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ORIGINAL RESEARCH

Exploring the potential of shared electric vehicles from e-mobility hubs as an alternative for commute and food shopping trips

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Abstract
Electric shared mobility hubs, called eHUBs, offer users access to a range of shared electric vehicles, including e-bikes, e-cargobikes, and e-cars. Through the diversity of modes offered, eHUBs provide mobility solutions for different target groups and trip purposes. In this study, potential users' willingness to use shared electric vehicles from eHUBs as either a commute or food shopping trip alternative was analysed using logistic regression methods. Results indicated that half of respondents were willing to use shared electric vehicles for at least a few of their regular commute or food shopping trips, although this proportion dropped substantially if considering the use of shared vehicles in combination with public transport. Across modes and trip purposes, holding a pro-shared mobility attitude and belonging to the youngest age group strongly increased the willingness to use shared modes. Yet, while eHUBS may offer a potential alternative for at least some of people's regular commute or food shopping trips, cross-mode shifts may be limited. That is, car drivers show a greater interest in shared e-cars, whereas cyclists show a greater interest in e-bikes and e-cargobikes with public transport. Further influential factors, as well as implications for both shared mobility providers and local authorities, are discussed.

1 | INTRODUCTION

In order to decrease traffic congestion, air pollution, and noise pollution in cities, shared mobility is gaining increased attention from local authorities worldwide [1]. Shared vehicles including bicycles, cars, and scooters, have the potential to reduce trips by private car or delay car dependence until later in life, while acting as a first- and last-mile alternative for public transport modes [2–4]. Based on initial estimations by Ciari and Becker [5], as little as one quarter of the current vehicle fleet would be sufficient to meet current travel demand if shared.

In addition, if electric, shared vehicles can also have a direct impact on emissions, yet only if substituting trips by private petrol or diesel car [6]. Therefore, electric mobility hubs (eHUBs) aim to offer citizens access to a variety of shared electric vehicles including shared e-bikes, e-cargobikes, e-cars and, in the future, possibly e-scooters (see Figure 1), which can be rented on an as-needed basis [7, 8]. By providing access to several shared mobility options, eHUBs can serve different target groups and situation-specific needs and thus may facilitate multimodal transport. Mobility hubs can also increase the catchment area of public transport and serve as focal points for accessing goods and services [9]. As suggested by Rongen et al. [10], however, mobility hubs require an integrated mobility system to improve the user experience and reduce the transfer burden if they are to be adopted on a large scale.

As the evidence concerning the use of shared vehicles for different trip purposes is still relatively scarce, in this study, we aim to determine the most influential attitudinal, demographic, and travel behaviour related factors in considering the use of shared electric vehicles from eHUBS to act as an alternative for people's regular commute or food shopping trips. The shared electric modes being considered in this study include shared electric cars and shared e-bikes or e-cargobikes, thus providing a choice of at least two shared electric alternatives to potential users. This will inform the potential of eHUBS to facilitate multimodal trips instead of the private car among current non-users of shared mobility.

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FIGURE 1 Example of shared electric modes that may be accessible via eHUBS.

1.1 | Literature review

To date, there has been a wealth of research identifying the factors that may increase the uptake of shared mobility options, mostly bike or car sharing (see Table 1).

With regard to e-bike (including e-cargobike) sharing, it has been found that a range of recurring demographic factors, such as age, gender, income, and education, tend to be associated with bike sharing usage or intention [6, 11, 14, 15, 17, 22]. For instance, in their review of shared e-mobility services, Liao and Correia [6] conclude that shared mobility users are mostly male, middle-aged, and tend to have higher levels of income and education (see also [23]). Similarly, Ko et al. [22] report that gender, car ownership, and education tend to influence shared mobility usage.

With regard to car sharing, several parallels to bike sharing can be observed. In particular, car sharing tends to be especially attractive to younger people without cars, or those who already have one car available in their household [18]. Social and attitudinal factors have also been shown to be decisive for the intention to use e-car sharing. Those with pro-environmental worldviews generally hold a more positive attitude towards EV sharing which, in turn, is a significant predictor of adoption intention [19]. In addition, recent research by Curtale et al. [20] suggests that social influence is a significant predictor of intention, whereas car ownership proves to be detrimental to car sharing use intention. Similar to bike sharing, car sharing tends to be used for shorter trips (see [6, 21]), although the rental time for shared car trips tends to be longer as opposed to covering the same trip by bicycle [21].

Surprisingly, however, none of the reported studies focused on or even included trip purposes, which is why the current study has the specific objective of exploring the influential factors in considering shared electric vehicles as either a commute or food shopping trip alternative. Shared e-bikes and e-cars, for instance, can serve as a regular commute trip alternative, whereas e-cargobikes are particularly suited to transporting goods, such as groceries. Although in the literature various trip purposes tend to be considered (e.g. visiting friends or relatives, going out, shopping), especially in relation to private car use (e.g. ref. [24]), the present study focuses on substituting commuting and food shopping trips, as these trips are usually the most frequent. With regard to mode substitution, it has been shown that bike sharing does not automatically translate into the substitution of trips by private car. Bieliński et al. [12], for instance, report that shared electric bikes do not function as a substitute for car trips, but are more likely to substitute public transport trips instead. Similarly, research conducted by Ma et al. [13] suggests that bike sharing users not only reduce private car use, but also reduce walking, as well as private bicycle and public transport use. An important observation is also made by Handy and Fitch [25], whose research suggests that, before even being considered as a commute trip alternative, (e-bike) sharing systems first need to create awareness of e-bikes. Overall, the findings are more promising for e-cargobikes, which due to their capacity of carrying goods, are more versatile as a non-car alternative [16].

The research presented here elaborates on these findings by determining whether shared electric vehicles, as provided via eHUBs, can serve as a suitable alternative for people's commute or food shopping trips and which existing modes, if any, they are likely going to replace. To this end, data from an existing survey of the eHUBs project was analysed, as further explained in the following section.

TABLE 1 Factors influencing mode substitution based on previous literature.

