

Understanding e-cargo bike substitution of car, cycling, and walking through domestic trials in three UK cities

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ABSTRACT

This study examines ECB mode substitution using a mixed-methods approach combining travel diaries from 42 households participating in real-world ECB trials across Leeds, Oxford, and Brighton with 111 interviews. ECB trips mostly replaced car travel (60%), followed by conventional cycling (23%) and walking (17%). Regression analysis showed that car substitution was more likely among men, older adults, retirees, multi-car households and for passenger-carrying, shopping, child-escorting, and leisure trips. Qualitative findings further described a gradual process of building confidence, adapting routines, and integrating the ECB into everyday mobility, enabling progressively greater car substitution. For some, the ECB was viewed as a realistic alternative to a second car. The findings show that ECBs offer a versatile family mobility solution with substantial sustainability potential by reducing vehicle mileage and emissions, while supporting transitions towards car ownership renunciation. The study details targeted policy interventions that can maximise ECBs uptake and their contribution to sustainability.

1. Introduction

As cities face pressing challenges related to traffic congestion and greenhouse gas emissions, reducing car dependency has become a policy goal for many cities around the globe. This requires modal shifts from a system of automobile dominance to a system that combines a mix of different modes, such as walking, cycling, and public transport (Dennis and Urry, 2003). However, studies have shown that modal shift away from cars is particularly difficult for families with children, as cars provide the necessary comfort and safety to support the “mobilities of care” (Ferguson, 2009; McCarthy et al., 2017; Ravensbergen et al., 2020). Considering this, electric cargo bikes (ECBs) have emerged as a potentially transformative option, offering the benefits of cycling with added load-carrying capacity and electric assistance. Thus, they extend the feasible range of cycling and allow trips traditionally undertaken by car, particularly child-related trips, such as school drop-offs, and chained trips such as grocery shopping (Riggs, 2016; Riggs and Schwartz, 2018). It is therefore important to investigate the mode substitution effects of ECBs, particularly in relation to cars.

Mode substitution, broadly defined as the replacement of trips previously made by one mode with another, is central to evaluating the impact of new mobility technologies on travel behaviour and sustainability goals. Existing research on mode substitution focuses on how traditional cycling or electric bikes replace car use. Studies highlight substantial public health, safety, and environmental benefits when car trips are replaced by active modes (Carroll et al., 2019; Rabl and de Nazelle, 2012; Xia et al., 2013). However,

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although 75% of UK trips being under 5 miles, active travel has low mode share (National.Travel.Survey, 2026). Whilst cycle trips can be faster than car or public transport in urban areas, travel time is cited as a barrier to cycling as is the need to carry passengers or luggage (Beckx et al., 2013). E-bikes broaden this substitution potential by reducing the physical effort required and extending the trip range, yet even here, evidence suggests that only a minority of e-bike trips substitute for car use (Bigazzi and Wong, 2020). Concerns that e-bikes may primarily displace other low-carbon modes rather than driving highlights the need to explore how specific forms of electric cycling, such as ECBs, might more directly target car use.

Unlike regular e-bikes, ECBs are purpose-built for transporting goods and passengers, making them especially well-suited to replace car trips associated with family mobility (Cass et al., 2025; Glachant et al., 2025). Evidence on private ECB use and its mode substitution patterns is sparse, and early studies offer cautious optimism (Becker and Rudolf, 2018; Hess and Schubert, 2019; Riggs, 2016). Against this backdrop, this study seeks to deepen understanding of how ECBs substitute for car driving and active travel. Utilising detailed travel diaries and interviews, we systematically examine which modes ECB trips replaced, and how socio-demographic, household, built environment, and trip characteristics influence substitution patterns. Our mixed-method approach addresses limitations of earlier research that relied heavily on stated preferences or aggregated national data, by offering granular, trip-level evidence grounded in actual travel behaviour.

In our sample, ECB trips most frequently replaced car journeys. Yet results reveal that substitution patterns are not uniform, but are shaped by trip characteristics, household routines, infrastructure provision, and the gradual process through which users learn to integrate ECBs into everyday mobility. This study contributes to the growing body of research on sustainable mobility transitions, demonstrating how ECBs can reduce car dependency.

2. Literature review

2.1. Cycling and car travel substitution

Mode substitution refers to instances when individuals use a travel mode to make a journey that was previously made by another mode. Numerous studies have investigated the substitution of car travel by cycling, suggesting high potential for greenhouse gas emission reductions, accident prevention, and public health improvements (Gotschi and Mills, 2008; Grabow et al., 2012). However, the potential of active travel to replace car trips is largely constrained by trip distance, as trips longer than 7.5 km are deemed unlikely to be substituted (de Hartog et al., 2010). Beckx et al. (2013) suggested that only 9.5% of car trips can be substituted by active travel, after considering constraints such as long travel distance, multiple passengers, and carrying heavy goods.

There are two major approaches to empirical analysis of substitution behaviour: indirect inference and direct questioning (Piatkowski et al., 2015). Indirect inference relies on population-level survey data such as travel surveys and uses the difference in modal shares across different geographic areas as approximations of the potential of mode substitution (Cervero and Radisch, 1996; Larco et al., 2011). This approach lacks direct evidence of substitution and relies heavily on the assumption of a 1:1 substitution rate between active transport and driving, which tends to exaggerate potential substitution rates (Guo et al., 2007; Handy and Clifton, 2001). Direct questioning, on the other hand, collects data directly from individuals through surveys and travel diaries. This enables not only more accurate estimates of substitution effects but also detailed analysis of socio-demographic and environmental determinants of mode substitution. For instance, active travel seems more likely to replace driving among younger and more educated individuals (Krizek et al., 2009), while households with higher car ownership (Barbour et al., 2019) and more children (Ye et al., 2018) have been found to be less likely to substitute car trips with active travel. Piatkowski et al. (2015) found substantial variation in car substitution potential by active travel across cities (25%–86%), suggesting higher substitution in suburban areas due to limited alternatives to driving, and lower substitution in central areas where cycling is already well entrenched.

2.2. Mode substitution potential of ECBs

Due to their carrying capacity, ECBs can replace vans for the last-mile deliveries in urban areas (Verlinghieri et al., 2021), and can serve as an alternative to the family car for parents and caretakers (Thomas, 2021). Typically, users of cargo bikes are found to be middle-aged men (Narayanan and Antoniou, 2022; Riggs, 2016). However, the electrification of these bikes opens up new opportunities for other groups to substitute car trips (Beckx et al., 2013). This is particularly relevant for women who are more likely to be responsible for childcare (Garrard, 2003; Riggs and Schwartz, 2018; Thomas, 2021) and for the elderly who have reduced physical capacity to cycle (Dill and Rose, 2012). In terms of socio-economic status, most studies have concluded that the user demographic for ECBs is dominated by the upper-middle class (Boterman, 2018; Bourne et al., 2020; Marincek et al., 2024; Riggs, 2016).

Carracedo and Mostofi (2022) concluded that due to the novelty of ECBs, most existing research has focused on its use in the freight transport and commercial domain, with domestic use receiving less attention. This focus may skew user profiles toward, for instance, male-dominated commercial use, underrepresenting women and household-related travel. Some studies have found that ECB users tend to come from car-owning households (Boterman, 2018; MacArthur et al., 2014), which suggests a high potential for substituting car travel. This is supported by an empirical study in the US (Riggs, 2016), which recorded a 41% reduction in car use after ECBs were introduced. Studies on ECB sharing schemes in Switzerland (Hess and Schubert, 2019) and Germany (Becker and Rudolf, 2018) also suggest significant car substitution potential. Meanwhile, the substitution of cars was found to be more feasible for certain trip purposes, like commuting and childcare trips rather than, for instance, suburban shopping (Bjornara et al., 2019; Riggs and Schwartz, 2018). ECBs can also substitute active travel (walking and cycling). As for walking, since the typical travel distance range of ECBs is quite different from walking (Riggs, 2016), substitution is marginal, accounting for less than 5% across multiple empirical studies

(Becker and Rudolf, 2018; Hess and Schubert, 2019; Riggs, 2016).

Existing studies on ECBs' mode substitution relied on stated preference surveys (Gruber et al., 2024; Liao et al., 2024; Riggs, 2016), which could limit insight into real-world travel behaviours. Exceptions include Sun et al. (2020) and de Haas et al. (2021), who used more rigorous longitudinal travel panel data in the Netherlands to study substitution. However, they focused on e-bikes instead of ECBs. Further, these studies have relied on aggregated national-level data, which could overlook important trip-level details, intersectionality, and individuals' rationales for mode substitution. To fill these gaps, this study utilises data from both travel diaries and interviews to offer a richer understanding of substitution behaviour, capturing not only what changes occur but also why and how they emerge in everyday contexts.

3. Methods

The ELEVATE¹ project adopted a complex mixed-methods design, incorporating both quantitative and qualitative data collection and analysis. It involved a national survey, ECB trials, stakeholder interviews, workshops, and other activities. The trials formed an integral part of the ELEVATE research methodology rather than an evaluation of an externally delivered intervention. Fig. 1 provides an overview of the different stages of ELEVATE and identifies the specific datasets utilised in this study, while other project outputs draw on additional data collection components (e.g., national survey) to address different research questions. Philips et al. (2024) feature a detailed account of the project protocol, whereas Philips et al. (2025) provide an overview of the project findings, drawing on insights from the national survey.

3.1. The ECB trials

The ECB trials involved 49 households across Leeds, Oxford, and Brighton (Fig. 2). Participant recruitment followed a two-stage survey process: an initial study area survey, followed by a potential participant survey (PPS) sent to those interested in a trial loan of an ECB. Recruitment strategies comprised social media promotion, flyers distribution, visits to schools, nurseries, and community centres, and word-of-mouth referrals. The trials were situated in suburban and *peri*-urban neighborhoods characterised by high levels of car ownership and predominantly middle-class demographics. Yet, each trial zone in the three cities has its own unique characteristics in terms of proximity and connectivity with city centres, public transportation availability, traffic conditions, proximity to transport hubs, population, cycling infrastructure, and topography (Table 1).

Participating households were identified and shortlisted from the PPS. Eligibility criteria included household availability, access to secure storage—indoors or in a garage—and a stated intention to use the ECB frequently. Efforts were made to ensure diversity in household composition and socio-demographic background; however, this was only partly reflected in the final sample, see Table 2 and Appendix 1. Table 2 provides a summary of the participating households and highlights several characteristics. The sample was not representative of the wider population. Recruitment was partly self-selecting, with participants expressing a prior interest in ECBs and cycling. The practical trial requirements favoured households with adequate storage, which typically meant detached or semi-detached properties with garages or dedicated storage space. Over half of households stored the ECB in a garage, at least 60% reported annual incomes of £50,000 or more, and more than 70% lived in suburban or rural settings. Participants also exhibited relatively high levels of education and physical activity, with 86% holding higher education qualifications and 65% reporting at least 150 min of daily physical activity. These characteristics are consistent with previous research suggesting that early ECB adopters tend to be relatively affluent, highly educated, and environmentally conscious, with stronger pre-existing cycling identities. While these factors may have increased participants' willingness to trial and integrate the ECB into their daily lives, they also limit the generalisability of the findings to the wider population.

