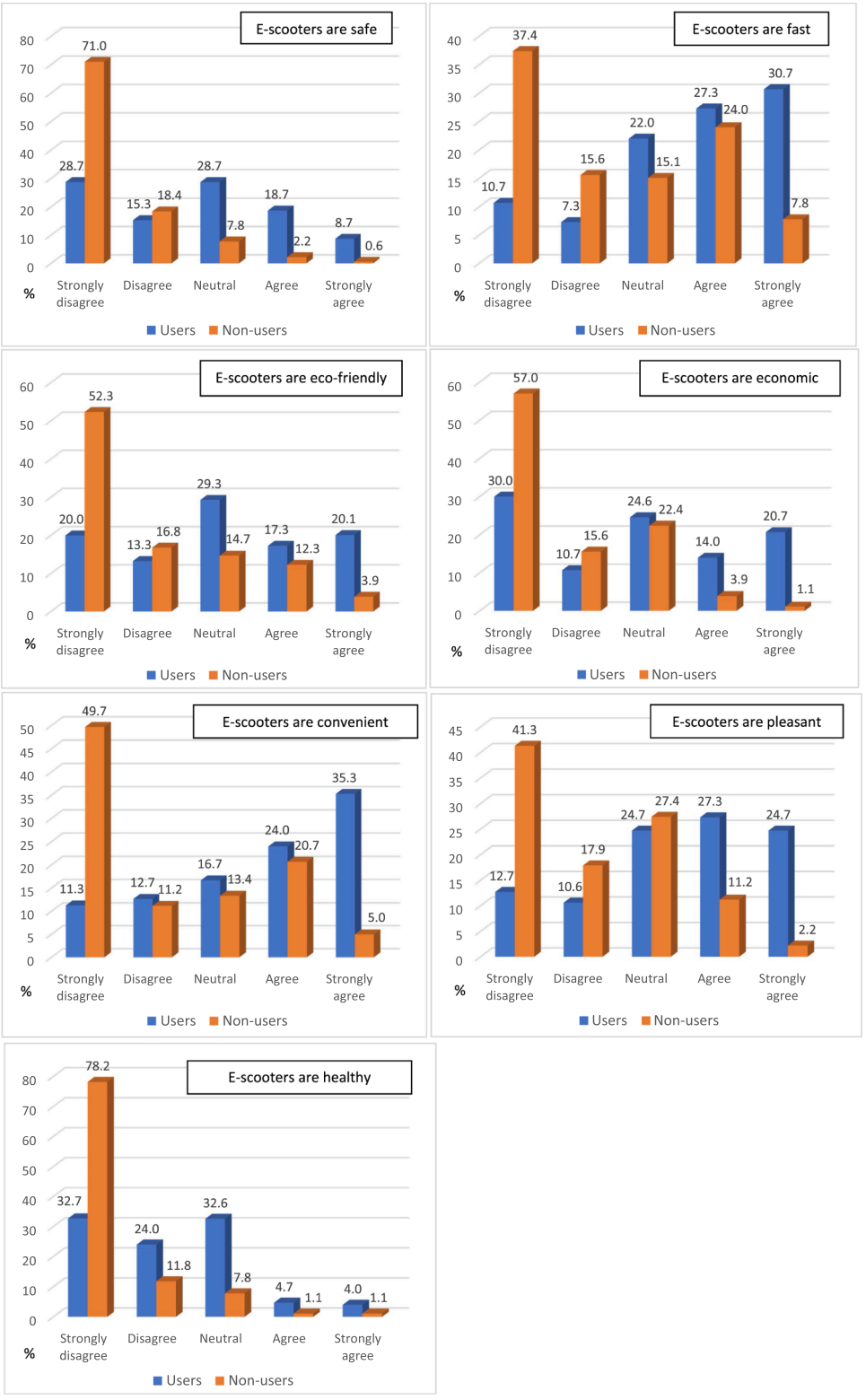

Fig. 1. Perceptions of users and non-users about e-scooter qualities.

articles, it could be deducted that they described privately owned scooters, and those were the articles about scooters catching fire during charging. Lately more and more articles raised policy and regulation issues; the recent change of law is probably behind this.

