Use it and keep it ? Insights from an e-bike trial program in Quebec

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Short summary

As a low-carbon transportation mode, e-bikes are promising for the ecological transition of the transportation sector. Even though they are fairly common in several regions of the world, they are mainly used by "early adopters" in North America, particularly in the Quebec province of Canada. To evaluate the effectiveness of an e-bike trial in shifting people's attitudes towards e-bikes and the barriers that prevent them from e-cycling, we use the data from the Velovolt project in Québec. These include both pre- and post-surveys as well as GPS data. We find that the way participants actually used their e-bikes and the characteristics of their cycling environment had much more impact on their intention to buy an ebike than their socioeconomic characteristics. This shows that transport planners should favor the development of infrastructure and e-bike-trial programs to encourage e-bike adoption.
Keywords: E-bike, Cycling behavior, Modal shift, GPS Data

1 Introduction

Modal shift from cars to less emissive transport modes is essential to mitigate climate change. Among these less emissive modes are public transport, as well as bicycle and e-bikes. The latter are a promising alternative for urban and peri-urban contexts, as they are more flexible than public transport, allow for longer distances than regular bikes and walking, and can reach varied segments of the population. However, e-bikes are not widely developed, and even less in North-American contexts.

To help implement efficient and targeted policies to encourage modal shift to e-bikes, it is therefore necessary to understand the reasons leading users to buy or not to buy e-bikes. To do so, trials and surveys have been implemented in the last 10 years, starting with the Netherlands and China (de Kruijf et al., 2018), showing a general satisfaction of e-bike as a transport mode, and an increase in the modal share of e-bikes after a trial. However, these were mostly done in countries where regular bikes are already highly used, contrary to North America, and are therefore hardly transferable. Moreover, these studies mostly consisted in longitudinal surveys, containing socioeconomic and satisfaction questions, but only declarative data on the e-bike trips characteristics. Behavioral data (GPS data) was used in Cairns et al. (2017) and de Kruijf et al. (2018); De Kruijf et al. (2019), but only to compute distance traveled and days with e-bike use. de Kruijf et al. (2018) recommended further research based on the "route characteristics" like "quality and safety of cycling infrastructure", and underlined the difference in contexts between the Netherlands and North America (de Kruijf et al., 2018).

To fill in these gaps, the Vélovolt initiative was implemented in Québec by a local NGO, Equiterre. In this project, each participant tried an e-bike with a GPS device for a few weeks and completed a pre- and post- survey concerning their perception and intention to buy an e-bike. Their GPS data were collected to have objective behavioral information on the trips they made and the routes they used. Having both declarative and behavioral data makes this dataset an opportunity to explore the use of e-bikes in Québec. From a policy point of view, it allows us to understand which are the incentives that could be implemented to target specific type of e-bike users, as participants are asked what would be most suitable to them. In a global context of scarce public funds, efficient measures have to be encouraged.

The aim of this paper is therefore to :

- Understand how participants have used the lent e-bikes ;
- Combine the behavioral data (GPS) and declarative data (surveys) to explain the participants' intention to buy an e-bike;
- Identify the measures that can be implemented to encourage the adoption of e-bikes in a context of high car usage and low bike modal share.

2 Materials and methods

Materials

The Velovolt campaing was launched by the Equiterre association in 2021, to study the potential modal shift from cars to e-bikes in the Quebec province in Canada. Companies, non-governmental organizations, public administrations and educational institutes could apply on the Equiterre website to participate in the project. The selection was made based on their capacity and motivation to implement the Velovolt programm, and to ensure the geographical and organization type diversity. For the 34 selected organizations, an initial survey was sent to identify the volunteers among employees, with socio-demographic and mobility questions. Finally, participants to the trial were selected among the volunteers that used their car as their main commuting mode (see Figure 1). More detailed descriptions can be found in the project report (Equiterre, 2024).
The trials took place between June and December 2022 and April and December 2023. Participants were issued an e-bike for 5 to 35 days, with most trials lasting 2 weeks. The lent e-bikes were Gazeel Medeo T9, with a battery capacity that can theoretically last up to 88km. Each e-bike was equipped with a GPS sensor provided by the company ConnectedCycle, that was automatically started when the e-bike was used. The position, speed and elevation of the e-bikes are collected every 30s, with a precision of 10m.