Study	Shared mode	Predictors / Relevant findings
Barbour et al. [11]	Bike	Gender, age, income, household size, commute type and length, and vehicle ownership all played significant roles in bike-sharing usage and modal substitution decisions.
Bieliński et al. [12]	Bike	Electric bike rides did not act as a substitute for car trips. Shared e-bikes were used by residents as a substitute for public transportation or as a first/last mile of transport to/from public transportation stops.
Ma et al. [13]	Bike	Bike-sharing users reduced walking, the use of private bicycle, bus/tram, and car. Male and multimodal commuters are more likely to use dockless bike-sharing.
Martin and Shaheen [14]	Bike	Common attributes associated with shifting toward public transit (as a result of bike sharing) include increased age, being male, living in lower density areas, and longer commute distances.
Ye et al. [15]	Bike	Age and income are negatively associated with bike-sharing usage; the transfer distance (about 1 km), owning no car, students, and enterprises are positively associated with usage; weather and travel distance have a significant negative impact on mode shifting.
Becker and Rudolf [16]	Cargobike	Results show that 46% of respondents maintain that they would have made the trip by car in the absence of a cargo-bike-sharing operator, indicating the high potential of cargo-bike-sharing to reduce car usage.
Dorner and Berger [17]	Cargobike	Men, well-educated people, and cyclists are particularly interested in cargobikes and cargobike-sharing.
Burghard and Dütschke [18]	Car	Carsharing with EVs is particularly attractive for younger people who (i) live as a couple but without cars or (ii) are starting a family and use carsharing as a supplement to their own cars.
Buschmann et al. [19]	Car	Attitude offers the strongest predictor of intention to use electric carsharing. Consumers who are concerned about the environment possess a more positive attitude towards electric carsharing.
Curtale et al. [20]	Car	Social influence represents the most important driver of behavioural intention, followed by performance expectancy and personal attitude […], while car ownership has a negative indirect effect on intention.
Liao et al. [2]	Car	Around 40% of car drivers indicated that they are willing to replace some of their private car trips by carsharing, and 20% indicated that they may forego a planned purchase or shed a current car if carsharing becomes available near to them.
Sprei et al. [21]	Car	FFCS services are mainly used for shorter trips with a median rental time of 27 min and actual driving time closer to 15 min […]. Rental times are generally shorter than equivalent walking time but longer than cycling.
Liao and Correia [6]	Car, bike, and scooter	Shared e-mobility services are mainly used for short trips, and their current users are mostly male, middle-aged people with relatively high income and education.
Ko et al. [22]	Shared mobility services	Gender, car ownership, and education, among variables reflecting socio-demographic characteristics, have significant effects on intention to use shared mobility.

2 | METHOD

2.1 | Survey design and measures

The eHUBs survey used in the current study was primarily targeted at current non-users of shared mobility to gauge their interest into shared electric mobility. It was conducted between March and December 2020 before the implementation of eHUBs in seven pilot cities. Below, only the questions and variables of interest to this study are presented.

2.1.1 | Dependent variables

Two separate questions were used to establish current non-shared mobility user's willingness to use shared electric vehicles from an eHUB as a regular commute or food shopping trip alternative, given that these alternatives were available in their city, as they had not yet been implemented at the time of data collection. Respondents were asked to choose between shared e-cars (both trip purposes), e-bikes (only commute), and e-cargobikes (only food shopping), in combination with public transport or not, as an alternative, totalling eight shared mobility options or four per trip purpose, respectively. Responses were analysed in the form of two categories—'*would not use*' versus '*would use for at least a few trips*', with the former category being used as the reference group in subsequent analyses—drawing a clear distinction between potential users and non-users.

2.1.2 | Independent variables

A combination of attitudinal, socio-demographic, and travel related variables were used to predict respondents' choices of commute and food shopping trip alternatives using binary logistic regression (Table 2). As most predictor variables were categorical in nature, dummy variables were created (i.e. $n-1$

TABLE 2 Independent variables entered into logistic regression using the forward method.

Independent variables	Categories	Reference group
Attitudinal		
Pro shared mobility	Standardised object score (from CATPCA)	-
Pro-environment	Standardised object score (from CATPCA)	-
Pro-barriers	Standardised object score (from CATPCA)	-
Socio-demographic		
Age	18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74 (years)	75 or older
Gender	Male, Female	Other
Country	Belgium, France, Germany, Netherlands, United Kingdom	Other
Total number of adults in household	2, 3, 4 or more	1
Total number of children in household	1, 2, 3 or more	0
Education level	No school education, School education, Professional qualification, University degree	Prefer not to say
Gross annual household income	<£20,000, £20,000–39,999, £40,000–59,999, £60,000–79,999 £80,000–99,999, >£100,000	Prefer not to say
Current occupation	(1) In education/training: Secondary school education, Apprenticeship/Traineeship, Part-time student, Full-time student (2) Employed: Part-time employed, Full-time employed, Self-employed (3) Not employed: Unemployed, Retired from work, Home/family as primary role	Other
Travel related		
Driver's licence	Yes	No
Commute trip satisfaction	0–100 continuous Likert scale	-
Commute distance	1–5, 6–10, 11–15, 16–20, 25–45, 50–70, 75–95, 100 or more (km)	<1 km
Commute frequency	2–3 times per month (tpm), 1–2 days per week (dpw), 3–4 dpw, 5 dpw or more	Once per month or less
Food shopping distance	1–5, 6–10, 11–15, 16–20, 25–45, 50–70, 75–95, 100 or more (km)	<1 km
Food shopping frequency	2–3 times per month (tpm), 1–2 days per week (dpw), 3–4 dpw, 5 dpw or more	Once per month or less
Traveller identity	Car driver, cyclist, public transport user, multimodal user	Walker
Private motorised transport Cycling for transport Walking for transport Public transport	Once per month or less, 2–3 times per month (tpm), 1–2 days per week (dpw), 3–4 dpw, 5 dpw or more	Never nowadays
Number of cars/bicycles/cargobikes/scooters, mopeds, or motorbikes available in the household	1, 2, 3 or more	0

dummy variables per variable where *n* equals the number of categories) and appropriate reference groups were chosen.

Attitudinal components were derived via a Categorical Principal Component Analysis or CATPCA (i.e. the equivalent of Principal Component Analysis for ordinal data) of 20 attitudinal statements, measured on a 7-point Likert scale (1—strongly disagree to 7—strongly agree). Similar to conventional PCA, CATPCA reduces the dimensionality of a data set by producing a number of uncorrelated principal components, yet it does not assume linear relationships between the variables, as it allows variables to be nominal or ordinal (i.e. non-linear). While PCA is often erroneously applied to Likert scale type data, which it treats numerically, the advantage of CATPCA is that it can treat Likert scale type data ordinally and hence at its appropriate measurement level [26]. Based on a review of previous literature, 20 statements were created to reflect attitudes towards car use, the environment, and shared mobility (see also **Table 5**), all of which may have a potential impact on an individual's intention to adopt novel shared mobility services [27]. Several items were derived based on Everett Rogers' Diffusion of Innovation (DOI) Theory [28] to measure people's attitudes towards the innovation (e.g., the relative advantage of renting shared [L]EVs

TABLE 3 Recommended sample size for each eHUBS pilot city.

City	Population	5% error	Achieved sample (*n*)
Amsterdam	1,157,519[a]	385	466
Manchester	576,500[b]	384	368
Nijmegen/Arnhem	172,000[c] / 162,477[d]	384	267
Leuven	102,275[d]	383	405
Kempten	69,151[d]	383	303
Dreux	30,664[d]	380	255

[a]https://worldpopulationreview.com/world-cities/amsterdam-population.
[b]https://secure.manchester.gov.uk/info/200088/statistics_and_intelligence/438/population.
[c]http://population.city/netherlands/nijmegen/.
[d]Retrieved in March 2020 from citypopulation.de.

from eHUBS compared to other mobility options or perceived compatibility with mobility needs), which may influence uptake. The remaining attitudinal items were based on Ajzen's Theory of Planned Behaviour (TPB; ref. [29]), measuring people's intention to adopt eHUBs, perceived behavioural control, and subjective (or social) norms.