Each participating household received a free ECB loan for an average four-week period during summer 2023. Subsequently, 11 households from the original cohort were selected for extended trials of up to six months conducted during winter² 2023–2024. Participants were provided with either a front-loader or a longtail³ ECB (Fig. 3). They also received comprehensive support, including pre-trial cycle training and a range of equipment such as locks, helmets, extra child and baby seats, rain covers, Fitbit smartwatches, and other accessories tailored to the needs of each household—for example, we provided a ramp to one household so they could get the bike up steps and store the bike in a shed in the garden. Ongoing support was available throughout the trial via regular communication with researchers.

3.2. Data and analysis

Given the complex and context-dependent nature of mobility behaviour, this paper utilises a mixed-methods approach, placing emphasis on quantitative insights drawn from travel diaries and qualitative data obtained through interviews, supplemented by

¹ Innovative Light ELectric Vehicles for Active and Digital TrAvEl: a collaborative research project that aims to understand how e-micromobility can reduce transport-related energy use and carbon emissions while improving health by identifying where, when, and for whom it is most effective.

² The one-month Summer trials contributed both travel diary (quantitative) and interview (qualitative) data to the analysis. However, the extended 6-month Winter trial contributed only qualitative interview data, which were used to provide longer-term insights into ECB adoption and routine formation.

³ As suggested by the names, longtails carry cargo and/or passengers behind the cyclist, and front-loaders or 'longjohns', in front.

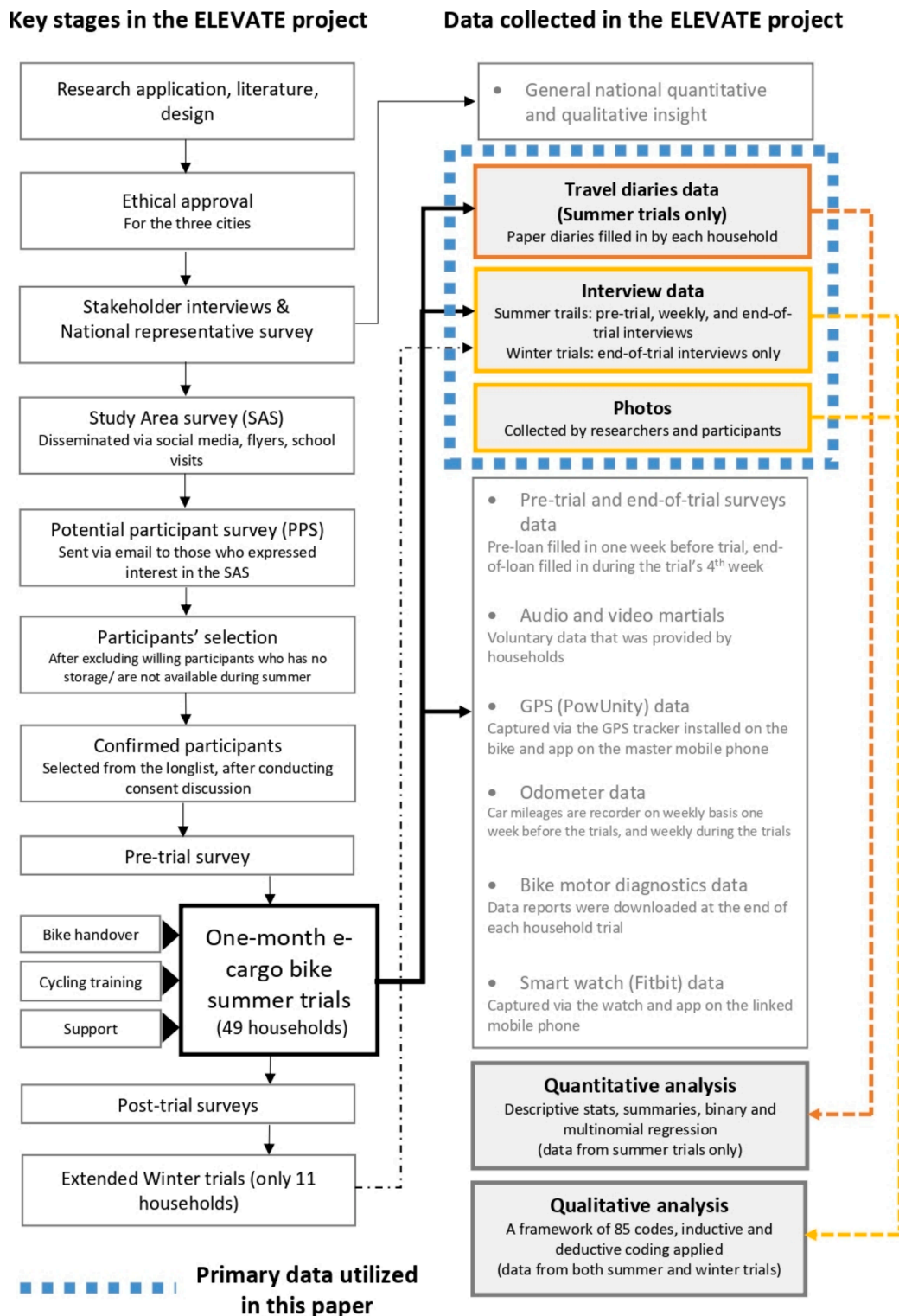


Fig. 1. Overview of the ELEVATE research design and data sources used in this paper.

broader insights drawn from the project. Combining quantitative data with qualitative insights allows for a more nuanced understanding of both the measurable patterns of ECB use and the subjective experiences and motivations behind mode choice. [Hanson \(2024\)](#) explains that this methodological heterodoxy is essential for unpacking the often-blurred line between choice and



Fig. 2. The three UK cities where the e-cargo bike trials took place.

constraint in travel behaviour, and for capturing how individuals interpret and negotiate their mobility within specific social and spatial contexts.

3.2.1. Quantitative data

The quantitative analysis investigated the influence of various factors like sociodemographic characteristics, household structure, built environment, trial-related aspects, and trip attributes on mode substitution.

Paper-based travel diaries were used to self-record participants' use of the ECBs during the Summer trial period. The diaries captured a range of trip-level data, including ECB journey dates, times, distance, duration, number of passengers, trip purpose, weather, the feasibility of undertaking the journey by alternative modes, and whether the ECB trip replaced another mode of transport. Participants were regularly prompted to record their ECB journeys in the diaries, which were subsequently converted into digital format. Missing or incomplete entries were addressed by cross-referencing audio recordings and transcripts from the corresponding weekly interviews (see Section 3.2.2). Trips with unresolved data gaps or conflicting information were excluded from analysis. Also, participants were instructed to record each return journey completed within a limited timeframe or multipurpose journey as a single entry. However, in some cases, these were logged as multiple trips; such entries were reviewed and consolidated into a single trip to maintain consistency.

During the trial, participants were encouraged to use the bikes, but no pressure or criticism was directed toward those who used it less frequently. Six households recorded minimal use—defined as four or fewer trips per household—primarily due to factors such as low confidence, extended travel, or unforeseen circumstances. These households were excluded from the analysis. Additionally, as the study focused specifically on ECB trips that substituted other modes of transport, 82 out of 935 journeys were excluded from the quantitative analysis; these were reported as either unfeasible by alternative modes or were theoretically possible but not completed.

Table 1

The ECB trial zones and key characteristics (compiled from different sources).

City	Trial zone	Characteristic and location	Inhabitants
Leeds	Otley, Guiseley, and Yeadon	Otley, Guiseley, and Yeadon are former satellite towns that have been subsumed into the wider conurbation of Leeds, located approximately 11, 10, and 8 miles respectively from Leeds centre. Guiseley is served by suburban rail, while Otley and Yeadon lack direct rail connections. Otley is linked to Leeds via a bus service operating at 30-minute intervals.	Predominant supergroup is “suburbanites and Peri-urbanites” but also contain others such as “Retired Professionals”, Semi-and in-skilled workers”, “Legacy communities” and “Baseline UK”.
Oxford	Kennington	A suburb was formerly a village, located just beyond Oxford’s southern bypass, approximately three miles from Oxford’s city centre and two miles from the nearest railway station at Radley. It is connected to central Oxford by a bus service operating at 20-minute intervals.	Dominant supergroup is “Ethnically Diverse Suburban professionals” with small numbers of “suburbanites and Peri-urbanites”, “Retired Professionals”, and “Baseline UK”.
Brighton	Preston Park and Hove Park Areas (also Known as 4 ways)	Metropolitan suburbs of Brighton, situated approximately two miles from the city centre.	The Brighton study area contains similar proportions of 3 supergroups: “Baseline UK”, “Multicultural and Educated Urbanites” and “Ethnically diverse suburban professionals”.

The Index of Multiple Deprivation (IMD) is an is a composite measure of area-level deprivation that combines information across multiple domains, including income, employment, education, health, crime, housing, and access to services. It provides a relative ranking of neighbourhoods based on overall socio-economic disadvantage and is widely used as a proxy for social class and living conditions (GOV.UK, 2025). Our trial areas are on average less deprived than the national average. Kennington is the least deprived of the trial areas. However, each trial area contains multiple Lower-Layer Super Output Areas (LSOAs). LSOAs are created by the UK’s Office of National Statistics (ONS) and are a standard statistical geography used for reporting small area statistics (GOV.UK, 2025). All LSOAs in Kennington are less deprived than the national average. Trial zones in Leeds and Brighton contain some LSOAs that are more deprived than the national average. The term ‘supergroup’ from the ONS is the highest tier of a hierarchical classification system that groups UK neighborhoods into 8 categories based on similar demographic, household, and socioeconomic traits using Census data.

Table 2

Summary characteristics of households participating in the ECB trials (N = 49).