Overall, media's portrayal of e-scooters is negative with very few exceptions. E-scooters are being described as problematic (or potentially problematic) 267 times in the articles, while their advantages (or potential advantages) are only mentioned 51 times. This is a distinctive imbalance that can create reputation issues. The analysis also indicates clearly what the key problems with e-scooters in Sweden are according to the media narrative:

1. E-scooters are cluttering the cityscape via irresponsible parking.
2. E-scooters are dangerous in traffic creating safety hazards while being ridden or parked.
3. E-scooter rules and regulations are unclear.
4. E-scooter providers do not deliver services always in a responsible manner.
5. E-scooters can potentially be unsustainable.

These are of course issues highly dependent on each other, which is also apparent when one reads the articles. As an example of such an interdependence, the e-scooter drivers may park the wrong way because they behave irresponsibly, which is the reason that leads to cluttered cityscapes, since providers do little about it, while the whole issue is worsened by unclear or not strongly propagated parking regulations.

4.2. Questionnaire analysis

Our questionnaire allowed us to understand if the six major themes emerging in the discourse analysis and the five key problem areas that define the 'bad' reputation of e-scooters in Sweden according to the local media, actually correspond to the general public attitudes about e-scootering. Quantitative surveys are a robust tool in the hands of transport researchers for assessing perceptions, identifying the relations between them and producing results more easily generalisable to a broader context (Nikitas et al., 2021).

Our research strategy approach to recruit for a sample with relatively balanced numbers between users and non-users, for two cities with similar characteristics and almost identical exposure to the attitude object, enables us to detect perceptual differences between these two groups that go beyond urban setting specifics *per se*. This provides us with the opportunity to develop a more in-depth understanding of the weight that e-scooter usage has on perception built-up and subsequently offer a more diverse spectrum of policy and industry recommendations that are custom tailored to both groups.

We used sporadic elements of a number of underpinning behavioural and attitudinal theories but we did not base our work into a particular one (like the Theory of Planned Behaviour or Technology Acceptance Model) *per se*. This was a choice aligned with the newness of the topic, its very unique, novel and untested qualities and our focus on making this an applied and policy-oriented study that matches (and is restricted around) the thematic discourse results of the news item analysis.

Our first concern was to have good representation for both users and non-users. E-scooter users and non-users were fairly split in our sample (users: 45.2 % and non-users: 54.8 %). Our sample was male dominated (67.5 % men to 32.5 % women), well-educated (64 % had at least a Bachelors degree) with 82.7 % of our participants having a driving license for a car, moped or motorcycle. These differ from typical national averages; in 2022 from 10.52 million Swedish inhabitants, 5.3 million are men and 5.22 million are women, while around 42 % of the population have at least some level of upper secondary education). These differences were somewhat expected since by committing to gather a significant number of people able to contribute their usage-informed e-scooter perspectives we unintentionally encouraged the over-representation of well-educated males; these individuals according to literature findings are the people most likely to be e-scooter users (see Dozza et al., 2022; Raptopoulou et al., 2020; Wang et al., 2022). Our study confirms in a strong way this literature result since 54.8 % of our male respondents self-identified as e-scooter users while only 26.5 % of our female ones did the same. The age split of our sample was relatively balanced (i.e., 18–24: 4.6 %, 25–34: 17.9 %, 35–44: 24.6 %, 45–54: 25.8 %, 55–64: 17.6 % and 65 and over: 9.4 %). Because we wanted our findings to reflect the real e-scooter market profiling we did not account for the sample imbalances *per se* in our study; thus we should acknowledge that perhaps without weighting the sample to account for skewness toward males and the well-educated, external validity may be somewhat depressed.

Fig. 1 presents the results of the crosstabulations between usage (users vs non-users) and seven thematic e-scooter evaluations referring to the key attitudes of the survey respondents. These specifically refer to e-scooters being considered: *safe; fast; eco-friendly; economic; convenient; pleasant;* and *healthy*. Our participants' answers differ dramatically between user and non-users. This is an expected, but still worthwhile, finding on its own.