Travel related factors included items such as the possession of a driver's license, frequency of use of four major transport modes (i.e. walking, cycling, private motorised, and public transport), as well as traveller identity (e.g. identifying oneself as a car driver or cyclist), which has been shown to be associated with both stated intentions and self-reported travel behaviour [30]. For respondents' regular commute trips, an additional measure included commute trip satisfaction which was measured on a 0–100 continuous Likert-scale ranging from 0—very dissatisfied to 100—very satisfied.

2.2 | Participant sample

Data were collected from seven pilot cities across Europe, where mobility hub solutions with shared electric vehicles are being implemented and researched as part of the EU-funded eHUBs project. Please note that, due to their geographical proximity (10 miles or about 16 km), the cities of Nijmegen and Arnhem are considered as one city/region. The recommended sample size for each city was determined by using the sample calculator proposed by Ortúzar and Willumsen [31].

$$n = \frac{p(1-p)}{\left(\frac{e}{Z}\right)2 + \frac{p(1-p)}{N}}$$

where

p = proportion or incidence of cases. Assuming worst case scenario, $p = 0.5$

e = value of error in result; 10% error = 0.1, 5% error = 0.05

z = standardised score for level of confidence; $z = 1.96$ is used for 95% confidence level

N = total population being studied

Table 3 presents the recommended and achieved sample sizes, where 5% error stands for a 95% confidence level, meaning that in 95% of cases the sample is expected to accurately reflect the population from which it was drawn.

In total, 2540 respondents completed the online questionnaire. Some participants did not complete all survey sections (n = 47, 2%) and thus had to be removed for further analysis, leaving a final sample size of 2493 respondents. The majority of respondents were recruited from the seven eHUBs pilot cities (n = 2064, 83%), whereas the remainder reported living in different cities which were, however, located in one of the five target countries (n = 414, 17%). The latter group of respondents was retained for the analysis as the survey was targeted broadly at current non-users of shared mobility and took place before the implementation of eHUBs. The online survey was distributed via each city's own distribution channels (e.g. email lists, newsletters, social media), whereas respondents in the two largest pilot cities (i.e. Amsterdam and Manchester) were recruited via a polling agency (n = 834 or 33%) and hence showed greater representativeness of the population in these cities.

As the recommended sample size could not be achieved for all seven pilot cities, respondents were grouped by their country of residence instead (i.e. Belgium, France, Germany, The Netherlands, and the UK). Demographic data for participants are provided in Table 4. Please note that all demographic questions were optional; hence, totals may not always add up to the full sample size. Finally, the number of adults in the household refers to persons equal to or older than 18 years, whereas the number of children in the household refers to persons less than 18 years.

2.3 | Analysis

Four binary logistic regression models that explain people's willingness to use shared electric vehicles from eHUBS were estimated for each trip purpose. Socio-demographic variables, travel related variables, and attitudinal components (Table 5), were used as explanatory variables in the analysis (Tables A1 and A2 in the appendix, respectively).

2.3.1 | CATPCA

All three extracted categorical components showed good levels of reliability, with Cronbach's α values being in the range of 0.79 to 0.82 [32], while collectively explaining 50% of the variance. Broadly, the three categorical components reflected (1) holding a positive attitude towards, and expressing an interest in trying out, different shared mobility options (Pro-Shared), (2) perceived barriers to the use of shared mobility such as incompatible mobility needs or a lack of confidence in the operation of eHUBs (Pro-Barriers), and (3) showing concern for the environment, such as feeling a moral obligation to reduce personal greenhouse gas emissions (Pro-environment).

TABLE 4 Sample demographic characteristics ($N = 2493$).

Variable	Categories	Count (n)	Percent (%)
Age	18 to 24	287	11.5
	25 to 34	620	24.9
	35 to 44	551	22.1
	45 to 54	468	18.8
	55 to 64	337	13.5
	65 to 74	179	7.2
	75 or older	49	2.0
Gender	Male	1312	53.4
	Female	1127	45.9
	Other	16	0.7
Country	Netherlands	761	30.7
	Germany	478	19.3
	Belgium	441	17.8
	England	404	16.3
	France	387	15.6
	Other	7	0.3
Number of adults*	1	735	29.9
	2	1243	50.6
	3	253	10.3
	4 or more	226	9.1
Number of children	0	975	52.6
	1	348	18.8
	2	366	19.8
	3 or more	163	8.8
Current occupation	School/Trainee/Student	251	10.4
	Employed (PT, FT, or Self)	1711	70.7
	Home/Unemployed/Retired	406	16.8
	Other	53	2.2
Education	Post- or undergraduate studies	1675	67.5
	School education	430	17.3
	Professional qualification	291	11.7
	No school education	15	0.6
	Prefer not to say	73	2.9
Income	<£20,000	392	15.8
	£20,000–39,999	644	25.9
	£40,000–59,999	502	20.2
	£60,000–79,999	272	10.9
	£80,000–99,999	139	5.6
	>£100,000	103	4.1
	Prefer not to say	435	17.5

2.3.2 | Binary logistic regression model

The probability of a certain event occurring or not can be estimated using a binary logistic model. The model establishes a relationship between multiple independent variables (both, continuous and categorical) and a dependent variable (categorical). The model was initially formulated by McFadden in the 1980s [33] and since then it has been used extensively in the transportation mode choice literature. The advantage of logistic regression is that the assumption of normality is relaxed, which is not the case in linear or log-linear regression [34]. The model is based on the theory of maximization of utility, which postulates that the option with maximum utility will be chosen. The utility of an alternative is given by the following equation:

$$U_{ni} = V_{ni} + \varepsilon_{ni}$$

where V is the deterministic part of the utility for individual n and mode i, and ε is the random error term of the utility. The random error is assumed to have a type-2 extreme value distribution and is identically and independently distributed (IID) across individuals and alternatives. The deterministic part of the utility consists of dependent variables and their sensitivities (β_x) as given by the following equation:

$$V_{ni} = \beta_0 + \beta_x x_n$$

The probability P_{ni} of individual n choosing alternative mode i is given as follows:

$$P_{ni} = exp(\beta_0 + \beta_x x_n) \;/\; \left(1 + exp(\beta_0 + \beta_x x_n)\right)$$

For each shared electric vehicle type, in order to compare preferences, 'I would not use it for any trips of this purpose' was chosen as the reference group. Due to the large number of independent (dummy) variables (>80), logistic regressions were computed using the forward rather than backward method, which starts with a model including only a constant, to which significant predictors are gradually added in a stepwise fashion (see [35], for more information). Predictor variables were added to the model based on the probability of the Wald statistic (i.e. Wald $\chi 2$), which is the equivalent of the t-test for predictors in multiple linear regression. Here, $\alpha = 0.05$ was chosen as the entry criterium for predictors, whereas $\alpha = 0.06$ was chosen as the cut-off value. Tables A1 and A2 present the regression coefficients, significance level, and odds ratios, of the predictor variables that were retained in each model.