Characteristic	No of HH (%)	Characteristic	No of HH (%)	Characteristic	No of HH (%)
<i>City</i>		<i>Household income</i>		<i>Residential settings</i>	
Leeds	18 (36.7)	50,000 or more	30 (61.2)	Suburban	31 (63.3)
Oxford	16 (32.7)	20,000–49,999	12 (24.5)	Urban	13 (26.5)
Brighton	15 (30.6)	Do not know/ not say	7 (14.3)	Rural	5 (10.2)
<i>Age</i>		<i>Cars in HH</i>		<i>Storage</i>	
25–34	7 (14.26)	No cars	1 (2)	Garage	27 (55.1)
35–44	28 (57.14)	One car	24 (49)	Garden/ yard	10 (20.4)
45–54	6 (12.3)	Two cars	20 (41)	Shed	6 (12.25)
55 or more	8 (16.3)	Three or more cars	4 (8)	In house	6 (12.25)
<i>Employment status</i>		<i>Adults in HH</i>		<i>Daily physical exercise</i>	
Employed	39 (79.6)	One	6 (12.3)	150 min or more	32 (65)
Retired	4 (8.2)	Two	42 (85.7)	30–150 min	14 (29)
Looking after home	4 (8.2)	Three or more	1 (2)	Less than 30 min	3 (6)
Unemployed/ other	2 (4.1)				
<i>Gender of lead user</i>		<i>Children in HH</i>		<i>Housing type</i>	
Woman	25 (51)	No children	14 (29)	Semi-detached	19 (38.8)
Man	24 (49)	One Child	11 (22)	Detached	17 (34.7)
		Two children	18 (37)	Terraced	10 (20.4)
<i>Education</i>		Three children	1 (2)	Flat/ caravan	3 (6.1)
Further education (yes)	49 (100)	Four or more children	5 (10)		
Higher education (yes)	42 (85.7)				

for various reasons, see Azzouz et al. (2026) for a detailed account of these trips. Furthermore, 37 trips that replaced public transport were also excluded due to the limited sample size.

A total of 816 ECB trips were then analysed to assess the predictive power of different factors on mode substitution, and two regression models were estimated. Importantly, the diaries did not record non-ECB trips, as documenting all journeys would have substantially increased participant burden and potentially compromised the completeness of ECB trip recording. Consequently, the regression analysis focused exclusively on reported ECB trips.

3.2.2. Qualitative data

The qualitative analysis in this paper aimed to gather in-depth insights to support, explain, expand, and contextualise the findings revealed by the quantitative modelling.

During the summer trials, each participating household took part in five semi-structured interviews: one pre-trial confirmation



Fig. 3. The ecb models that were used in the trials, front loader (top), longtail (bottom).

interview, followed by four weekly interviews. The final (Week.4) interview served as a comprehensive end-of-trial interview and normally lasted 60 min or longer. The pre-trial interviews obtained informed consents and discussed expectations, household structures, existing travel habits, routines, and mode choice, concerns, and motivations. The weekly interviews discussed both ECB and non-ECB journeys that had been conducted during the previous week. Week.4 interviews added broader topics including facilitators to ECB use, non-ECB trips and underlying reasons, barriers, and limitations, emotional responses, perceptions, and occasional travel behaviours, trial impacts on the household, mode substitution, and recommendations.

In this paper, the qualitative analysis drew on around 111 interviews; 43 pre-trial interviews, 49 Week.4 interviews, five weekly check-in interviews, and 10 end-of-trial interviews from the extended Winter trial cohort. Interview transcripts were systematically analysed using NVivo 14 (cloud-based collaborative version). The coding framework comprised a total of 85 codes, primarily developed deductively based on existing literature, interview protocols, and a structured prompting strategy. Inductive coding was also employed to integrate emergent themes identified in early interviews and initial rounds of analysis. Three researchers involved in the interviewing process contributed to coding, while a fourth, independent researcher participated in the coding process to mitigate interviewer bias. Coding reliability was ensured through pilot coding sessions and collaborative discussions, following established best practices (Elliott, 2018). Data analysis was facilitated using NVivo's coding query and text-search functions (Table 3). Unlike quantitative modelling, and due to data availability, the qualitative analysis focused on both ECB and non-ECB trips.

4. Results

4.1. Descriptive analysis

A total of 42 households and 816 trips were included in the analysis. Table 4 shows that the analysis of the modes replaced by ECB trips revealed several notable trends. Of the 816 analysed journeys, the largest proportion replaced car trips (60.0%), followed by conventional cycling (23.0%) and walking (17.0%). Mode substitution patterns varied by city: Brighton had the highest proportion of car substitutions (63.9%), while Leeds showed the strongest shift from cycling (40.4%), and Oxford displayed a relatively balanced substitution profile.

The diaries recorded a greater overall number of ECB trips among women, accounting for 477 trips compared to 339 trips by men. In absolute terms, women also recorded more ECB trips substituting car travel, with 265 trips compared to 225 among men. However, proportionally, men were more likely to use ECBs as a substitute for car travel, as 66.4% of male ECB trips replaced car journeys compared to 55.6% among women. Regarding distance, ECBs replaced a total of 2,504 recorded car miles, of which 1,223 miles were

Table 3

Examples of codes and keywords used in the qualitative analysis.

Codes	Keywords
Change, children, city, convenience, cost of travel, cycling comparisons, distance-related, eco, education, flexibility, future purchase and use, guilt and car avoidance, impact on household, infra-household, leisure, logistical problems, shopping, substitution, time-related, work and commute, non-use of bike, barriers.	Switch, swap, replace, better, avoid, instead.
Code description example:	
• <i>Cycling comparison</i>: e-Cargo bike comparisons with either electric or non-electric bikes. • <i>Infra-household</i>: Where negotiations/conflicts/trip requirements with/of rest of household determine use or non-use of cargo bike or other modes. • <i>Substitution</i>: Discussion throughout of direct substitution of other modes by e-cargo bike, also in answers in final interview – whether they are a viable mode of alternative transport.	

Table 4

Characteristics of ECB journeys by substituted mode of transport.

Substituted mode		Conventional bike		Car		Walk		Total	
Trip characteristics		Count	%	Count	%	Count	%	Count	%
Total	Total	188	23%	490	60%	138	17%	816	100%
City	Brighton	41	21.8%	175	35.7%	58	42%	274	33.6%
	Leeds	76	40.4%	138	28.2%	26	18.8%	240	29.4%
	Oxford	71	37.8%	177	36.1%	54	39.1%	302	37%
Gender	Female	123	65.4%	265	54.1%	89	64.5%	477	58.5%
	Male	65	34.6%	225	45.9%	49	35.5%	339	41.5%
Bike type	Longtail	80	42.6%	247	50.4%	78	56.5%	405	49.6%
	Front-loader	108	57.4%	243	49.6%	60	43.5%	411	50.4%
Purpose	Escort education (i.e. taking children to school or college)	23	12.2%	67	13.7%	68	49.3%	158	19.4%
	Commuting	94	50%	61	12.4%	0	0%	155	19%
	Shopping	17	9%	107	21.8%	14	10.1%	138	16.9%
	Entertainment or public activity	12	6.4%	91	18.6%	17	12.3%	120	14.7%
	Other escort (i.e. taking children to other activities)	20	10.6%	60	12.2%	13	9.4%	93	11.4%
	Personal business	5	2.7%	64	13.1%	9	6.5%	78	9.6%
	Visiting friends or relatives	4	2.1%	25	5.1%	10	7.2%	39	4.8%
	For fun	4	2.1%	9	1.8%	6	4.3%	19	2.3%
	Work	8	4.3%	1	0.2%	1	0.7%	10	1.2%
	Day trip	1	0.5%	5	1%	0	0%	6	0.7%
Trial week	First	52	27.7%	123	25.1%	38	27.5%	213	26.1%
	Second	36	19.1%	148	30.2%	21	15.2%	205	25.1%
	Third	52	27.7%	111	22.7%	39	28.3%	202	24.8%
	Fourth	47	25%	99	20.2%	40	29%	186	22.8%
	Fifth	1	0.5%	9	1.8%	0	0%	10	1.2%
Day	Weekend	25	13.3%	139	28.4%	28	20.3%	192	23.5%
	Weekday	163	86.7%	351	71.6%	110	79.7%	624	76.5%
Time	Morning	108	57.4%	200	40.8%	59	42.8%	367	45%
	Afternoon	54	28.7%	191	39%	51	37%	296	36.3%
	Evening	21	11.2%	73	14.9%	24	17.4%	118	14.5%
	Night	5	2.7%	26	5.3%	4	2.9%	35	4.3%
Cyclist	Primary	170	90.4%	464	94.7%	129	93.5%	763	93.5%
	Secondary	18	9.6%	26	5.3%	9	6.5%	53	6.5%
Passengers	Cyclist alone	101	53.7%	224	45.7%	39	28.3%	364	44.6%
	With passengers	87	46.3%	266	54.3%	99	71.7%	452	55.4%
Multi-purpose	No	149	79.3%	427	87.1%	123	89.1%	699	85.7%
	Yes	39	20.7%	63	12.9%	15	10.9%	117	14.3%
Trip obligation	No	34	18.1%	131	26.7%	37	26.8%	202	24.8%
	Yes	154	81.9%	359	73.3%	101	73.2%	614	75.2%

associated with women's trips and 1,281 miles with men's trips. Although women recorded a greater number of car-substituting ECB trips overall, men reported undertaking longer car-substituting journeys, with a mean distance of approximately 5.7 miles compared to 4.6 miles for women.

In line with Egan (2025), ECB trips fulfilled different purposes. The most common ECB trip purposes were escorting children to educational institutions (19.4%), commuting (19.0%), and shopping (16.9%), followed by participation in entertainment or public activities (14.7%). ECB commuting was mainly replacing conventional cycling trips (50%), while nearly half of walk-substituted trips (49.3%) were for escorting children to school. Car-replaced trips were more varied, with shopping (21.8%) and public activities

(18.6%) also significant.

Longtail and front-loader bikes were equally represented overall, though longtails were more frequently used⁴ in walking-substituted trips. Most trips occurred on weekdays (76.5%) and during the morning (45%), with car substitutions peaking at weekends (28.4%). Most trips were completed by the primary cyclist in the household (93.5%) and often with passengers, especially in walk-substituted trips (71.7%). Finally, a high proportion of all trips (75.2%) were reported to be obligatory, with active travel-substituted trips showing particularly notable associations with necessity.

Fig. 4 illustrates significant gender differences (Pearson Chi-square $p < 0.001$). Men were more likely to travel alone (53.4%) than women (39.8%), while women were more likely to travel with children. Although one-child trips were similar across genders (32.9% female, 37.8% male), the gap widened with additional children: 20.3% of female trips included two children and 6.7% included three, compared to 8.6% and 0.3% for males, respectively. These findings suggest that women were more likely to use ECBs for family-related travel, highlighting their role in supporting caregiving responsibilities, which disproportionately fall to women.

The reported average trip distance and duration were 4.71 miles and 28.7 min, respectively; however, cross-city variations existed (Fig. 5). Leeds, with its more peripheral suburbs, reported the highest mean distance (5.89 miles) and duration (35.69 min), along with the highest standard deviations, suggesting greater variability in travel patterns. Conversely, Oxford and Brighton demonstrated more consistent and shorter trips, with averages of 4.27 miles and 4.16 miles, respectively.

Finally, to determine whether city, household, and car ownership influenced key aspects such as mode substitution, travel distances and durations, a Multivariate Analysis of Variance (MANOVA) was performed. MANOVA results in Table 5 confirmed that both city and household have statistically significant effects across substituted mode, ECB trip distance, and duration, with p -values consistently below 0.001. Car ownership, however, significantly affects only the substituted mode variable ($p = 0.009$) and does not show a statistically significant influence on either trip distance or duration.