Consistently non-users are significantly more negative than the user group in every single assessed characteristic or possible quality of e-scootering. Both groups see issues with the traffic safety, health and cost of e-scooters, with the users being a lot closer, on average, to neutral and the non-users being emphatically negative. Almost half of the users value the eco-friendly capacity of e-scooters, when clearly the significant majority of non-users reject this premise. This is interesting because it means that some users see e-scooters as a feasible car replacement, while most non-users consider it as substituting walking and cycling trips instead. Nevertheless, it is still surprising that that a third of the users do not consider this mode eco-friendly. Users are most likely to see the value of e-scooters in terms of their ability to provide fast, convenient and pleasant services; these are possibly the key reasons why they could be using them. About a third of our non-users agreed that e-scooters are fast and more than a quarter of them that they are convenient. One out of four non-users also do not see them as an unpleasant mode. These three e-scooter perceived qualities (i.e., speed, convenience, pleasure) could be a tripole of e-scooter qualities thus, where both groups see value, and can be used as a benchmark for promotion campaigns.

In Fig. 2 we present two findings that are directly comparable with the two discourse themes referring to rules and regulations and

cityscape fit. Although perceptional differences do exist between users and non-users (i.e., users are more evenly split between the five Likert categories than non-users who are very likely to be positive or very positive in the two statements) the trend is similar for both groups. They do agree that extra care and emphasis should be given to building and disseminating clearer e-scooter rules and regulations and providing better parking provision to help cities avoid cluttering issues. These are two investments that clearly need to be addressed for e-scooters to be more acceptable.

To extend our understanding beyond descriptive and crosstabulation statistics we performed a binary logistic regression including all the seven e-scooter qualities and two policy perceptions illustrated in Figs. 1 and 2 respectively plus age and driver license demographics. We chose this robust analytical tool to forecast cumulative odds for distinct groups of variables, predicting the dependence levels between a series of key variables, untangling, and justifying the relationship and dynamics between selected assumptions. The choice of the binary model was dictated by our two-valued dichotomous dependent variable that was usage (users vs non-users). The underpinning hypothesis that is tested by the survey suggests that people's choice to use or not use e-scooters is defined to a considerable degree by their key perceptions regarding e-scooter potential qualities as illustrated in Fig. 1, their stance about the needs for clearer regulation and improved parking provisions as illustrated in Fig. 2 and individual background characteristics namely age and being holders of a driving license or not.

We tested for multicollinearity via nonparametric correlation testing using Kendall's tau-b (τb) correlation coefficient and we found that our independent variables are not highly correlated and could be used in the same model. We also calculated the Variance Inflation Factor (VIF) to double-check the severity of multicollinearity in regression analysis; no value exceeded 4 when for collinearity to be unacceptably high we need a VIF value close to 10. The reported model has a high R^2 that allows the extraction of useful and generalisable points.

According to the model's results (see Table 2) the most important statistically significant factors impacting on use are age, holding a driver license and perceptions about e-scooters being economic and pleasant. Perceptions about e-scooter being healthy and in need of better parking provision yielded statistically significant results for some categories of answers. Age had the most powerful and easy to read impact on usage; the younger the group the more likely its members to be e-scooter users. There was only one exception in this rule; the 55–64 year-olds and 45–54 year-olds had reverse results. People holding a driving license were more likely to use e-scooters. The perception about e-scootering being economic was impactful as well; although there is no clear trend the one given is that people strongly agreeing that e-scooters are economic were significantly more likely to self-describe as users. Similar results were recorded for the variable referring to e-scooters being pleasant; people that strongly agreed to that were more likely to be users than other respondents. Surprisingly, the people strongly agreeing that e-scooters can be healthy, were more unlikely than other groups to use them. This is a paradox that can be further explored. People strongly agreeing that parking needs better provision, were in principle, less likely to be users; to be a user, quite possibly, one needs to think that parking is to a degree available even if there are expectations for more and better parking conditions. Perceptions about safety, eco-friendliness, regulation clarity, convenience and speed yielded back results that were primarily not of statistical significance.

5. Discussion

The rise of the e-scooter as an emerging mobility mode, has triggered extensive discussions on their operations, use and fit in built environments (Ma et al., 2021). Developing a better understanding of their reputation and the narrative behind this, as a factor reflecting and affecting their image and their capacity to be incorporated effectively and benefit our urban landscape is crucial. Studying the acceptance of the local populations exposed to their use and the thematic agendas that may underpin this for users and non-users is equally important. These are areas, that despite a wealth of emerging research on e-scooters, are still understudied and misunderstood (Christoforou et al., 2021; Gössling, 2020; Mitra & Hess, 2021; Tuli et al., 2021).