An odds ratio (OR) greater than 1 indicates that, holding all other predictor variables constant, a one-unit increase in the predictor variable in question increases the likelihood for a person to belong to the alternative (target) group—here, this refers to those who indicated 'I may use [shared mobility option] for at least a few trips of this purpose'). For example, for shared e-cars as a commute trip alternative, the OR for

TABLE 5 Rotated categorical component (CC) loadings and reliability estimates (DOI = Diffusion of Innovation; TPB = Theory of Planned Behaviour, PBC = Perceived behavioural control).

Attitude statements / Statistics	Measured construct	CC1	CC2	CC3
Cronbach's alpha (α)	Reliability	0.82	0.79	0.80
Explained variance (Eigenvalue / number of items)	Variance	0.18	0.17	0.15
(1) I would enjoy trying out and using different electric vehicles from an eHUB.	Trialability (DOI)	0.79		
(2) I would be interested in using eHUBs for commuting trips when they've become available in my city.	Adoption intention for commute (TPB)	0.78		
(3) I would be interested in using eHUBs for non-work trips when they've become available in my city.	Adoption intention for leisure (TPB)	0.77		
(4) Shared mobility options provide me with more flexibility in the way I travel.	Relative advantage #1 (DOI)	0.70		
(5) I am confident that, if I wanted to, I could use eHUBs without problems.	Complexity #1 (DOI)	0.65		
(6) I am often among the first people to experiment with new technologies.	Affinity for technology	0.53		
(7) I would rather wait for other people to try eHUBs before I use them.	Delayed adoption intention		0.77	
(8) Shared mobility solutions like eHUBs are too complicated for me to use.	Complexity #2 (DOI)		0.73	
(9) Shared mobility options cannot fulfil my mobility needs.	Perceived compatibility (DOI)		0.70	
(10) I prefer travelling the way I am used to rather than using eHUBs.	Habit		0.69	
(11) There is no point in using shared mobility options if you already own a car.	Relative advantage #2 (DOI)		0.68	
(12) I do not feel confident to use an electric car.	PBC e-car (TPB)		0.54	
(13) People should be allowed to use their cars as much as they like, even if it causes damage to the environment.	Car use attitude #1 (TPB)		0.49	
(14) Almost everyone around me owns a private car.	Perceived social norm		0.29	
(15) For the sake of the environment, everyone should reduce how much they use cars.	Car use attitude #2 (TPB)			0.78
(16) I feel a moral obligation to reduce my emissions of greenhouse gases.	Personal norm			0.76
(17) Congestion, air pollution and noise from road traffic is a real problem in my city.	Environment attitude #1 (TPB)			0.64
(18) People around me find it important to reduce emissions of greenhouse gases.	Perceived subjective norm			0.60
(19) People who drive cars that are better for the environment should pay less to use the roads.	Car use attitude #3 (TPB)			0.52
(20) I feel confident to ride an electric bicycle.	PBC e-bike (TPB)			0.43

pro-shared mobility attitude is 2.80, which indicates that for every one-unit increase in the pro-shared mobility component, the odds to consider using a shared e-car for at least a few (commute) trips almost triple (180%) compared to the reference group (i.e. 'I would not use it for any trips of this purpose'). In contrast, an OR lower than 1 indicates that, for every one-unit increase in the predictor variable, the likelihood of belonging to the alternative group decreases, while the likelihood of belonging to the reference group, which is not interested in the use of eHUBS (i.e. would not use), increases.

3 | RESULTS

Descriptive results for respondents' willingness to use shared electric vehicles from eHUBs for their regular commute and food shopping trips are shown in Figures 2 and 3. In total, 46–50% of respondents are willing to use shared electric vehicles from eHUBs for at least a few of their regular commute or food shopping trips, although this proportion drops to 23–37% for the combined use of shared electric vehicles and public transport.

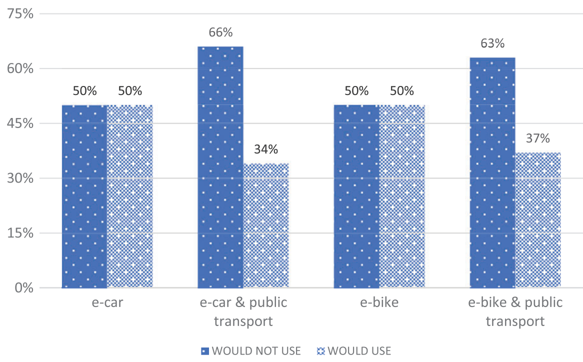

FIGURE 2 Respondents' willingness to use e-car (N = 2015), e-car and public transport (N = 1961), e-bike (N = 2007), e-bike and public transport (N = 1974) for commuting.

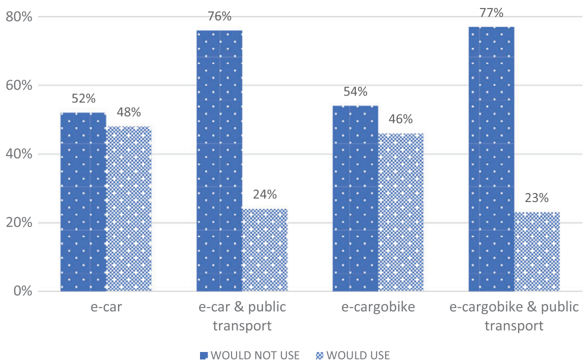

FIGURE 3 Respondents' willingness to use e-car (N = 2016), e-car and public transport (N = 1960), e-cargobike (N = 2005), e-cargobike and public transport (N = 1960) for food shopping.

Binary logistic regression was used to investigate the relationship between attitudinal, socio-demographic, and travel related predictor variables and the likelihood of adopting eHUB alternatives for either commute or food shopping trips (i.e. 'would not use' [reference group] versus 'would use for at least a few trips' [target group]). The four binary logistic regression models correctly classified between 71–77% of respondents as potential eHUBs users (i.e. 'would use for at least a few trips') and non-users ('would not use'), respectively, in the commute scenario, increasing to 72–84% in the food shopping scenario. Thus, in most cases, the model predictions were congruent with respondents' stated preferences. Below, the logistic regression results for each trip purpose and shared electric vehicle type are presented in turn.

3.1 | Shared electric vehicles as a commute trip alternative (see Table A1 in the Appendix, for results)

3.1.1 | General findings

For each shared electric vehicle type, including in combination with public transport, a pro-shared mobility attitude strongly increased the odds of considering the use of shared vehicles from an eHUB as an alternative. More specifically, holding all other predictor variables constant, the odds of considering the use of any shared electric vehicle type for at least a few trips more than doubled for a one-unit increase in pro-shared mobility attitude [ORs = 2.27 to 2.80, (+)127–180%]. Interestingly, perceived barriers towards shared mobility use also increased the odds for considering the use of three of the four commute trip alternatives [ORs = 1.21 to 1.36, (+)21–36%].