4.2. Quantitative analysis

Travel diary data showed that car travel was the most frequently substituted mode (60% of substituted trips), followed by conventional cycling (23%) and walking (17%). To examine the factors associated with these substitution patterns, binary and multinomial logistic regression models were estimated.

4.2.1. Model (1): ECBs substituting car vs active travel

Model 1 (Table 6) examines the characteristics associated with ECB trips that substitute car travel rather than active travel (walking and cycling combined). Importantly, Model 1 was intended to identify characteristics associated with observed substitution patterns rather than to predict mode choice.

4.2.1.1. Sociodemographic and household characteristics. Results revealed notable geographic variation. Respondents in Leeds ($p < 0.001$) and Oxford ($p = 0.010$) were significantly less likely than those in Brighton to replace car trips, reflecting contextual, infrastructural, and cultural factors. Leeds' trial zones were distant from the city centre, limiting ECB suitability due to longer travel distances. Brighton's supportive transport policies such as traffic-calming measures, low-speed zones, dedicated cycling lanes and expanded active travel infrastructure (CIVITAS, 2015; Durrant et al., 2018) may have facilitated ECB adoption. In Oxford, reflecting a strong cycling culture, ECBs likely supplemented existing active travel rather than substituting car use, given the city's compact form and higher baseline cycling levels.

Men were more likely than women to replace car trips rather than active travel trips when using the ECB ($p < 0.001$). This may reflect gender differences in baseline travel behaviour, where men, at least in the UK context, continue to be the primary car driver in the household and rely more heavily on cars (Lucas et al., 2019). Women, on the other hand, undertake a greater share of local and shorter walking or cycling trips, making ECB use more likely to replace car travel among men. Additionally, men may be more likely to use ECBs for direct trips such as commuting, where car substitution is more straightforward. In contrast, women often undertake more complex, multi-stop journeys involving caregiving responsibilities or errands (Scheiner, 2014; Scheiner, 2018; Yang et al., 2023).

Age and employment status were also associated with substitution patterns. Older adults (≥ 45 years) ($p < 0.001$) and retirees ($p = 0.001$) were more likely to use ECBs in place of cars rather than active travel (Fig. 6). This likely reflects lower baseline levels of walking and cycling among these groups, with the electric assistance and carrying capacity of ECBs eliminating physical barriers and enabling trips that might otherwise be made by car. Also, retirees may have more flexible schedules than employed individuals. This may reduce the advantage of the car in time-constrained situations.

However, individuals with higher education ($p < 0.001$) and higher physical activity levels ($p = 0.009$) were less likely to replace car travel, suggesting they may already favour active modes and thus use ECBs as a supplement rather than a substitute.

Regarding household structure, and confirming Ye et al.'s (2018) results, each additional child reduced the odds of car substitution, likely due to carrying capacity constraints. However, two-parent households were significantly more likely to replace car travel than single-parent households ($p = 0.001$), possibly because two-parent households may have more flexibility to organise travel and to negotiate care-related responsibilities.

Finally, households with two or more cars were more likely to replace car trips than those with only one car ($p = 0.004$). This

⁴ Households only had one type of cycle – bike type was not a choice for trips.

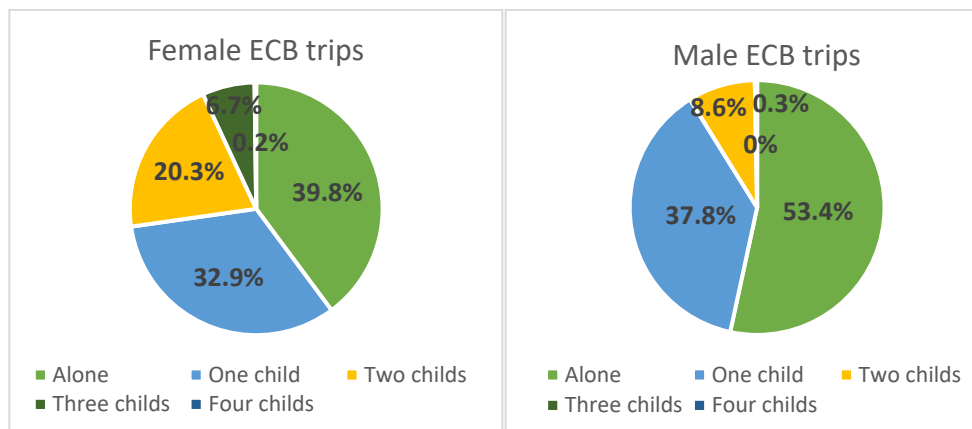


Fig. 4. Gender vs number of passengers.

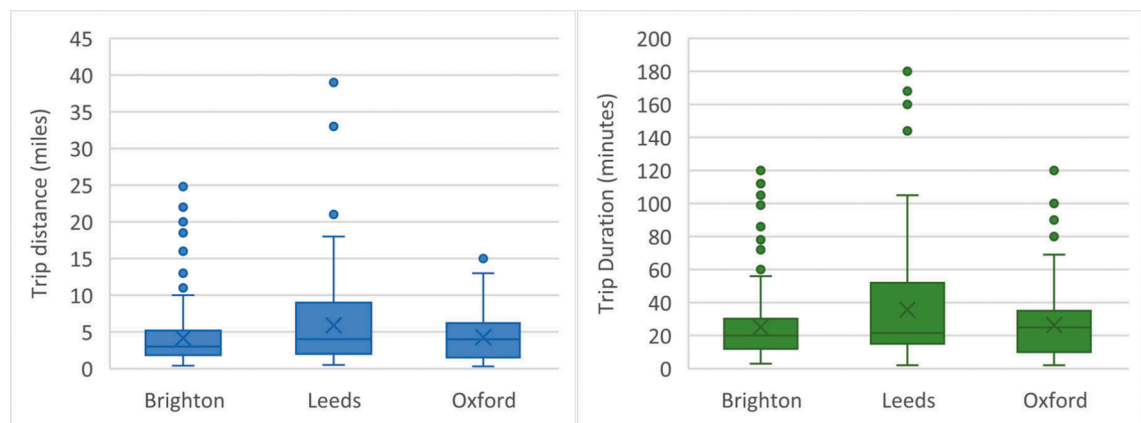


Fig. 5. Trip distances and durations.

Table 5

MANOVA analysis examining influences of cities, households, and car ownership.

	City			Household			Car ownership		
	F	p-Value	Sig.	F	p-Value	Sig.	F	p-Value	Sig.
Substituted mode	12.14	<0.001	***	7.587	<0.001	***	6.772	0.009	**
ECB trip distance	13.542	<0.001	***	9.835	<0.001	***	1.126	0.289	
ECB trip duration	14.844	<0.001	***	10.126	<0.001	***	0.015	0.904	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

Note: a key assumption underlying the robustness and reliability of MANOVA results is the homogeneity of variance-covariance matrices across groups. This assumption is typically assessed using Box's M test. In the present analysis, unequal sample sizes across the three cities led to a significant Box's M result ($p < 0.001$), indicating a violation of the covariance homogeneity assumption. To address this issue and maintain the robustness of the findings, a Scheffé post-hoc test was employed. Unlike other post-hoc procedures, the Scheffé test does not assume equal sample sizes or homogeneous covariances and allows for the examination of all possible contrasts among group means, including both pairwise and complex comparisons (Scheffé, 1953; Tabachnick and Fidell, 2013). However, it is important to note that the Scheffé test is known for its conservative nature, making it less likely to identify statistically significant differences.

contrasts with Barbour et al. (2019), who found that higher car ownership is associated with lower levels of substitution by active travel. The result suggests that, unlike conventional cycling or walking, ECBs are more effective in facilitating car substitution even within multi-car households.

4.2.1.2. *Built environment variables.* Storage significantly influenced the likelihood of substituting car trips with ECBs. Participants

Table 6
Binary logistic regression, car vs active travel (active travel as reference category).

Predictors (independent variables)	Model (1)	
	Exp (B)	Sig.
<i>Sociodemographic and Household characteristics variables</i>		
City (Brighton as reference)		
Leeds	0.119	0.000
Oxford	0.163	0.01
Gender (Female as reference)		
Male	9.919	0.000
Education (Further education as reference)		
Higher education	0.202	0.000
Age (below 45 as reference)		
45 or over	4.727	0.000
Household income (20 k-49.9 k as reference)		
50 k or more	1.789	0.078
Employment (working as reference)		
Non-working	1.968	0.084
Retired	8.982	0.001
Physical activity (below 150 mins as reference)		
150 mins or more	0.389	0.009
Children in HH (no children as reference)		
Children exist	2.328	0.146
Number of children in household	0.693	0.023
Number of parents in household	6.41	0.001
Car ownership (one as reference)		
Two or more	2.505	0.004
<i>Built environment variables</i>		
Housing (detached as reference)		
Semi-detached	2.205	0.012
Terraced, flat or caravan	0.409	0.197
Location (urban as reference)		
Suburban	0.4	0.101
Rural	2.071	0.345
Storage (garage as reference)		
Garden, yard, shed, or inside the house	0.453	0.02
Key storage issues (no issues as references)		
Issues exist	0.867	0.603
<i>Trial-related variables</i>		
Bike type (longtail as reference)		
Front loader	1.029	0.95
Trial duration	0.992	0.81
<i>Trip characteristics variables</i>		
Week	1.02	0.815
Day (weekend as reference)		
Weekday	0.607	0.056
Time (morning as reference)		
Afternoon	1.268	0.285
Evening	1.925	0.025
Night	1.442	0.506
Distance in miles	1.167	0.000
Duration in minutes	1	0.992
Cyclist (lead as reference)		
Secondary	0.285	0.003
Passengers (cyclist alone as reference)		
Cyclist with passengers	2.774	0.015
Number of passengers	0.517	0.004
Multi-purpose (no as reference)		
Yes	0.680	0.197
Purpose (commuting as reference)		
Entertainment or public activity	8.622	0.000
Escort education (taking children to school)	0.531	0.138
Other escort (taking children to activities)	5.586	0.000
Personal business	7.735	0.000
Shopping	8.735	0.000
Other trip purposes	1.933	0.129

(continued on next page)

Table 6 (continued)

Predictors (independent variables)	Model (1)	
	Exp (B)	Sig.
Trip obligatory (no as reference)		
Yes	1.731	0.054
Weather (sunny as reference)		
Rainy	1.025	0.938
Cloudy	1.529	0.129
Windy	2.889	0.017

McFadden R square = 0.33 (good model fit).

Hosmer and Lemeshow test sig.: 0.423.