Our mixed method approach provides numerous revealing findings that, if synthesised, describe accurately the current e-scooter

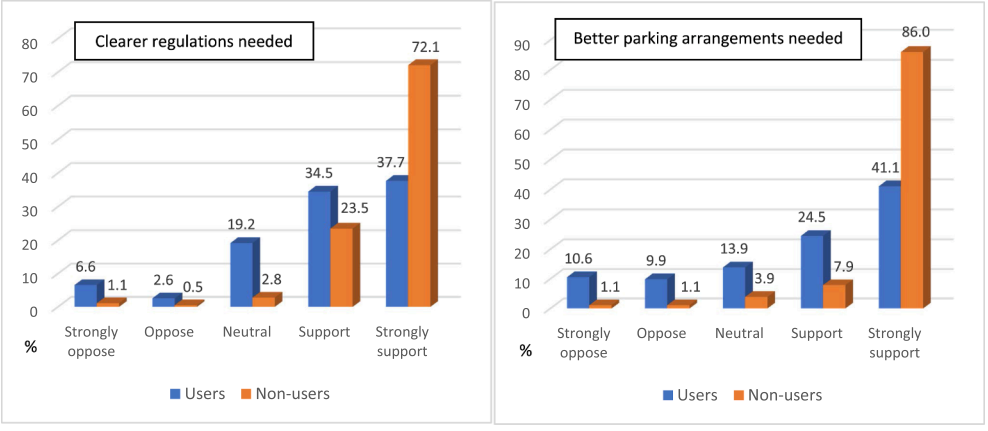

Fig. 2. Perceptions of users and non-users about e-scooter regulation and parking needs.

Table 2
Binary Logistic Regression: E-scooter usage vs key e-scooter attitudes.

Variables		Estimate	Std. Error	Wald	df	Sig.	95 % Confidence Interval	
							Lower Bound	Upper Bound
Threshold	Usage	−0.825	1.475	0.313	1	0.576	−3.716	2.065
Location	Age: 18–24	−5.626*	1.645	11.691	1	0.001	−8.851	−2.401
	Age: 25–34	−3.601*	1.101	10.705	1	0.001	−5.758	−1.444
	Age: 35–44	−2.691*	1.104	5.945	1	0.015	−4.854	−0.528
	Age: 45–54	−1.820**	1.020	3.183	1	0.074	−3.820	0.180
	Age: 55–64	−2.416*	1.086	4.951	1	0.026	−4.543	−0.288
	Age: 65 and over	0[a]			0			
	Licence: Yes	−1.065*	0.529	4.047	1	0.044	−2.103	−0.027
	Licence: No	0[a]			0			
	Fast: SD	−1.811	1.110	2.658	1	0.103	−3.987	0.366
	Fast: D	−0.636	1.051	0.366	1	0.545	−2.696	1.424
	Fast: N	−1.829**	1.003	3.324	1	0.068	−3.794	0.137
	Fast: A	−0.398	0.950	0.175	1	0.675	−2.259	1.464
	Fast: SA	0[a]			0			
	Convenient: SD	3.169*	1.178	7.244	1	0.007	0.861	5.477
	Convenient: D	0.811	1.163	0.486	1	0.486	−1.468	3.090
	Convenient: N	1.195	1.109	1.161	1	0.281	−0.978	3.368
	Convenient: A	1.151	1.039	1.227	1	0.268	−0.886	3.188
	Convenient: SA	0[a]			0			
	Safe: SD	3.055	2.089	2.139	1	0.144	−1.039	7.148
	Safe: D	3.605**	2.106	2.929	1	0.087	−0.524	7.733
	Safe: N	2.512	2.041	1.515	1	0.218	−1.488	6.511
	Safe: A	2.980	1.957	2.318	1	0.128	−0.856	6.816
	Safe: SA	0[a]			0			
	Healthy: SD	−4.121	2.588	2.535	1	0.111	−9.194	0.952
	Healthy: D	−5.741*	2.653	4.683	1	0.030	−10.940	−0.541
	Healthy: N	−6.187*	2.664	5.395	1	0.020	−11.408	−0.966
	Healthy: A	−4.695**	2.832	2.749	1	0.097	−10.246	0.855
	Healthy: SA	0[a]			0			
	Pleasant: SD	2.134**	1.231	3.006	1	0.083	−0.278	4.547
	Pleasant: D	2.491**	1.277	3.807	1	0.051	−0.011	4.994
	Pleasant: N	2.154**	1.200	3.223	1	0.073	−0.198	4.506
	Pleasant: A	2.455*	1.212	4.102	1	0.043	0.079	4.831
	Pleasant: SA	0[a]			0			
	Economic: SD	3.289*	1.646	3.990	1	0.046	0.062	6.516
	Economic: D	4.605*	1.742	6.984	1	0.008	1.190	8.019
	Economic: N	3.627*	1.619	5.019	1	0.025	0.454	6.800
	Economic: A	3.955*	1.752	5.097	1	0.024	0.522	7.389
	Economic: SA	0[a]			0			
	Eco-friendly: SD	−0.742	0.935	0.630	1	0.428	−2.573	1.090
	Eco-friendly: D	−0.503	0.951	0.279	1	0.597	−2.366	1.361
	Eco-friendly: N	−1.631**	0.929	3.080	1	0.079	−3.452	0.191
	Eco-friendly: A	−0.613	0.937	0.428	1	0.513	−2.450	1.224
	Eco-friendly: SA	0[a]			0			
	Regulation Clarity: SD	−1.196	1.398	0.732	1	0.392	−3.935	1.544
	Regulation Clarity: D	1.974	1.631	1.465	1	0.226	−1.222	5.170
	Regulation Clarity: N	−1.480*	0.747	3.924	1	0.048	−2.943	−0.016
	Regulation Clarity: A	−0.183	0.452	0.164	1	0.685	−1.070	0.703
	Regulation Clarity: SA	0[a]			0			
	Better Parking: SD	−1.599	1.050	2.320	1	0.128	−3.657	0.459
	Better Parking: D	−3.314*	1.059	9.788	1	0.002	−5.390	−1.238
	Better Parking: N	−1.212	0.766	2.502	1	0.114	−2.713	0.290
	Better Parking: A	−1.514*	0.559	7.334	1	0.007	−2.609	−0.418
	Better Parking: SA	0[a]			0			