Furthermore, with the exception of e-cars, belonging to the youngest age group (i.e. 18 to 24 years) increased the willingness to use shared vehicles [ORs = 1.59 to 2.50, (+)59–150%]. Finally, with the exception of shared e-bikes, holding a professional qualification [ORs = 1.85 to 2.25, (+)85–125%] also increased the odds, whereas the following factors decreased the odds:

- living in Germany [ORs = 0.39 to 0.66, (−)61–34%, except e-cars]
- regular commute trip satisfaction [ORs = 0.98 to 0.99, (−)2–1%] and
- identifying as a multimodal user [ORs = 0.63 to 0.66, (−)37–34%, except e-cars]

3.1.2 | Shared e-car

Various factors increased the odds of considering shared e-cars as a commute trip alternative including

- having an annual household income that is either less than £20,000 or between £80,000–99,999 [ORs = 1.44 to 1.79, (+)44–79%]
- using private motorised transport between one to four days per week [ORs = 1.44 to 1.95, (+)44–95%] and holding a driver's licence [OR = 2.10, +110%] as well as
- living in France [OR = 1.65, +65%]

In contrast, the following factors significantly decreased the odds of considering shared e-cars (including in combination with public transport unless stated otherwise):

- living in Belgium [ORs = 0.41 to 0.58, (−)59–42%]
- cycling on five days per week or more [ORs = 0.63 to 0.66, (−)37–34%]
- using PT on five days per week or more [OR = 0.53, −47%, e-car only]
- commuting on three to four days per week [OR = 0.70, −30%, e-car only]
- a commute trip distance of 1–5 km [OR = 0.67, −33%, e-car only]

3.1.3 | Shared e-car and public transport

- Overall, the combined use of e-cars and public transport was less favoured compared to shared cars alone (i.e. 66% versus

50% indicated they would not use this option; see Figure 2). However, identifying as a car driver [OR = 1.50, +50%] and regular public transport use (i.e. at least two to three times per month) increased the odds of considering this option significantly [ORs = 1.77 to 2.13, (+)77–113%]. On the other hand, factors decreasing the odds included:

- frequent (i.e. on five days per week or more) cycling or walking [ORs = 0.66 to 0.71, (−)34–29%]
- a commute trip frequency of three to four days per week or more [ORs = 0.52 to 0.58, (−)48–42%] and
- living in a two-person household [OR = 0.74, −26%]

3.1.4 | Shared e-bike

For shared electric bikes, a variety of factors increased the willingness to consider this option for at least a few of respondents' regular commute trips:

- holding a pro-environmental attitude [OR = 1.29, +29%]
- owning a car [OR = 1.33, +33%] and using private motorised transport on three to four days per week [OR = 1.61, +61%]
- owning a cargobike [OR = 1.55, +55%] and currently cycling from once per month or less up to three to four days per week [ORs = 2.16 to 3.10, (+)116–210%]
- a commute trip distance of 6–10 km [OR = 1.67, +67%] and a trip frequency of two to three times per month [OR = 2.47, +147%]

Trip distances of 25 km or more, on the other hand, were associated with decreased odds for this option [ORs = 0.18 to 0.57, (−)72–43%].

3.1.5 | Shared e-bike and public transport

The willingness to use a combination of shared e-bikes and public transport as a commute trip alternative was positively predicted by:

- using public transport on a regular basis ranging from two to three times per month up to five days per week or more [ORs = 1.51 to 3.05, (+)51–205%]
- having school education [OR = 1.46, +46%], a professional qualification [OR = 2.25, +125%], or living in a household with four or more adults [OR = 1.63, +63%]
- having a gross annual household income of less than £20,000 [OR = 1.56, +56%]
- currently cycling, albeit only on a weekly basis [ORs = 1.72 to 1.82, (+)72–82%]
- a commute trip distance of 16 to 20 km [OR = 1.67, +67%] and a commute trip frequency of two to three times per month [OR = 2.44, +144%]
- owning either one or two bicycles [ORs = 1.48 to 1.62, (+)48–62%] or cargobikes [ORs = 2.06 to 11.69, (+)106–1069%], or owning a motorbike [OR = 1.67, +67%]

3.2 | Shared electric vehicles as a food shopping trip alternative (see Table A2 in the Appendix)

3.2.1 | General findings

Some similarities emerged between people's regular commute and food shopping trips. As with the former, a pro-shared mobility attitude strongly increased the odds of considering shared electric vehicles for food shopping trips [ORs = 2.15 to 2.86, (+)115–186%], whereas younger respondents (i.e. 18 to 24 years) generally reported a greater willingness to use shared electric vehicles from an eHUB [ORs = 1.73 to 2.41, (+)73–141%]. Moreover, food shopping trip distance, irrespective of the length of trips, increased the willingness to consider eHUB alternatives [ORs = 2.79 to 17.90, (+)179–1690%]. Factors that negatively influenced willingness included:

- living in Belgium or Germany [ORs = 0.36 to 0.42, (−)64–58%] (for the combined use of either shared e-cars or e-cargobikes with public transport)
- holding a university degree or identifying as a multimodal user [ORs = 0.38 to 0.61, (−)62–39%] (for the combined use of either shared e-cars or e-cargobikes with public transport)
- using private motorised transport on five days per week or more [ORs = 0.41 to 0.68, (−)59–32%] (except for shared e-cars)

3.2.2 | Shared e-car

The following factors increased the odds of considering shared e-cars:

- identifying as a car driver and/or holding a professional qualification [OR = 1.50 to 1.73, (+)50–73%]
- food shopping two to three times per month and/or holding a driver's licence [ORs = 1.51 to 1.92, (+)51–92%]
- using private motorised transport on one up to four days per week [ORs = 1.56 to 1.77, (+)56–77%] and having two private cars in the household [OR = 1.44, +44%]

In contrast, the interest in shared e-cars for food shopping significantly decreased for those belonging to the 65–74 age group [OR = 0.51, −49%].

3.2.3 | Shared e-car and public transport

Even more so than for respondents' commute trips, the combined use of e-cars and public transport was substantially less favoured compared to shared e-cars alone (i.e. 76% versus 52% indicated they would not use this option; see Figure 3). However, several factors increased the odds of considering shared e-cars and public transport as a food shopping alternative including:

- perceived barriers [OR = 1.43, +43%]
- food shopping on three to four days per week [OR = 1.75, +75%]
- living in a household with four or more adults [OR = 2.32, +132%]
- walking or using public transport either two to three times month or three to four days per week [ORs = 1.75 to 1.91, (+)75–91%]
- owning either a cargobike [OR = 1.98, +98%] or up to two motorbikes [ORs = 2.20 to 2.82, (+)120–182%]

Yet, those who reported cycling on five days per week or more were less willing to use this option [OR = 0.41, −59%].