Notes:

1) A collinearity diagnostic was performed to assess the Variance Inflation Factor (VIF) for the variables in the model. Two variables had VIF values exceeding 10, suggesting a high degree of multicollinearity. Consequently, these variables were excluded from the analysis. One variable – City – exhibited a VIF of 7.25, indicating a moderate level of multicollinearity. All remaining variables had VIF values ranging from 1 to 5, which suggests low intercorrelation among predictors and an acceptable range that is unlikely to distort the regression estimates.

2) Based on the reported trip counts, the odds of using the ECB for substituting car versus active travel were approximately 1.25 for women (265/212) and 1.97 for men (225/114). This yields an odds ratio of about 1.57, indicating that men are only around 1.6 times more likely than women to substitute car trips, rather than the much larger effect (9.919) suggested by the regression results. The large odds ratio for gender (and for some other predictors) in the regression model is likely driven by adjustment effects rather than the raw data. When additional variables such as trip purpose, distance, household structure, or load are included, the gender coefficient reflects differences after controlling for these factors, which can substantially inflate the estimated effect. Also, while the model includes 816 trips, these are drawn from 42 households, with many repeated observations from the same individuals and trips that share very similar characteristics. This may cause confounding or suppression effects—for example, if men tend to make longer, car-oriented trips while women make shorter, active ones. Controlling for these variables can amplify the apparent influence of gender, even when the unadjusted difference is relatively modest. That said, rather than taking their numerical magnitude at face value, the odds ratios should be understood as indicating the direction and relative strength of associations.



Fig. 6. A senior participant using an ECB instead of a car to transport allotment produce.

storing ECBs in sheds, gardens, or indoor spaces were less likely to replace car trips than those with garage storage ($p = 0.02$). This aligns with findings in Teixeira et al. (2023), which shows that limited storage is more strongly associated with substituting other modes than cars. Replacing car travel seems to require a high level of ease of use, whereas retrieving an ECB from less convenient storage—such as narrow or cluttered spaces—introduces friction that discourages its use for time-sensitive trips. These manoeuvrability constraints are less consequential when substituting walking or conventional cycling, where expectations of immediacy are lower.

4.2.1.3. Trip characteristic variables. Trip-related factors were strong predictors of whether ECBs replaced car use or active travel. Trip distance was positively associated with car substitution; each additional mile travelled increased the probability of replacing car travel ($p < 0.001$), reflecting the limitations of walking and conventional cycling over longer distances. Also, trips involving passengers were significantly more likely to displace car travel rather than active travel ($p = 0.015$). This further underscores the ECB's advantage in carrying capacity and is consistent with Sersli et al. (2020), who highlight that cycling with multiple children on a conventional bicycle can be physically demanding and stressful. However, increases in passenger numbers notably reduced this likelihood ($p = 0.004$), indicating the practical constraints of carrying capacity and the ECB's better fit for younger families with fewer children.

Trip purpose also had a marked influence. Compared to commuting, ECBs were more likely to replace cars rather than active travel for entertainment ($p < 0.001$), shopping ($p < 0.001$), personal business ($p < 0.001$), and escorting children to activities ($p < 0.001$). While studies like Bjørnarå et al. (2019) found that switching from car to bike was particularly challenging for grocery shopping due to carrying capacity, especially when children are involved, this was not fully reflected in our trials. Instead, many participants described adapting their behaviour—such as adjusting shopping frequency and purchase volumes or confining children and goods to available space to make ECB use feasible, highlighting the role of behavioural adaptation in enabling car substitution. Evening trips also showed higher likelihood of car substitution ($p = 0.025$), likely reflecting the greater time and schedule flexibility of evening activities relative to daytime obligations such as work or school travel.

Finally, weather effects were mixed: while rain and cloud had no significant impact, windy conditions were associated with a higher likelihood of car substitution ($p = 0.017$). This suggests that ECBs can be a compelling alternative to cars in adverse weather, particularly when wind diminishes the appeal of walking or unprotected cycling.

Model (1) Summary

Overall, the binary logistic regression model revealed that ECBs are more likely to substitute car travel rather than active travel among men, older adults, retirees, and multi-car households, with geographic differences reflecting local infrastructure and cycling cultures. Longer distances, child transport, and leisure-oriented purposes including shopping, entertainment and evening travel significantly increased the odds of ECBs replacing car trips instead of active travel trips. ECB storage also shaped substitution likelihood, with garage access facilitating greater car replacement.

4.2.2. Model 2: ECBs substituting car vs walking vs cycling

The binary regression analysis (Model 1) combined walking and cycling under a single 'active travel' category to capture broad trends between motorised and non-motorised mode substitution. However, walking and cycling differ significantly. To avoid obscuring these distinctions and to generate more nuanced insights, a multinomial logistic regression (Model 2) was estimated, differentiating between car, walking, and conventional cycling as substituted modes (Table 7).

4.2.2.1. Sociodemographic and household characteristics. Consistent with the binary model, variables such as city, gender, education, age, employment status, physical activity, and household structure remained significant. However, the multinomial analysis revealed distinct substitution patterns between walking and cycling.

While Leeds showed elevated but non-significant odds of substituting both walking and cycling compared to Brighton, Oxford exhibited a strong and statistically significant tendency for ECBs to replace walking instead of cars ($p = 0.004$). This suggests that in Oxford, ECBs primarily enhance walkable journeys by improving speed, comfort, and cargo capacity, rather than displacing car use.

Higher levels of education ($p = 0.005$) and physical activity ($p = 0.013$) were significantly associated with the likelihood of ECBs replacing walking rather than cars. In contrast, the substitution of cycling with ECBs was not statistically significant for these groups. This suggests that individuals with higher education and greater physical activity levels may prefer ECBs for short, walkable trips due to their convenience and efficiency, while continuing to value the health and fitness benefits of conventional cycling.

Households with more children were significantly more likely to substitute walking with ECBs ($p = 0.012$) but not cycling ($p = 0.935$). This indicates ECBs provide a practical alternative to walking in family contexts, offering improved convenience and load capacity. Supporting this, users of front-loader ECBs were more likely to replace walking trips than longtail users ($p = 0.016$), highlighting a design preference suited for short, family-oriented travel. Finally, car ownership did not significantly predict the substitution of either cycling ($p = 0.108$) or walking ($p = 0.113$) over car use, suggesting that while car ownership influences overall substitution behaviour, it does not affect which active mode is replaced.

4.2.2.2. Trip characteristic variables. Weekday trips were significantly more likely to replace cycling ($p = 0.024$), suggesting that ECBs are used to support structured, routine travel where conventional cycling would otherwise be used. This pattern complements the higher likelihood of car substitution observed for discretionary and weekend trips, where greater flexibility allows ECBs to replace car travel more readily.

Greater distance was strongly associated with a lower likelihood of substituting walking ($p < 0.001$), and marginally so for cycling ($p = 0.051$), reinforcing ECBs' value in bridging the gap between short active and long car-dependent journeys. Similarly, carrying passengers significantly decreased the odds of replacing walking ($p = 0.002$). Nonetheless, as the number of passengers increased, the likelihood of replacing walking rather than car travel rose sharply ($p < 0.001$). These findings suggest that, while ECBs are more likely

Table 7
Multinomial logistic regression, car vs bike vs walking (car as reference category).

Predictors (independent variables)	Model (2)			
	Conventional bike		Walking	
	Exp (B)	Sig.	Exp (B)	Sig.
<i>Sociodemographic and Household characteristics variables</i>				
City (Brighton as reference)				
Leeds	6.391	0.055	4.165	0.106
Oxford	3.007	0.315	20.61	0.004
Gender (Female as reference)				
Male	0.063	0.000	0.245	0.007
Education (Further education as reference)				
Higher education	0.839	0.765	6.95	0.005
Age (bellow 45 as reference)				
45 or over	145.6	0.000	0.544	0.351
Household income (20 k-49.9 k as reference)				
50 k or more	1.479	0.51	0.799	0.622
Employment (working as reference)				
Non-working/ retired	0.005	0.000	0.722	0.468
Physical activity (below 150 mins as reference)				
150 mins or more	1.156	0.803	3.514	0.013
Children in HH (no children as reference)				
Children exist	2.267	0.375	0.452	0.313
Number of children in household	1.898	0.012	1.019	0.935
Number of parents in household	0.728	0.724	0.079	0.000
Car ownership (one as reference)				
Two or more	0.400	0.108	0.468	0.113
<i>Built environment variables</i>				
Housing (detached as reference)				
Semi-detached	0.064	0.000	0.602	0.296
Terraced, flat or caravan	1.694	0.678	2.876	0.236
Location (urban as reference)				
Suburban	0.303	0.175	12.34	0.003
Rural	0.352	0.374	1.361	0.826
Storage (garage as reference)				
Garden, yard, shed, or inside the house	1.305	0.628	4.226	0.006
Key storage issues (no issues as references)				
Issues exist	0.359	0.019	2.4	0.107
<i>Trial-related variables</i>				
Bike type (longtail as reference)				
Front loader	3.697	0.105	0.157	0.016
Trial duration	0.69	0.000	1.142	0.002
<i>Trip characteristics variables</i>				
Week	1.094	0.448	0.87	0.263
Day (weekend as reference)				
Weekday	2.276	0.024	1.779	0.103
Time (morning as reference)				
Afternoon	0.684	0.223	0.726	0.295
Evening	0.446	0.051	0.715	0.410
Night	0.389	0.208	0.218	0.09
Distance in miles	0.924	0.051	0.47	0.000
Duration in minutes	1	0.921	1.005	0.684
Cyclist (lead as reference)				
Secondary	6.119	0.001	1.338	0.652
Passengers (cyclist alone as reference)				
Cyclist with passengers	0.849	0.799	0.164	0.002
Number of passengers	0.522	0.129	5.169	0.000
Multi-purpose (no as reference)				
Yes	3.654	0.001	1.129	0.783
Purpose (commuting/ work as reference)				
Children escorting trips	0.042	0.000	10.48	0.035
Other purposes	0.212	0.007	49.14	0.001
Trip obligatory (no as reference)				
Yes	0.286	0.001	0.432	0.028
Weather (sunny as reference)				

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Table 7 (continued)

Predictors (independent variables)	Model (2)			
	Conventional bike		Walking	
	Exp (B)	Sig.	Exp (B)	Sig.
Rainy	1.754	0.167	0.320	0.037
Cloudy	0.572	0.162	0.775	0.513
Windy	0.793	0.697	0.144	0.004

McFadden R square = 0.486 (excellent model fit).

to serve as a car rather than walking alternative when passengers are involved, their substitutional value becomes constrained as the number of passengers increases, given the continued superiority of car carrying capacity for larger groups.