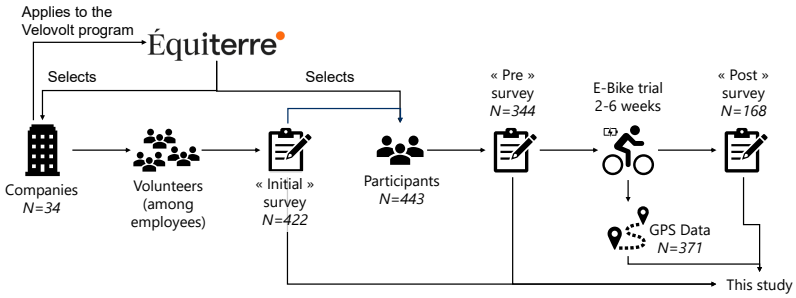


Figure 1: Description of the trial process.

Participants had to complete two surveys, a pre- survey before getting their e-bike and a post-survey after finishing their trials. Completing the post- survey was supposedly mandatory with the participation in the trials, but only the response rate of this post- survey was only 44.6%. Variables included in the initial survey are age, gender, occupation, household income (optional), household number of cars, bikes and e-bikes, number of persons per household and their characteristics, as well as information on the workplace and the working-from-home frequency, and information on the current mobility behavior of the respondents, including the most frequent mode used for commuting.
The pre- and post- surveys contained questions regarding what participants thought would prevent them to use an e-bike (barriers) and their intention to purchase an e-bike. The post- survey also contained specific questions reflecting on the experience of the participants during the trial (safety mainly) and their wishes for the incentives and actions that could be implemented to encourage them to shift to e-bikes.

In the end, 443 participants are present in our dataset. Among them, only 185 completed all surveys (initial, pre- and post-) and 234 completed the initial and the pre- survey. Some users only completed the post survey, having started their trials at the beginning of the campaign, when all the surveying tools had not been implemented yet. The number of users per survey is displayed in figure 2.

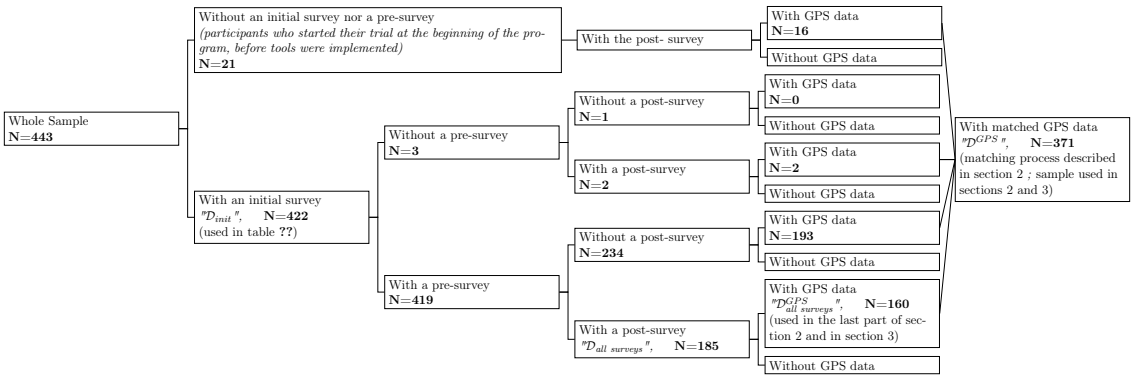


Figure 2: Samples and number of users in each sample. The notations between quotes are the names given to the samples in the rest of the paper. The matching process between the users and the GPS data are presented in section 2.