3.2.4 | Shared e-cargobike

Apart from the factors already mentioned under Section 3.2.1 (i.e. young age, pro-shared mobility attitude, food shopping trip frequency), only three factors further increased the willingness to use shared e-cargobikes as a food shopping trip alternative: living in Germany [OR = 1.55, +55%], living in a household with four or more adults [OR = 2.09, +109%], and owning a cargobike [OR = 2.14, +114%].

Factors decreasing the odds included:

- belonging to the 65–74 age group [OR = 0.39, −61%]
- living in England [OR = 0.56, −44%]

3.2.5 | Shared e-cargobike + public transport

The willingness to use shared e-cargobikes in combination with public transport was significantly greater for those:

- perceiving barriers [OR = 1.42, +42%]
- cycling for transport from two to three times per month up to three to four days per week [ORs = 2.10 to 3.33, (+)110–233%], and
- owning a cargobike [OR = 2.57, +157%]

On the other hand, the willingness to use this option was *negatively* influenced by:

- holding a university degree [OR = 0.62, −38%]
- identifying as a multimodal user [OR = 0.38, −62%] and
- living in a household with four or more adults [OR = 0.57, −43%]

4 | DISCUSSION

In this study, we investigated people's willingness to use shared electric vehicles from eHUBs for either their commuting or food shopping strips, therefore providing novel insights on the suitability of eHUBs to fulfil different trip purposes. The findings of the binary logistic regression analyses indicated that some variables increased the odds of considering shared electric vehicles regardless of trip purpose. Importantly, our findings suggest that:

- a positive attitude towards shared mobility is an important driver for potential use, increasing the odds by two to three times on average
- younger respondents (18−24 years old) are generally more inclined to consider the use of shared electric vehicles regardless of trip purpose and whether or not being used in combination with public transport (except e-cars for commuting purposes where young adults showed no preference)
- half of respondents, including car users who are responsible for roughly 60% of road transport emissions (EEA, [36]), are willing to use zero-emission shared electric alternatives for at least some of their commute trips, although this proportion drops substantially if considering their use in combination with public transport (coincidentally, this is also reflected in the smaller odds ratios of a pro-shared mobility attitude when comparing single versus multimodal—i.e. including PT—alternatives)
- cycling, irrespective of the frequency of use, increases the odds of wanting to use shared e-bikes for commuting, with a similar tendency emerging for e-cargobikes in the context of food shopping, albeit only in combination with public transport
- frequent cyclists and public transport mode users (5 days per week or more) showed reduced interest in shared e-cars for commuting, indicating that no major mode shifts are to be expected from those relying on modes that already are more sustainable
- current public transport users showed an interest in using both shared e-cars and e-bikes in combination with public transport for multi-modal commute trips, whereas both public transport users and those doing their grocery shopping on foot also expressed an interest in multi-modal use of shared e-cars with public transport for food shopping

Overall, our findings are comparable to the findings of previous research suggesting that (a) a pro-shared mobility attitude is an important predictor of the intention to use shared mobility services [19], (b) young adults are a primary target group for shared mobility services [18, 23], and (c) up two out of five car drivers may be willing to substitute at least some of their trips by private car with shared modes [2]. Further study findings are discussed in detail below.

Among the attitudinal factors, perceived barriers and a pro-environmental attitude also played a role, if only for specific alternatives. That is, a pro-environmental attitude was linked positively to the intention to use shared e-bikes for commuting, supporting previous research which has revealed a positive association between green perceptions and shared e-bike use [37]. Notably, perceived barriers increased the odds of considering shared e-cars as a commute trip alternative both alone and in combination with public transport. While this finding might seem counterintuitive, a possible explanation could be that, while respondents are generally interested in using shared electric vehicles as an alternative, this may often go hand in hand with commonly perceived barriers and misconceptions regarding electric or shared mobility, such as range anxiety, and concerns about the accessibility or availability of shared vehicles. Our results suggest that the intention to use shared vehicles may not necessarily be reduced due to the presence of perceived barriers. In contrast, perceived barriers might act as a catalyst for trying out shared (electric) vehicles to see whether these barriers are indeed true or merely perceived.

4.1 | Commute trip

As might be expected, those who already cycle on a regular basis expressed the greatest interest in shared e-bikes as a commute trip alternative, suggesting that these potential e-bike sharing users might indeed reduce the use of their private bicycles [13]. These findings also support recent research which suggests that shared e-bikes do not (necessarily) act as a substitute for car trips [12]. A commute trip distance of 6–10 km and a trip frequency of 2–3 times per month further increased the odds of considering shared e-bikes, stressing the potential of shared e-bikes as a viable commute trip alternative, although e-bikes tend to lose their edge over private cars for medium (i.e. 5–10 km) distances [5].

For shared electric cars, using private motorised transport during the week, and belonging to either high- or low-income groups, significantly increased the odds of considering this option. This indicates that there may indeed be potential to substitute private car trips with shared e-cars, although the pricing structure should be kept affordable so that low-income groups may also benefit from this option. For the combined use of either shared e-bikes or e-cars and public transport, cycling during the week and using public transport regularly increased the odds, suggesting that existing mode users may be attracted to these modes as a possible first- and/or last-mile alternative. Frequent cycling or public transport use (i.e. on at least 5 days per week or more) generally decreased the odds of considering shared e-cars as a commute trip alternative.

4.2 | Food shopping

For respondents' food shopping trips, only living in Germany, living in a multi-person household (i.e. four or more adults), and owning a cargobike significantly increased the odds of considering shared e-cargobikes, above and beyond the effects of a pro-shared mobility attitude and age, suggesting untapped market potential for this option, particularly in a German context (see [17], for similar findings in Austria). For shared e-cars, identifying as a car driver and holding a professional qualification both increased the willingness to consider e-cars as an alternative for food shopping trips, again, indicating some potential to substitute trips by private car. Finally, the combined use of shared modes and public transport for food shopping trips was broadly rejected, suggesting that unimodal trips are generally preferred by respondents, especially for trips of this purpose. However, owning either a cargo- or motorbike and cycling during the week did increase the odds for considering the combined use of shared e-cargobikes and public transport, partly supporting previous research which showed that cyclists are particularly interested in shared cargobikes [17].