Trip purpose revealed distinct substitution patterns between walking and cycling. Escorting children was significantly more likely to replace walking rather than car travel ($p = 0.035$) compared to commuting. Conversely, these journeys were far less likely to replace cycling instead of cars ($p < 0.001$), reflecting the modal share for such journeys. Similarly, discretionary activities (e.g. shopping, leisure) were more likely to replace walking rather than cars ($p = 0.001$), and less likely to replace cycling ($p = 0.007$). Together, these findings suggest that ECBs effectively replace walking for short, load-intensive, or family-focused travel. Further, they support the view that ECBs function better as a substitute for car use than as an upgrade to traditional bicycles—particularly for users who do not already rely on conventional bikes for child escorting.

Multi-purpose trips were notably more likely to substitute cycling rather than cars ($p = 0.001$). However, the substitution of walking was not significant ($p = 0.783$). ECBs may thus facilitate trip chaining, offering greater practicality than conventional cycling for complex journeys. Finally, obligatory trips were significantly more likely to substitute car use than either walking ($p = 0.028$) or cycling ($p = 0.001$), underlining ECBs' value in enabling car substitution not only for discretionary travel but also for essential, unavoidable journeys.

Model (2) summary

The multinomial analysis revealed important distinctions between ECB substitution of walking, cycling, and car travel that were obscured in the binary model. Results showed that ECBs are more likely to replace walking rather than car travel in contexts such as Oxford, among highly educated, physically active individuals, and families with children, especially for short, load-heavy trips, including shopping and child escorting. Cycling, on the other hand, was more commonly substituted by ECBs on weekday or multi-purpose trips, indicating ECBs often serve as a less physically demanding or more practical alternative to conventional cycling. Distance had a stronger negative influence on walking substitution than conventional cycling, underscoring ECBs' suitability for replacing trips that are too long for walking. The multinomial model further highlighted that trip purpose significantly shapes which mode is replaced, providing a more granular understanding of ECB use patterns and reinforcing ECBs' flexibility across diverse journeys and user needs.

4.3. Qualitative insights into mode substitution

While the quantitative analysis identified the circumstances under which ECBs were more likely to substitute car travel, walking, or cycling, interviews provided insight into the mechanisms and motivations underpinning these substitution patterns.

4.3.1. Perceived benefits of ECB use

4.3.1.1. Carrying capacity, electric assistance, and weather protection. The ECB's carrying capacity and motor assistance were two of its most valued features, enabling participants to transport children, shopping, and other loads on journeys that might otherwise require a car. Together, these features reduced the physical effort associated with carrying passengers and cargo (Fig. 7A,E), making many family-oriented trips more feasible than would be possible using conventional bikes. Mirroring Fyhri and Fearnley (2015)'s findings on e-biking, participants explained that the ECB's electric assistance enabled them to cycle more frequently and to reach farther destinations.

Also, in line with Rahman (2024), challenging weather conditions did not deter participants from ECB cycling. Weather-protective accessories like rain covers further enhanced convenience and featured offered that are typically associated with car travel (Fig. 7B,F), allowing participants to navigate inclement weather with enhanced comfort and confidence: "We had the rain cover on pretty much all through the winter because even when it wasn't raining it keeps [the children] warm from the wind" (O595⁵-Post. Winter-Woman).

4.3.1.2. Time savings and predictability. Another valued ECB feature was the ability to save travel time and improve journey predictability. Particularly for carers, travel time was experienced as a resource that needed to be carefully managed. Parents described

⁵ In the text, each household is identified by the initial letter of the trial city, followed by a unique number. For example, 'O581' refers to a household in Oxford, while 'L' and 'B' denote households from Leeds and Brighton, respectively.



A: Four-child household using the ECB for combined shopping and child transport trips

C: A two-child household using the ECB to transport one child, a baby in a child seat and a pet

E: A solo cyclist using the ECB to transport large water sport equipment along the river

B: Two ECBs equipped with different accessories: a baby seat (left) and a rain cover (right)

D: Parents using ECBs to foster cycling culture and sustainable travel practices among children

F: Three children being transported on a rainy day using a protective rain cover

Fig. 7. Illustrative examples of domestic ECB use across households and trip purposes.



Fig. 8. Need for ECB-friendly cycling infrastructure.

the ECB as a ‘massive time saver’, reducing the time and effort associated with travelling on foot with children. These findings support Egan (2025) and Te Brömmelstroet et al. (2022), who argue that travel time represents a significant burden within household mobility. As one full-time working mother of two explained:

“When I walk I start a journey and I don't know how long it's going to take...it's quite difficult to keep to schedules with a 2-year old...my toddler likes to stop every 2 min to see a snail or something...or...stop and have a tantrum, it can take us half an hour to do a 10-minute journey. This [bike] just allowed me to get home in a more predictable time.” (O72-Week.4-Woman).

4.3.1.3. Physical health. Several participants highlighted the health benefits of ECB use instead of driving. This was particularly evident among individuals who considered themselves less physically active. In line with [Bini et al.'s \(2024\)](#) suggestion that e-cycling can support individuals with poorer health outcomes, some of the less physically active trial participants viewed the ECB as an opportunity to integrate physical activity into everyday travel:

“It's also better for you...because you're not just sitting down...there was an element where I want to be able to combine exercise with functionality, so yes, we're going to do the school drop-off or yes, we're going to buy shopping but incidentally you get some exercise...I know you get much less exercise on an e-Bike but...it's better than nothing” (B182, Post.winter-Man).

For these users, ECBs combined everyday mobility with incidental physical activity. However, participants with higher levels of physical activity often preferred to use the ECB as a substitute for car travel or walking while continuing to rely on conventional bicycles for exercise and fitness, as a senior user noted: *“I value the exercise I get from a regular bike and that for me is quite important...so that's what makes me use a regular bike rather than the Cargo bike” (O24-Week.4-Man.75–79 years).*

4.3.1.4. Emotional and mental wellbeing. Participants highlighted the mental wellbeing benefits of ECB use, often contrasting these with the experience of travelling by other modes. Unlike sitting in an enclosed car, the open nature of ECB journeys fostered a greater sense of connection with the surrounding environment, allowing riders to enjoy summer weather and scenery. Parents and children described these journeys as happier, more relaxing, and more enjoyable than driving, as a mother of four noted: *“Really fun...that is smiles all round, smiles for miles” (B277-Week.4-Woman).* Parents valued the front-loading design, which allowed children seated in the front box or baby seat to remain within sight throughout the journey ([Fig. 7C](#)). This increased parents' sense of safety and reassurance compared with children seated behind on a conventional bicycle and enabled conversation, eye contact, singing, and shared experiences: *“I'd rather cycle outside than get in the car...because the weather's been so nice...it's fun because you can see him...chat to him...we had a lot of fun” (O7-Week.4-Woman).* Participants also appreciated the greater interaction with their surroundings, from waving to other road users to exchanging greetings with neighbours, fostering a stronger sense of community than travelling by car.

4.3.1.5. Environmental considerations and eco-awareness. ECB use was often embedded within broader household identities, values, and aspirations. Participants frequently referred to collective household commitments to cycling and sustainable travel. Environmental motivations featured prominently; several households reported making conscious efforts to avoid car use whenever possible and described feelings of satisfaction from replacing car journeys with ECB trips:

“It's been nice to make journeys that otherwise I would have used my car for...subconsciously you get a sense that you're doing some good by substituting your car...you are doing something for the planet and helping to be more sustainable” (B375-Week.4-Man).

Some participants associated car use with a sense of environmental guilt and deliberately prioritised the bike, occasionally making clear to their children that a journey would only take place by ECB and not by car. Further, echoing [Schmassmann et al. \(2024\)](#), parents described using the ECB as a means of fostering a cycling culture within the family. The bike provided opportunities to serve as role models and demonstrate that everyday life could be organised around alternatives to the car ([Fig. 7D](#)).

4.3.2. Learning, adaptation, and becoming a routine

4.3.2.1. Building confidence. Often, mode substitution was neither immediate nor straightforward. Instead, users described a gradual process through which confidence, familiarity, and experience expanded ECB use. Several participants initially used the bike for short and familiar journeys before progressively incorporating it into more complex or longer-distance travel, where other modes were substituted. Both genders actively used ECBs to substitute car travel. However, some women explained that it took time to build confidence. A female participant from the O581 household noted: *“In Week 4, once I gained confidence, I used the car less”.* Also, as confidence increased, participants described using the ECB for journeys they would not previously have considered cycling: *“We wouldn't just cycle for fun, but it was – I would book things that were farther away knowing that I could cycle there” (B247-Post.Winter-Woman).*

4.3.2.2. Adaptation. Behavioural adaptation extended to trip purpose and planning. Rather than abandoning ECB use when faced with carrying, logistical or time constraints, participants frequently adjusted shopping frequency, purchase volumes, journey organisation, or number of passengers carried to align with the ECB's capabilities. Some households described combining multiple activities into a

single trip, using the ECB's carrying capacity to facilitate trip chaining:

"It changed mine [travel habits] because for the shorter trips...I was using the bike...that would be principally my music stuff because it's...close enough for me to hop to it. I'd be carrying lots of stuff which...I could not carry. I could but I'd have to keep stopping and I'd be knackered when I got there and, on the way, back...We've not used the car for shopping...it was just convenient to stop...the linking of the trips" (L73-Week.4-Man-Retired)

4.3.2.3. From novelty to routine. Sustained ECB adoption required the gradual integration of the bike into everyday routines. While some participants acknowledged an initial novelty effect, many argued that the four-week trial was insufficient for the ECB to become fully embedded within household mobility practices. They suggested that longer-term access would allow families to reorganise routines, experiment with new travel patterns, and identify additional opportunities for car substitution. Over time, participants increasingly integrated the ECB into their everyday routines, particularly during the extended winter trials, where it evolved from a novel experience into a normalised mode of transport. As a mother of two explained:

"At first it was like a novelty, like 'let's go for a cycle', whereas then it became part of the routine of getting you from A to B rather than like a leisure activity, it was just your mode of transport, and I definitely went further in the winter trial because of the confidence" (B247-Post. Winter-Woman).

These findings suggest that the substitution potential of ECBs may increase over time as the bike becomes embedded within everyday mobility practices.

4.3.3. From car substitution to car ownership renunciation

A particularly important finding emerging from the interviews was that some households viewed the ECB not simply as a substitute for individual car trips, but as a potential substitute for car ownership itself. While many participants sought to reduce their reliance on cars, several multi-car households described the ECB as a realistic alternative to a second vehicle, either by avoiding the purchase of an additional car or by replacing an existing one. As one participant explained: *"We have two cars at the moment...we could replace the second car with an ECB" (O660-Week.4-Man).*

However, the high upfront cost of purchasing an ECB was frequently identified as a major barrier to adoption, even among our relatively affluent sample. Nevertheless, several participants justified the investment when comparing it with the ongoing costs of owning and operating a second car, including fuel, insurance, maintenance, parking, and vehicle depreciation. Households also highlighted the aforementioned long-term benefits of ECB ownership—benefits that a second car does not necessarily provide. One participant noted: *"Investing in an ECB is genuinely going to reduce our other transport costs... it has all these other benefits in terms of your health, wellbeing, and pollution...and it doesn't cost you anymore...then it becomes a...no-brainer" (L138-Week.4-Man).*

This finding is consistent with [Marincek et al. \(2024\)](#) and suggests that ECBs may facilitate a broader transition from car use reduction to partial car renunciation, whereby households increasingly reserve cars for longer-distance or exceptional journeys. Consequently, the benefits of ECB adoption may extend beyond trip-level substitution and contribute to more fundamental reductions in household car dependency and ownership.