N = 330, Model chi-square = 307.088; $p < 0.05$, −2log likelihood = 216.748, Nagelkerke Pseudo $R^2 = 0.661$.
SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree.
* statistically significant results for $p < 0.05$^**statistically significant result for $p < 0.1$.
[a] This parameter is set to zero because it is redundant.

narrative in Sweden from a media, user and non-user perspective. On the one hand, our discourse analysis of news items from three credible media indicates clearly that the reputation of e-scooters as described by the Swedish press on a daily basis is quite negative altogether with only sporadic exceptions. The study of Lipovsky (2021) based on the analysis of French media e-scooter reports conducted at an earlier stage of their emergence and for a shorter span (i.e., between 2018 and 2019) yielded similar results with ours; there were four times as many negative evaluations as positive ones in the French press and harsh criticism to the authorities about scooter-generated dysfunctions.

On the other hand, our quantitative survey that was administrated in the cities of Stockholm and Gothenburg, the two Swedish localities with the most exposure to e-scootering and active efforts to regulate it, suggests that users and non-users, in most cases, differ dramatically on how they perceive e-scooters. However, the same findings identify that there is at least some ground for achieving a degree of consensus about a number of key qualities underpinning e-scooters that if addressed or promoted adequately can support their improved integration in the urban fabric of Swedish cities and beyond.

The key themes that emerged from the discourse analysis, namely: *cityscape fit; traffic safety and irresponsible user behaviour; rules, regulations and exploits; business; sustainability; and convenience* were somewhat expected and have been explored mostly independently from one another to some extent by the literature. For example, *cityscape fit* issues around parking and cluttering (see James et al., 2019; Zakhem & Smith-Colin, 2021); *traffic safety* and accident analysis (see Dozza et al., 2022; Stigson et al., 2021) and *irresponsible user behaviour* (see Haworth & Schramm, 2019; Haworth et al., 2021b); *rules, regulations and exploits* (see Ma et al., 2021; Sokolowski 2020); *business* and management (see Degele et al., 2018; Štraub & Gajda, 2020); *sustainability* and environmental issues (see Hosseinzadeh et al., 2021; Wang et al., 2021) and *convenience* or reliability (see Altintasi & Yalcinkaya, 2022; Cao et al., 2021). Nevertheless, some critical knowledge gaps still remain for each of these themes, while our study also highlights the need to see them as interdependent thematic areas that when combined together are morphing the reputation of e-scooters. This analysis enabled us to come up with five key problems that are the root of bad reputation of e-scooters in Sweden (see end of Section 4.1) and should be the questions that need to be addressed by authorities so that e-scooters become more functional and popular for all. These are ultimately five plausible research directions for future research.