4.3 | Implications and recommendations

The above findings lead to several recommendations to assist local authorities and shared mobility providers to better tailor their services to current non-users:

- Commuting: In our survey, respondents tended to demonstrate mode stickiness (e.g. refs. [38, 39])—that is, current car drivers preferred shared e-cars for commuting, whereas current cyclists preferred shared e-bikes. In general, the greatest emission savings may be realised when drivers switch from ICE (internal combustion engine) vehicles to shared electric vehicles, because replacing lower emission intensive modes, such as public transport, are unlikely to yield substantial reductions in carbon emissions. Therefore, in the case of private car users, habit-disrupting interventions are recommended, with the trialability of shared mobility options playing a crucial role to kickstart the travel behaviour change process [40].
- Food shopping: Shared e-cargobikes were considered as a viable alternative for food shopping by young adults, German respondents, and multi-person households. Targeting these groups—for instance, through neighbourhood-focused cargobike sharing [41]—could produce useful results with regard to the potential substitution of the use of the private car for food shopping related trips. This is supported by the recent surge of interest in and success of cargobike sharing in Germany, Austria, and Switzerland [42].
- Affordability: Our results stress the importance of social equity considerations, such as the affordability of shared mobility options, especially for the younger generation and low-income earners [43]. There is added potential of eHUBs delaying car dependence or even preventing it altogether, if offering an affordable pricing structure, which could result in significant emission savings in the future.
- Accessibility: Our findings suggest that a proportion of current trips by private pedal bicycle may be replaced by shared e-bikes or e-cargobikes instead (see also ref. [44], for similar findings on trip substitution in the case of e-scooters). The optimal location choice of shared mobility (hub) locations is therefore crucial and should facilitate substitution of the private car (see also refs. [45, 46, 10]). This requires that hub locations are within walking distance of people's homes or workplaces, to discourage private car use for the first or last mile, or for the entirety of their commute or food shopping trip.
- Public transport integration: Although the combined use of shared electric vehicles and public transport was broadly rejected, this was not the case for public transport users. Public transport users expressed interest in using both shared

e-cars and e-bikes in combination with public transport for commute or food shopping trips. This suggests that shared vehicles may facilitate first- and last-mile access to public transport [4], such as at Park and Ride facilities or other transit-oriented development [10].

5 | CONCLUSIONS

This research has explored respondents' willingness to use shared electric vehicles for commute or food shopping trips. Our findings suggest that shared electric cars accessed via eHUBS may potentially replace at least some of people's commute and food shopping trips by private car, although cross-mode shifts, such as from private car to e-bike or e-cargobike, appear unlikely. Instead, there is greater potential for e-cars to act as a substitute for people's first or second private car. Similarly, e-bikes may primarily serve as a substitute for people's private bicycle, whereas shared e-cargobikes appear as an attractive alternative to current cyclists in combination with public transport. In summary, the findings indicate that shared electric mobility, provided via eHUBs, has the potential to become a part of people's daily routines as either a commute or food shopping trip alternative.

Campaigns offering trials of shared mobility e-cars and e-bikes in the workplace should be promoted to enable private car users to experience the benefits of shared mobility options as realistic alternatives and to kickstart travel behaviour change. Promotional activities at supermarkets over a trial period that allows free first use of e-cargobikes, particularly amongst the younger population and larger households, may help to break the habit of using private cars for food shopping related trips. The eHUBS concept has an important role to play in delivering policies that are aligned with social equity delaying the purchase of the first vehicle or the second vehicle, by being proactive in facilitating appropriate infrastructure, and ensuring affordability. Using publicly available data sources planners need to consider demographics and work with public transport operators and shared e-mobility providers to identify optimal locations for eHUBS which are within walking distance of people's homes or workplaces. In this way, eHUBs offer much potential to discourage private car use for the first or last mile, or for the entirety of their commute or food shopping trip.

For future research efforts in the domain of shared electric mobility hubs and vehicles, we offer the following suggestions. In our study, a few variables—such as young age and holding a positive shared mobility attitude—significantly increased the odds of considering the use of most or all shared electric vehicle types. However, the magnitude of odds ratios was observed to differ for different modes and trip purposes. For instance, belonging to the 18–24 age group significantly increased the odds of considering e-cars for food shopping, but not for commuting. Similarly, the odds ratio of considering e-bikes for commuting was substantially lower than either combination of shared e-cars or e-bikes with public transport. This suggests that the effect of independent variables is not homogenous across shared alternatives and, therefore, exploring these differences would be a promising avenue for future research. Another opportunity for future research lies in the consideration of further shared mobility modes, mode combinations, and trip purposes. For instance, in the present study, the authors did not consider the use of e-scooters, the combined use of shared vehicles and different public transport options (e.g. light rail, metro or train), or trip purposes other than commuting or food shopping. Expanding the research in these areas would provide useful insights to local authorities and shared mobility providers that aim to foster the use of shared electric vehicles in people's daily lives.

AUTHOR CONTRIBUTIONS

Gustav Bösehans: Conceptualization, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft; Kuldeep Kavta: Investigation, Writing – review & editing; Margaret Carol Bell: Investigation, Writing – review & editing; Dilum Dissanayake: Funding acquisition, Investigation, Project administration, Supervision, Writing – review & editing

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data is available from the corresponding author upon reasonable request.

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APPENDIX

TABLE A1 Logistic regression coefficients and odds ratios for commute trip alternatives; acc = accuracy (% classified correctly). Variables with a *p*-value lower than 0.05 are considered statistically significant at a 95% confidence level.

	Shared e-car (acc = 72%)			**Shared e-car + PT (acc = 77%)**			**Shared e-bike (acc = 71%)**			**Shared e-bike + PT (acc = 76%)**		
Variable	***b***	***p***	***OR***	***b***	***p***	***OR***	***b***	***p***	***OR***	***b***	***p***	***OR***
Constant	0.39	0.24	1.47	0.29	0.41	1.34	0.67	0.03	1.95	−0.55	0.05	0.58
Pro shared mobility	1.03	0.00	2.80	0.82	0.00	2.27	0.96	0.00	2.60	0.84	0.00	2.32
Pro perceived barriers	0.19	0.01	1.21	0.31	0.00	1.36				0.19	0.02	1.21
Pro-environment							0.26	0.00	1.29			
Age = 18 to 24				0.71	0.00	2.04	0.46	0.03	1.59	0.92	0.00	2.50
Age = 45 to 54							−0.33	0.04	0.72			
Age = 65 to 74							−0.99	0.00	0.37			
Country = Belgium	−0.55	0.00	0.58	−0.90	0.00	0.41						
Country = France	0.50	0.02	1.65									
Country = England							−0.55	0.00	0.58			
Country = Germany				−0.56	0.01	0.57	−0.94	0.00	0.39	−0.42	0.04	0.66
Number of adults = 2				−0.31	0.03	0.74						
Number of adults = 4+										0.49	0.03	1.63
School education										0.38	0.04	1.46
Professional qualification	0.61	0.00	1.85	0.66	0.00	1.93				0.81	0.00	2.25
University degree							−0.36	0.01	0.70			
Income < £20,000	0.36	0.05	1.44							0.44	0.02	1.56
Income = £80,000–99,999	0.58	0.03	1.79									
Identity = Car driver				0.41	0.03	1.50						
Identity = Multimodal				−0.45	0.02	0.64	−0.41	0.01	0.66	−0.46	0.00	0.63
Freq PMT = Opm or less												
Freq PMT = 1–2 dpw	0.37	0.02	1.44									
Freq PMT = 3–4 dpw	0.67	0.00	1.95				0.48	0.01	1.61			
Freq CYC = Opm or less							0.84	0.00	2.32			
Freq CYC = 2–3 tpm							0.79	0.00	2.21			
Freq CYC = 1–2 dpw							1.13	0.00	3.10	0.60	0.00	1.82
Freq CYC = 3–4 dpw							0.77	0.00	2.16	0.54	0.01	1.72
Freq CYC = 5 dpw or more	−0.46	0.01	0.63	−0.42	0.03	0.66						
Freq WAL = 5 dpw or more				−0.34	0.04	0.71						
Freq PUB = 2–3 tpm				0.57	0.00	1.77				0.41	0.03	1.51
Freq PUB = 1–2 dpw										0.83	0.00	2.29
Freq PUB = 3–4 dpw				0.76	0.00	2.13				1.12	0.00	3.05
Freq PUB = 5 dpw or more	−0.63	0.01	0.53	0.71	0.01	2.04				0.99	0.00	2.68
Number of cars = 1							0.29	0.02	1.33			
Number of bikes = 1										0.48	0.00	1.62