4.3.4. Circumstances limiting ECB substitution

Journey distance was frequently cited as a barrier. Many participants described the ECB as highly effective for local travel but less suitable for longer-distance trips, highlighting a threshold of approximately 5–10 miles or around 30 min of ECB cycling, beyond which the car became more attractive. This was particularly evident for journeys involving children, where travel time and fatigue became important considerations. A mother of four explained that using the car was inevitable in some instances: *"It's just too far to get to [another city]...another trip we took by car because I needed to take three kids and at that point, we only had two of the seats for the ECB" (O595-Week.4-Woman).*

Family logistics also constrained substitution. Participants continued to rely on cars when transporting larger groups, carrying bulky items, or managing children's naps and comfort needs. A father of two explained that although the ECB had replaced most local car trips, some journeys still required the car because *"we needed the pram for [child]...they both were a bit under the weather and needed a sleep" (O660-Week.4-Father)*. Journeys involving four or five people, older children, or substantial shopping loads remained difficult to accommodate by ECB, underpinning the ECB's suitability for smaller families with younger children. When asked which households would benefit most from ECBs, participants consistently highlighted smaller families with young children: *"I would 100% recommend it especially if someone has small children...if someone was...going to buy a car or use this, I would...persuade them to go in this direction" (B153-Week.4-Man).*

Severe weather, perceived safety, physical limitations, and infrastructure were additional barriers. Darkness and roads perceived as unsafe for cycling occasionally led participants to revert to the car. Further, particularly women of shorter stature, found the size and weight of the ECB challenging to manoeuvre, reducing confidence and limiting the bike's use. Finally, concerns regarding theft, secure

parking, and the difficulty of combining ECBs with other modes further limited some trips.

Importantly, non-substitution was not always the result of physical constraints but rather of established habits, entrenched routines, uncertainty, or limited flexibility for certain journeys. This was evident for morning education trips, which were described as highly time-sensitive and governed by established routines, as a mother of two noted: “*We just have heightened levels of stress and we’re late...[Laughter]...mornings are stressful and it doesn’t matter whether it’s to do with bikes or this morning it was scooters*” (L45-Post. Winter Woman).

5. Further discussion, policy implications, and limitations

Building on the findings, this section reflects on the study’s contribution, wider implications, key policy recommendations, and limitations.

5.1. Contribution and sustainability potential

The findings provide nuanced and original insights into the role of ECBs in shaping mode substitution behaviour, with important implications across academic, societal, and policy domains. Unlike much of the existing literature, this study offers a more differentiated understanding of how ECBs interact with multiple travel modes. Importantly, the analysis is grounded in real-world data

Table 8

Summary of key findings, sustainability implications, and recommended policy interventions.

Key finding	Sustainability implication	Potential intervention
ECBs most frequently substituted car trips (60% of substituted journeys).	ECBs can contribute to reductions in vehicle kilometres travelled, energy use, emissions, congestion, and noise.	Include ECBs within local and national transport decarbonisation strategies and active travel programmes.
Men, older adults, retirees, and multi-car households were more likely to substitute car rather than active travel modes.	ECBs can penetrate groups that are typically more car-dependent and often difficult to engage through conventional active travel initiatives. ECBs help rebalance care-related responsibilities by encouraging greater involvement of fathers in everyday child mobility.	Target grants, trials, and promotional campaigns towards multi-car households, older adults, and carers.
Highly active and educated individuals were less likely to substitute traditional cycling.	ECB benefits and substitution outcomes vary across user groups.	Develop targeted rather than universal ECB policies, recognising different user needs and travel behaviours.
ECBs were particularly effective for substituting cars in shopping, leisure, and child-escorting trips.	Many discretionary and family-oriented journeys that are not feasible by conventional cycling can be shifted away from car use.	Prioritise ECB support around schools, local centres, shopping destinations, and community facilities.
ECBs enabled substitution of car in both discretionary and obligatory trips.	ECBs can support sustainable mobility beyond recreational travel and become part of daily travel.	Rethink ECBs into transport planning as a practical mobility option rather than a niche cycling intervention.
Passenger carrying substantially increased car substitution, although capacity constraints remained for larger families.	ECBs offer strong potential for smaller families with younger children but are not equally suitable for all household structures.	Focus family-oriented ECB programmes on households with one or two children and support innovation in larger-capacity designs.
Storage accessibility strongly influenced car substitution.	Physical infrastructure extends beyond cycle lanes; convenient storage is essential for smoother everyday use.	Introduce ECB-compatible storage standards in new housing developments and retrofit programmes.
Participants frequently adapted shopping, trip planning, and routines to accommodate ECB use.	Behavioural adaptation is an important component of modal shift.	Support users through ECB-specific training, advice, and trial schemes that facilitate experimentation and learning.
Confidence increased over time, some participants felt four weeks was insufficient to establish new habits.	Short-term trials may underestimate long-term substitution potential.	Expand long-duration loan schemes, workplace trials, and community-based ECB access programmes. Utilise local ECB trials to enhance popularity and to ‘normalise’ the bikes.
Some households viewed the ECB as a substitute for a second car, but the high upfront cost impose a key barrier.	ECBs may contribute to reductions in car ownership as well as car use, especially if they become affordable to wider groups.	Develop second-car replacement schemes, ECB purchase subsidies, loans and leasing schemes that target different economic groups.
Environmental values and a desire to model sustainable behaviour for children motivated use.	ECBs can contribute to intergenerational shifts in mobility norms and lower future car dependency.	Frame promotional campaigns around family mobility, sustainability cultivation, and children’s travel experiences.
Distance, larger family size, safety concerns, ergonomics, and inadequate infrastructure limited substitution.	ECB substitution remains conditional on supportive environments, household circumstances, and physical capabilities.	Invest in connected cycling networks, scenery lanes, school streets, secure parking, safer junction design, ECB-friendly infrastructure (Fig. 8), ergonomic and inclusive ECB designs to suit different users

collected from household trials, combining quantitative and qualitative insights. This mixed-methods approach provides a richer understanding of substitution behaviour by capturing not only what changes occur, but also why and how they unfold in everyday contexts, highlighting their broader implications.

The study advances knowledge by demonstrating that ECB substitution is not uniform but rather shaped by trip characteristics, household routines, infrastructure provision, and the gradual process of learning how ECBs can be integrated into everyday life. ECBs do not simply displace one mode but occupy a flexible position in the mobility system, simultaneously complementing and competing with other modes. Such insights challenge overly simplistic narratives of modal shift and call for refined analytical approaches in future research.

The findings also highlight the importance of recognising heterogeneity among households and individuals. Different population groups engage with ECBs in distinct ways, leading to varied substitution outcomes. For instance, men, older adults, retirees, and multi-car households were more likely to use ECBs to substitute trips car rather than active travel trips, whereas highly educated and physically active individuals were more inclined to substitute walking or integrate ECBs alongside existing cycling practices. Similarly, younger households with fewer children and access to adequate storage were better positioned to realise the car-substitution potential of ECBs. These distinctions underscore that ECB adoption and its sustainability benefits are not evenly distributed but are shaped by socio-demographic, household, and built environment conditions. The study also highlights the importance of behavioural adaptation in enabling modal shifts. Participants described adjusting their routines, trip patterns, and expectations to accommodate ECB use. This again stresses that the transition to sustainable mobility is not purely a matter of infrastructure or technology but also involves learning, experimentation, and adaptation over time.

The adoption of ECBs can contribute meaningfully to reducing car dependency. They may not fully replace cars. However, their ability to substitute a significant share of everyday trips can lead to substantial reductions in vehicle miles travelled, emissions, noise pollution, and congestion, while enhancing road safety. Importantly, the study shows that ECBs are not limited to replacing 'easy' or recreational trips but can also support substitution in more complex and obligatory travel contexts. This broadens their relevance as a practical mobility solution rather than a niche or lifestyle-oriented alternative. Parents also used ECBs to actively cultivate environmental awareness and cycling habits among children, helping to shape long-term mobility norms away from car dependence. Economically, reducing reliance on (second) cars can lower travel costs. However, supportive mechanisms are required to make ECBs more accessible (Bissel and Becker, 2024), ensuring that adoption is not concentrated among affluent families, although car substitution potential is high in these groups.

5.2. Recommended policy interventions

The findings have implications for policy and planning contexts aimed at reducing car dependency and promoting sustainable mobility. They suggest that a 'one-size-fits-all' approach to promoting ECBs is likely to be less effective. Instead, targeted strategies are required to maximise ECBs' uptake and impact. The study identifies (1) household types and user groups most likely to substitute car travel, (2) the infrastructure, support mechanisms, and enabling conditions required to facilitate substitution, and (3) ECBs' potential to support broader transitions from car use reduction to reduced car ownership. Table 8 summarises these key findings and their associated implications and interventions.

5.3. Limitations

The study draws on a self-selecting sample of households already interested in ECB use and with access to sufficient resources, which limits the generalisability of the findings and raises questions about affordability and accessibility, particularly for lower-income groups. Findings may be transferable to similar suburban and *peri*-urban contexts characterised by high car dependency, yet broader applicability should be interpreted with caution. Nevertheless, the sample reflects the demographic profile of current early ECB adopters in the UK and therefore provides valuable insights into the factors shaping ECB mode substitution during this early stage of market uptake. Other limitations include the potential for inaccuracies in participants' self-reported data (Prelicpean et al., 2018), and the potential for social desirability bias (Larson, 2018), where participants may, for instance, exaggerate the influence of environmental motivations on their actual mode choices.

6. Conclusion

This study examined the role of ECBs in shaping mode substitution within everyday household mobility, providing detailed insights into when, how, and for whom ECBs replace car travel, walking, and conventional cycling. Drawing on quantitative travel diary data and qualitative evidence from real-world household trials, the findings show that ECBs most frequently substituted car trips, particularly for short- to medium-distance journeys involving child escorting, shopping, and other everyday activities. However, substitution

was not uniform. It varied according to socio-demographic characteristics, household composition, built environment factors, trip characteristics, and the gradual process through which households learned to integrate the ECB into their daily routines. While men, older adults, retirees, and multi-car households were more likely to substitute car rather than active travel, highly educated and physically active participants were more likely to replace walking or incorporate ECBs alongside existing cycling practices. Convenient storage, together with journey distance, passenger load, and trip purpose, further shaped substitution outcomes. Importantly, these differentiated patterns should not overshadow the broader finding that families across varied household structures and journey types used ECBs to replace substantial numbers of car trips and vehicle miles.