Our statistical analysis allowed us to compare this reputation with the real-life perceptions of e-scooter users and non-users as collected and analysed from our complementing survey study. Seven perceived qualities of e-scootering were tested about its ability to provide services characterised as: *safe; fast; eco-friendly; economic; convenient; pleasant; and healthy.* Our results showcase that users were consistently more likely to give a much more favourable assessment of e-scooters than non-users who were, in line with the literature (e.g., Buehler et al., 2021; Raptopoulou et al., 2020), much more reluctant to be positive towards them. Even users however, identified through their answers traffic safety, cost and the health-enhancing properties of e-scooters as potentially problematic. Traffic safety and cost have been highlighted before as barriers for e-scooter use or issues of concern by users (e.g., Almannaa et al., 2021; Nikiforiadis et al., 2021) but health and wellbeing related issues hardly ever; even if there have been empirical concerns that e-scooter use could lead to healthy lifestyle degradation in case these create modal shift from more active travel forms (Nikitas, 2023). This means that indirectly our users could be admitting to some degree that they are replacing walking and cycling (i.e., healthier trips) with e-scooter rides, something aligned with the literature (Laa & Leth, 2020). The same issue could be underpinning the e-scooter perceived eco-friendliness results, which are balanced with an average value close to neutral for users but overwhelmingly negative for non-users. Only this time the polluting problems of batteries (Leurent, 2022) could be an even more critical part of this evaluation's rationale. Users, however, are very positive in their evaluations when it comes to e-scooters providing fast, convenient and pleasant services. These three are the perception categories where non-users showcase some level of sympathy towards e-scooters and could be a common ground of understanding that e-scooters, if properly managed and marketed, could potentially have some merits in the city level recognised by all.

Although perceptional differences are evident between users and non-users (the latter are far more likely to demand policy changes) when assessing via the questionnaire the two discourse themes referring to urban space fit and regulations there are also similarities. Both users and non-users are more likely, than not, to assign the need for extra effort in building and disseminating clearer e-scooter rules and regulations and providing better parking allowance that could resolve cluttering issues. This is an important directive for policy-making and city planning that needs further investment and care.

On top of this analysis, the binary logistic regression model designed to explain the two-valued dependent variable of usage (user or non-user) enabled us to understand better the significance and the interdependencies of these perceived qualities since they were used as independent variables. There were a few important statistically significant results that can be useful for the two cities and others with similar characteristics that need discussing.

Younger people tend to self-describe themselves as e-scooters users more than older people unsurprisingly. This is in line with the literature (e.g., Dozza et al., 2022; Raptopoulou et al., 2020; Wang et al., 2022). Although from the very ergonomics of this mobility vehicle and its techno-centric operations (e.g., access heavily dependent on app use) it is clear that this is a mode that will always be more popular to younger populations, efforts can be invested in making this a safer, more easily accessible and less intrusive intervention. These efforts could make the e-scooter more acceptable by older audiences even if they will never use it. Investing in educating people of every age to access and operate them could diminish the perceptual barrier of technofear and make technophilia, a factor reported by Vallejo-Morales et al. (2021) as a key acceptance parameter, less important. People with a driving license are also more likely to be users than those who do not possess one. So, training and familiarisation with the concept of driving can support e-scooters' value as a usable mode.

The perception about e-scooters being economic was particularly impactful in the usage decision. Cost is a key deterrent in using them (Nikiforiadis et al., 2021) as it is for every transport intervention. Campisi et al. (2022) reports, for the context of Italy, that from a long list of e-scooter motivators 'spending less' is the second least chosen option with a mere 24 % approval; only the answer 'because it is safe' got a lower positive response. E-scooters in Sweden can be quite expensive so more affordable price tarrifs and a wider choice of subscriptions and reductions could make this less of a concern for potential riders. Making deals for integrating these services in the public transport smartcard programmes can help making e-scooters more economic for users and financially viable for their operators.