(Continues)

TABLE A1 (Continued)

	Shared e-car (acc = 72%)			Shared e-car + PT (acc = 77%)			Shared e-bike (acc = 71%)			Shared e-bike + PT (acc = 76%)		
Variable	***b***	***p***	***OR***	***b***	***p***	***OR***	***b***	***p***	***OR***	***b***	***p***	***OR***
Number of bikes = 2										0.39	0.02	1.48
Number of cargo = 1				0.65	0.01	1.91	0.44	0.06	1.55	0.72	0.00	2.06
Number of cargo = 2				1.87	0.00	6.50				2.46	0.00	11.69
Number of motor = 1				0.72	0.00	2.06				0.51	0.01	1.67
RT Distance = 1–5	−0.41	0.00	0.67									
RT Distance = 6–10							0.51	0.00	1.67			
RT Distance = 16–20										0.52	0.04	1.67
RT Distance = 25–45							−0.57	0.00	0.57			
RT Distance = 50–70							−1.24	0.00	0.29			
RT Distance = 75–95							−1.73	0.00	0.18			
RT Distance = 100 or more							−1.57	0.00	0.21			
RT Freq = 2-3 tpm							0.90	0.00	2.47	0.89	0.00	2.44
RT Freq = 3–4 dpw	−0.35	0.04	0.70	−0.65	0.00	0.52						
RT Freq = 5 dpw or more				−0.55	0.02	0.58						
RT Satisfaction	−0.01	0.00	0.99	−0.02	0.00	0.98	−0.01	0.00	0.99	−0.02	0.00	0.98
Driver's licence	0.74	0.00	2.10									
Number of samples	1431				1403		1414				1403	
Pseudo R^2 (Nagelkerke)	0.36				0.38		0.35				0.39	

TABLE A2 Logistic regression coefficients and odds ratios for food shopping trip alternatives; acc = accuracy (% classified correctly). Variables with a *p*-value lower than 0.05 are considered statistically significant at a 95% confidence level.

	Shared e-car (acc = 74%)			Shared e-car + PT (acc = 84%)			Shared e-cargo (acc = 72%)			Shared e-cargo + PT (acc = 83%)		
Variable	***b***	***p***	***OR***	***b***	***p***	***OR***	***b***	***p***	***OR***	***b***	***p***	***OR***
Constant	−2.60	0.00	0.08	−2.63	0.00	0.07	−1.01	0.00	0.37	−2.81	0.00	0.06
Pro shared mobility	1.05	0.00	2.86	0.86	0.00	2.36	0.93	0.00	2.53	0.77	0.00	2.15
Pro perceived barriers				0.36	0.00	1.43				0.35	0.00	1.42
Age = 18 to 24	0.55	0.01	1.74	0.61	0.01	1.85	0.55	0.01	1.73	0.88	0.00	2.41
Age = 65 to 74	−0.67	0.01	0.51				−0.93	0.00	0.39			
Country = Belgium				−0.94	0.00	0.39				−1.03	0.00	0.36
Country = England							−0.58	0.00	0.56			
Country = Germany				−0.93	0.00	0.39	0.44	0.01	1.55	−0.88	0.00	0.42
Number of adults = 4+				0.84	0.00	2.32	0.74	0.01	2.09	−0.56	0.00	0.57
Professional qualification	0.55	0.01	1.73									
University degree				−0.50	0.00	0.61				−0.58	0.00	0.56
Identity = Car driver	0.41	0.02	1.50									
Identity = MM user				−0.98	0.00	0.38				−0.88	0.00	0.42
Freq PMT = 1–2 dpw	0.57	0.00	1.77									
Freq PMT = 3–4 dpw	0.45	0.01	1.56									
Freq PMT = 5 dpw or more				−0.39	0.04	0.68	−0.89	0.00	0.41	−0.63	0.00	0.53
Freq CYC = Opm or less										0.74	0.00	2.10
Freq CYC = 2–3 tpm										0.97	0.00	2.63
Freq CYC = 1–2 dpw										1.20	0.00	3.33
Freq CYC = 3–4 dpw										0.80	0.00	2.23
Freq CYC = 5 dpw or more				−0.91	0.00	0.41						
Freq WAL = 2–3 tpm				0.58	0.01	1.79						
Freq WAL = 3–4 dpw				0.64	0.00	1.89						
Freq PUB = 2–3 tpm				0.56	0.01	1.75						
Freq PUB = 3–4 dpw				0.65	0.01	1.91						
Number of cars = 2	0.37	0.01	1.44									
Number of cargo = 1				0.68	0.01	1.98	0.76	0.00	2.14	0.94	0.00	2.57
Number of cargo = 2										2.89	0.00	17.98
Number of motor = 1				0.79	0.00	2.20				0.45	0.04	1.56
Number of motor = 2				1.04	0.01	2.82						
FST Distance = 1–5	1.41	0.00	4.10	1.32	0.00	3.76	1.12	0.00	3.06	1.39	0.00	4.02
FST Distance = 6–10	1.78	0.00	5.90	2.01	0.00	7.45	1.03	0.00	2.79	1.60	0.00	4.93
FST Distance = 11–15	1.63	0.00	5.12	2.83	0.00	16.99	1.21	0.00	3.36	2.17	0.00	8.78
FST Distance = 16–20	1.37	0.01	3.93	2.44	0.00	11.42				2.18	0.00	8.84
FST Distance = 25–45	2.25	0.01	9.45	1.94	0.02	6.97				2.89	0.00	17.90
FST Freq = 2-3 tpm	0.41	0.03	1.51									
FST Freq = 3–4 dpw				0.56	0.01	1.75						
Driver's licence	0.65	0.00	1.92									
Number of samples	1441			1412			1439			1406		
Pseudo R^2 (Nagelkerke)	0.35			0.44			0.31			0.41		