A key contribution of this research lies in moving beyond simplified understandings of modal shift. Rather than treating substitution as a straightforward replacement of one mode by another, the findings demonstrate that ECB adoption is a gradual and adaptive process. Participants described building confidence, modifying routines, adapting travel behaviours, and progressively integrating the bike into everyday mobility. These behavioural processes were critical in enabling car substitution and suggest that short-term evaluations may underestimate the longer-term potential of ECBs. The study also identifies the circumstances that continue to constrain substitution, including larger family size, longer journey distances, safety concerns, ergonomics, and inadequate infrastructure, highlighting that successful adoption depends on supportive environments as well as household circumstances.

Beyond reducing individual car trips, the findings indicate that ECBs may contribute to broader transitions away from car dependency. The ECBs were frequently viewed as a realistic alternative to a second car, suggesting that the benefits of adoption may extend from reducing car use to reducing car ownership. Combined with wider benefits for physical activity, wellbeing, environmental awareness, and the cultivation of sustainable travel habits among children, ECBs represent more than an alternative transport mode; they offer a practical mechanism for supporting long-term household mobility transitions.

Overall, this study demonstrates that ECBs offer a flexible and context-dependent pathway towards more sustainable mobility. Their contribution lies not only in replacing car trips but also in reshaping everyday family travel practices through learning, behavioural adaptation, and routine formation. By providing a richer understanding of the conditions under which ECBs substitute different transport modes, this study contributes to academic debates on sustainable mobility transitions while offering practical evidence to inform targeted policies aimed at reducing car dependency and supporting wider uptake of family-oriented cycling.

CRedit authorship contribution statement

Labib Azzouz: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Noel Cass:** Writing – review & editing, Writing – original draft, Methodology, Data curation. **Zhaoqi Zhou:** Writing – review & editing, Writing – original draft.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this paper the authors used ChatGPT in order to only improve the readability and language of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the article.

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Appendix 1. Sample characteristics

City	ID	Age	Gender	Employment status	Education		Household income	Children in household				Adults		Daily physical activities (minutes)	Car ownership	Home and zone		
					Further education	Higher education		0-4 years	5-9 years	10-14 years	15-17 years	18-64 years	+ 65 years			Housing type	Storage	Urban-ness
Leeds	L18	35-39	Man	Employed	Yes	Yes	£50,000 or more	0	0	0	0	1	0	150 or more	1	Terraced	Shed	Urban
Leeds	L45	40-44	Woman	Employed	Yes	Yes	£50,000 or more	1	1	0	0	2	0	150 or more	1	Detached	Garage	Suburban
Leeds	L57	55-59	Man	Employed	Yes	No	£50,000 or more	0	1	1	0	2	0	150 or more	1	Semi-detached	Shed	Suburban
Leeds	L73	60-64	Man	Retired	Yes	Yes	£50,000 or more	0	0	0	0	2	0	150 or more	2	Semi-detached	Shed	Suburban
Leeds	L82	50-54	Woman	Employed	Yes	Yes	Don't know / not say	0	0	1	1	2	0	30-150	2	Terraced	Shed	Urban
Leeds	L138	40-44	Man	Employed	Yes	Yes	£50,000 or more	0	1	0	0	1	0	Less than 30	2	Semi-detached	Shed	Rural
Leeds	L180	40-44	Woman	Looking after home or family	Yes	Yes	Don't know / not say	2	0	0	0	2	0	150 or more	3 or more	Detached	Garage	Rural
Leeds	L203	40-44	Man	Employed	Yes	Yes	£50,000 or more	0	0	0	0	2	0	150 or more	2	Terraced	In house	Suburban
Leeds	L208	40-44	Woman	Employed	Yes	Yes	£50,000 or more	0	0	1	0	2	0	30-150	1	Semi-detached	Garage	Suburban
Leeds	L241	40-44	Man	Employed	Yes	Yes	£50,000 or more	2	0	0	0	2	0	Less than 30	2	Detached	Shed	Rural
Leeds	L258	40-44	Woman	Employed	Yes	Yes	£50,000 or more	0	0	2	0	2	0	150 or more	2	Detached	Garage	Suburban
Leeds	L289	65-69	Man	Retired	Yes	No	£20,000-£49,999	0	0	0	0	1	1	150 or more	1	Semi-detached	Garage	Suburban
Leeds	L293	55-59	Man	Employed	Yes	Yes	£50,000 or more	0	0	0	0	3	0	150 or more	2	Detached	Garage	Rural
Leeds	L295	40-44	Woman	Employed	Yes	Yes	£50,000 or more	0	0	0	0	2	0	30-150	2	Terraced	Garage/back of house	Urban
Leeds	L300	30-34	Man	Employed	Yes	Yes	£50,000 or more	0	0	0	0	2	0	150 or more	1	Terraced	Kitchen	Urban
Leeds	L303	40-44	Man	Employed	Yes	Yes	£50,000 or more	1	1	0	0	2	0	150 or more	2	Semi-detached	Garage	Suburban
Leeds	L323	40-44	Woman	Employed	Yes	Yes	Don't know / not say	1	0	0	0	2	0	30-150	1	Caravan	Lean-to	Rural
Leeds	L329	30-34	Man	Employed	Yes	Yes	£50,000 or more	1	0	0	0	2	0	150 or more	1	Semi-detached	Garage	Suburban
Oxford	O7	35-39	Woman	Employed	Yes	Yes	£50,000 or more	1	0	0	0	2	0	150 or more	1	Detached	Garage	Suburban
Oxford	O11	45-49	Man	Employed	Yes	Yes	Don't know / not say	0	0	2	0	2	0	150 or more	0	Semi-detached	Garden	Suburban
Oxford	O12	40-44	Woman	Employed	Yes	No	£20,000-£49,999	1	1	0	0	2	0	Less than 30	3 or more	Detached	Garage	Suburban
Oxford	O23	60-64	Woman	Employed	Yes	No	£20,000-£49,999	0	0	0	0	1	1	150 or more	2	Semi-detached	Garage	Suburban
Oxford	O24	75-79	Man	Retired	Yes	Yes	£20,000-£49,999	0	0	0	0	0	2	150 or more	2	Detached	Garden	Suburban

Oxford	O61	65-69	Woman	Employed	Yes	No	£20,000-£49,999	1	0	0	0	2	2	150 or more	3 or more	Semi-detached	Passage to the garden	Suburban
Oxford	O72	40-44	Woman	Employed	Yes	Yes	£50,000 or more	1	1	0	0	2	0	30-150	1	Detached	Garage	Suburban
Oxford	O85	40-44	Man	Employed	Yes	Yes	£50,000 or more	0	0	0	0	2	0	30-150	2	Semi-detached	Garage	Suburban
Oxford	O563	40-44	Woman	Looking after home or family	Yes	No	£20,000-£49,999	2	0	0	0	2	0	150 or more	2	Detached	Garage	Suburban
Oxford	O581	35-39	Man	Employed	Yes	Yes	£50,000 or more	1	0	0	0	2	0	150 or more	1	Detached	Garage	Suburban
Oxford	O589	35-39	Man	Employed	Yes	Yes	£20,000-£49,999	0	0	0	0	2	0	150 or more	1	Terraced	Garage	Suburban
Oxford	O595	35-39	Woman	Employed	Yes	Yes	£50,000 or more	1	3	0	0	2	0	150 or more	1	Detached	Garage	Suburban
Oxford	O646	45-49	Man	Employed	Yes	Yes	£50,000 or more	1	0	0	0	2	0	30-150	2	Semi-detached	Garden	Suburban
Oxford	O660	30-34	Man	Employed	Yes	Yes	£50,000 or more	2	0	0	0	2	0	30-150	2	Semi-detached	Garage	Suburban
Oxford	O692	40-44	Man	Employed	Yes	Yes	£50,000 or more	0	1	2	1	1	0	30-150	1	Detached	Garage	Suburban
Oxford	O700	30-34	Man	Employed	Yes	No	£20,000-£49,999	2	0	0	0	2	0	150 or more	1	Semi-detached	Garden	Suburban
Brighton	B10	40-44	Woman	Unemployed	Yes	Yes	£20,000-£49,999	0	0	2	0	2	0	150 or more	2	Detached	Garage	Suburban
Brighton	B38	35-39	Woman	Looking after home or family	Yes	Yes	£50,000 or more	2	1	0	0	2	0	30-150	1	Terraced	Hallway	Urban
Brighton	B55	35-39	Woman	Employed	Yes	Yes	£50,000 or more	2	0	0	0	1	0	150 or more	1	Detached	Yard	Urban
Brighton	B107	45-49	Woman	Employed	Yes	Yes	£50,000 or more	0	0	2	0	2	0	150 or more	1	Detached	Garage	Suburban
Brighton	B131	70-74	Woman	Retired	Yes	Yes	£50,000 or more	0	0	0	0	0	2	150 or more	2	Detached	Garage	Suburban
Brighton	B153	25-29	Man	Employed	Yes	Yes	£50,000 or more	0	0	0	0	1	0	150 or more	1	Flat	Garage	Urban
Brighton	B171	35-39	Woman	Employed	Yes	Yes	£50,000 or more	1	0	0	0	2	0	150 or more	1	Terraced	Yard	Urban
Brighton	B172	40-44	Woman	Employed	Yes	Yes	£20,000-£49,999	5 or more	1	2	0	2	0	150 or more	2	Semi-detached	Garage	Suburban
Brighton	B182	45-49	Man	Employed	Yes	Yes	£50,000 or more	0	1	0	0	1	0	150 or more	1	Semi-detached	Garden	Suburban
Brighton	B247	25-29	Woman	Employed	Yes	Yes	£20,000-£49,999	2	0	0	0	2	0	150 or more	1	Flat	Garage	Urban
Brighton	B261	40-44	Woman	Not employed/ other reasons	Yes	Yes	Don't know / not say	0	1	0	0	2	0	30-150	2	Terraced	Garden	Urban
Brighton	B277	40-44	Woman	Employed	Yes	Yes	£50,000 or more	1	2	1	0	2	0	30-150	1	Semi-detached	Hallway	Urban
Brighton	B354	30-34	Woman	Looking after home or family	Yes	Yes	£20,000-£49,999	2	0	0	0	2	0	30-150	3 or more	Semi-detached	Garage	Suburban
Brighton	B357	35-39	Man	Employed	Yes	Yes	Don't know / not say	4	0	1	0	2	0	150 or more	2	Semi-detached	Yard	Urban
Brighton	B400	45-49	Man	Employed	Yes	Yes	Don't know / not say	0	0	0	0	2	0	30-150	1	Terraced	Hallway	Urban

Data availability

Research Link Provided

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