Due to the trial design (employees of voluntary companies, in the main urban Quebec regions), the persons who volunteered to participate are not representative of the Quebec population. They are mostly between 45 and 54 years old, with a low representation of younger persons. It is interesting to see that there are a lot of couples without children : this could be due to a self-censorship to participate in an e-bike trial when you have children to drop and fetch. Most of the volunteers have a fixed workplace (by the trial design), in a larger proportion than Quebec residents (around 93% compared to 84% in the general population). There are less car users for commuting (64% compared to 78%), which could be explained by the urban nature of the regions. Regarding mobility, most household have bikes (91%) but they are probably mostly used by children or for leisure, as less than 10% of the participants use them frequently to commute. Most participants do not have either a transit pass or are member of car/bike sharing services, which seems to suggest that the offer is not available or matching their needs. To study modal shift towards a new alternative offer, it is therefore a very interesting sample.

The GPS Data were processed using the methodology developed in De Rolland et al. (2025) to define trips and map-match them to bicycle networks. The median observed speed is 20 km/h, with a median ride duration of 26mn and a median length of 12.3 km.

Methodology

Matching of the GPS data with the survey data. Each bike was attributed a unique id, but not matching key between the bikes and the participants were provided. Further processing was therefore needed to match the survey data to the GPS data of the bikes.
The matching was done based on three main characteristics: the organizations users belong to, their trial period, and their home and work addresses. An iterative algorithm was used based on the number of times the GPS trips crossed home and work adresses, as well as the availability of the bikes. The obtained datasets are presented in figure 2. The rest of the paper focuses on dataset $\mathcal{D}^{GPS}_{init}$ (the 371 participants who were matched with e-bikes, representing 83.7% of $\mathcal{D}_{init}$) and dataset $\mathcal{D}^{GPS}_{all\ surveys}$ (the 160 participants who completed all surveys, including the post-survey, and who were matched with e-bikes, representing 86.5% of $\mathcal{D}_{all\ surveys}$).

Classification of the rides and users. To reduce the number of variables in the GPS trips and characterize better the trajectories, a Factor analysis of mixed data (FAMD) is applied to the variables defined in table 1 using the `famd` function of the `prince` library in `python 3.12.4`. The FAMD allows to account for both the quantitative and boolean variables. On the projected variables resulting from the FAMS, a clustering analysis is conducted using the kmeans algorithm. Clusters of ride typologies are therefore obtained.
Based on these clusters of rides, it is possible to define vectors describing the behavior of a participant: $v_u = [p^0_u, ..., p^{n_c}_u]$ with p^i_u the proportion of the rides made by participant u in cluster i and n_c the number of ride clusters obtained at the previous step. These participants' vectors are in turn clustered to obtain participants' clusters.
Combination of behavioral data (GPS) and declarative data (surveys). Using the variables available in the survey, the user's clusters are compared to their declared intention to buy

Category	Variable	Unit	Definition
Trajectory	Length of the ride	m	Sum of the segments between two GPS points for a given ride
	Duration of the ride	s	Time difference between the last and first GPS point of the ride
	Speed	km/h	Length of the ride (converted to km) divided by the Duration of the ride (converted to hours)
Cycling Environment	Proportion of the ride on the bicycle network	%	Proportion of the GPS points matched to the bicycle network as defined in De Rolland et al. (2025). GPS points are collected every 30s.
	Proportion of the ride on the protected bicycle network	%	Same as above, but including only the points matched to cycle tracks physically separated from the car network (see De Rolland et al. (2025))
Weather	Wind Speed	km/h	Variables provided by the Canadian Center for Climate Services **?** for the closest station to the starting point of the ride
	Precipitation Amount	mm	
	Temperature	°C	
Geometric	Detour	-	Ratio between the length of the trajectory following the points one by one and the distance between the first and the last point.
	Ratio Deviation to Straight Line	-	Ratio between the Deviation and the distance between the first and last point. The Deviation is the mean distance between the trajectory and a straight line.
Calendar	Departure Time during Peak Hours	Boolean	Equals 1 if the timestamp of the first point of the ride is between 5 a.m. and 8:59 a.m. or between 3 p.m. and 6:59 p.m. and 0 otherwise. The peak hours are chosen defined to the Origin-Destination Survey conducted in Montreal (ARTM, 2020)
	Is a weekend day	Boolean	1 if the first point of the ride is happens during a Saturday or a Sunday; 0 otherwise
	Is a Saturday	Boolean	1 if the first point of the ride is happens during a Saturday; 0 otherwise
	Is a Sunday	Boolean	1 if the first point of the ride is happens during a Sunday; 0 otherwise