One of the authentic and loud messages of this work refers to e-scooters' perceived value of being pleasant. Our respondents that strongly agreed to this premise were more likely to be users than all the other respondents. Guo and Zhang (2021) reported that e-scooters can be preferred by road users because they can be faster, more convenient, and fun to ride. Weschke et al. (2022) also noticed

that 'more fun' can be associated with willingness to approve and use e-scooters. So fun, or in our context pleasure, is a key motivation factor that even non-users, to some degree, recognise. There should be a clarification that pleasure does not translate to the purpose of the trip *per se* (i.e., a leisure or recreational trip); a utilitarian trip can be fun too. Sanders et al. (2020) reports that over 70 % of the local e-scooter riders they surveyed stated that they most frequently used them for transport, rather than recreation and they ride them for reasons of speed, reliability, convenience but also fun. Their ability to provide fun and pleasant experiences, while being a real mode and not a 'toy' is therefore a quality of e-scooters that should be emphasised further and supported by urban design from local planners and mobility providers.

Surprisingly, the people strongly agreeing that e-scooters can be healthy, were more unlikely than other groups to use them. This is a paradox that should be further explored. Our educated guestimate, based on our work, is that some of the users simply compared them in their assessment with walking, which is a healthier alternative. The literature is divided when it comes to e-scooters and health and has very different angles too. According to Jiao et al. (2022) health-related characteristics such as crude prevalence of arthritis, diabetes, and obesity were found to be important predictors for e-scooter trips. On the other hand, Cano-Moreno et al. (2021) concluded that for a common e-scooter and a road profile with a good roughness level, a velocity of 16 km/h starts to be uncomfortable, and 23 km/h could be harmful for health, even for short trip durations. 'Healthy' is therefore a complex to assess e-scooter quality.

People strongly agreeing that parking for e-scooters should be enhanced, were in principle, less likely to be users. Finding easier parking has been reported to actually be a reason for people to switch from cars to e-scooters (Gebhardt et al., 2021) so that result makes sense. Users tend to see the glass half full and concentrate on the 'easier' parking availability rather than on the public space aesthetics and cluttering effects that non-users, in absence of enjoying the parking perspective users do, tend to focus on. The mixed results (no linear trend to usage according to the agreement level) however show that many users themselves do appreciate the cityscape problems that unregulated, arbitrary and careless e-scooter parking creates. E-scooters in Sweden are not registered vehicles, and therefore one cannot be fined for parking them incorrectly. Geofencing is used to stop them from being parked in certain areas. Gothenburg has introduced dedicated parking spots for them. Parkeringspatrullen is an initiative devised by them to support efforts enabling (and forcing) users to park them appropriately (not left in the ground for instance or in front of bike-sharing stations impeding their use). A solution we see, for controlling parking issues, is providing designated e-scooter parking slots next to all public transport stops.

Perceptions about safety, eco-friendliness, regulation clarity, convenience, speed yielded back results that were not always statistically significant. However, all of them are agendas, especially the three first ones, that have been also identified as reputation-defining themes by the discourse analysis; they are of particular importance and should not be relegated to non-issues. Traffic safety, the most notorious acceptance barrier according to the literature (e.g., Fitt & Curl, 2020; Yang et al., 2020) has to be improved and the new Swedish legislation seems to lean towards this direction with its stricter regulations for the use of these microvehicles (e.g., pavement use and parking are forbidden). Investment in infrastructure and training for e-scooter users and non-users should be also provided.

Their environmental appeal should be also rebranded if they are to become more attractive and reputable; Useche et al. (2022b) mentions e-scooter's "environmentally friendly" features (e.g., low-polluting vehicle with car substituting potential) as a source of competitive advantage. Rules and regulations pushing for user behavioural change including mandatory training, helmet wearing, and less arbitrary parking combined with better policing could make e-scooters more acceptable by non-users and the press. Inappropriate or rushed implementations and over-supply that may disturb the harmonic coexistence of e-scooters with other travel modes should be avoided at any cost (Latinopoulos et al., 2021); this is a reputation-breaker potentially.

Fast and convenient services both mentioned in other studies in the same breath with 'pleasant' as motivational factors for e-scooter adoption by their users (e.g., Sanders et al., 2020; Guo & Zhang, 2021) should be, according to our work, a consistent and unified tripole for promoting, advertising and branding these vehicles in light of the fact that this is a message relatively accepted even by non-users. Finally, since perceptions about e-scooter systems were found to be more positive among non-riders after a system's launch (Buehler et al., 2021), pilot projects or providing more time, investment and support to existing schemes, may improve public perceptions of e-scooters.

6. Conclusions

E-scooters, a potentially powerful disruptor and alternator of the urban mobility landscape today (McQueen & Clifton, 2022), creates a need for municipalities across the globe to understand their deployment so that they can capture some of the benefits that these devices provide but also mitigate the impact and risks associated with their use (Riggs et al., 2021). This paper contributes to this effort by contextualising the current reputation of e-scooters in Sweden as depicted by the local press and as analysed via an attitudinal survey that ran in Stockholm and Gothenburg with a balanced sample between e-scooter users and non-users.

The bad reputation of e-scooters, that is currently articulated by the local media, where there is approximately one positive e-scooter portrayal for every five negative ones, and one neutral portrayal for every three negative ones, may influence especially non-users to be reluctant not only towards their usage but towards their very existence. Our work provides statistical evidence that there are significant differences in the evaluations of users and non-users when it comes to seven perceived e-scooter qualities (*safety; speed; eco-friendliness; cost; convenience; fun;* and *health & wellbeing)* and two policy practicalities (*regulations clarity;* and *parking provision*). Safety, health, eco-friendliness and cost can be major acceptability barriers for the non-user group but are at the same time factors that even users see as potentially problematic. These are all key areas for reform and image reshaping. Clarity in policy-making and legislation and better parking provision are seen by both groups as key parts of this effort. On the other hand, e-scooters have a much better

reputation as providers of fast, convenient and pleasant mobility services; even a substantial minority of non-users recognised these as qualities of e-scooters. Thus, we conclude that this triad could be the starting point for promoting more effectively e-scooters.

The bad reputation of e-scooters could lead to banning them from cities, introducing measures to limit further their numbers and regulating their use and parking so heavily that they will 'lose' their fun identity. This may be a problem as their flexible services could be part of the transformation away from a car-dependent society. By providing novel first and last-mile trip services, of 1.6 km on average in both Gothenburg and Stockholm, e-scooters could deter to some degree motorised traffic. This is because it is quite likely that even if people taking part in studies do not admit this, in their absence, they would actually use car-centric services instead (Sanders et al., 2020).

As in every study with a social science context, we need to acknowledge that this one also has some limitations. In an ideal world, with infinite resources we could have read all the 12,500 news articles that have been written in the entire Swedish press industry for e-scooters. However, since our systematic approach was primarily qualitative we are confident that the corpus identified and analysed is representative of the true Swedish media narrative. Also, we acknowledge that as discourse analysts we naturally made assumptions about how audiences read, comprehend and interpret texts when different audiences may understand texts differently; even evaluating, as we did, the way the authors of the news items intended to report on e-scootering (i.e., positive, neutral and negative) could include some bias. Having been self-reported, the data of our survey may be contingent on certain biases that cannot be measured like response bias and social desirability bias. Our convenience sampling could also have an element of bias (i.e., volunteer or self-selection bias). We have to acknowledge that our user/citizen-centric approach, primarily based around acceptance aspects, is only part of the complete narrative picture; policymakers' decision-making, that ideally should be well-aligned with the general public's choices and priorities, can be sometimes disproportionally affected by certain key agendas and especially traffic safety in this particular case.

Finally, when it comes to identifying future research pathways, our work opens up further the e-scooter dialogue in a number of ways. Our discourse analysis has established five areas raising problems for e-scooters' reputation and city functionality that can be further explored. These refer to e-scooters' potential for: cluttering the cityscape via irresponsible parking; being a source of safety hazards while being ridden or parked; being inadequately or unclearly regulated; being badly managed; not being or considered sustainable. Our survey also creates research questions about the health-centric qualities of e-scooters and how these are exactly perceived by users and non-users and about the way with which cost, a key deterrent for the willingness to use e-scooters could be reduced or be seen as an improvement over what people usually neglect to consider, the car use cost for equivalent travel. Also, future research could help in understanding e-scooters and their synergetic or substitutional relationship with public transit better so that transport stakeholders could provide more integrated and cost-effective solutions for both.

CRediT authorship contribution statement

Pontus Wallgren: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Oskar Rexfelt:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Alexandros Nikitas:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

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

Data availability

The data that has been used is confidential.

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