Table 1: Variables used for the rides definition and classification.

an e-bike, as well as the barriers they perceive to using an e-bike and to the incentive they declare preferring. To do so, preprocessing was applied to the two questions dedicated to the purchase intention, in order to group the answers in 3 main categories : "Yes", "No" and "Maybe" (see table 2).
When looking at the whole sample with GPS data ($\mathcal{D}^{GPS}$, the 193 missing post- surveys are very visible (see figure 3). The proportion of "Yes" (56.1%), "Maybe" (53.8%) and "No" (55.6%) pre-surveys with empty post- surveys are quite similar, which limits non-response bias. For the 160 participants with both a pre- and a post-survey and GPS data ($\mathcal{D}^{GPS}_{all\ surveys}$), evolutions of the participant' answers between the pre- and the post- surveys are then defined. Using these evolutions, for each user, both the post- answer and the evolution are compared to the participant's cluster defined previously.

Simplified category	Answer to: "Are you planning on buying an e-bike ?"	Answer to: "In which time frame ?"	pre- survey: N=	post- survey: N=
Yes	"Yes"	"In the current year"	35	29
	"Yes"	"Within 2 years"	72	47
Maybe	"Yes"	"In more than 2 years"	12	12
	"Maybe"	-	198	64
No	"Don't know"	-	27	8
	"No"	-	9	18
-	Empty answer	-	18	193

Table 2: Answers to the purchase intention questions and assigned simplified categories among the 371 users with matching GPS data ($\mathcal{D}^{GPS}$, see figure 2). "Empty" answers means the survey was not completed by the user.

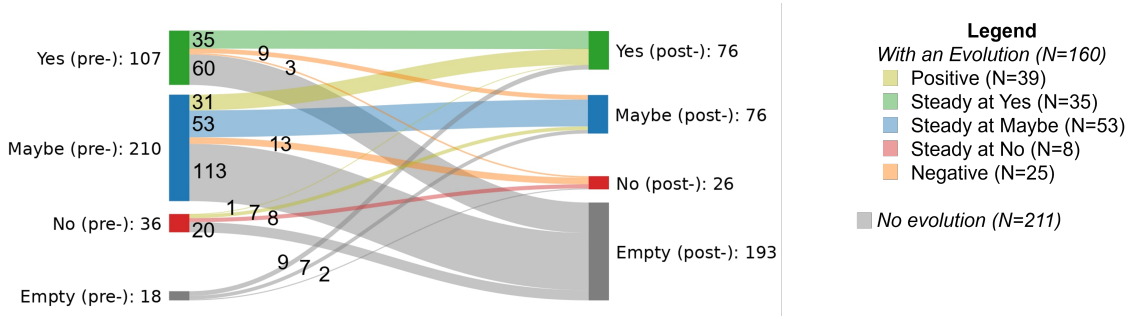


Figure 3: Evolution between the pre- and post- surveys for the 371 participants with matching GPS data ($\mathcal{D}^{GPS}$, see figure 2). "Empty" answers means the survey was not completed by the user. The participants with an evolution are participants who answered both the pre- and the post- survey ($\mathcal{D}^{GPS}_{all\ surveys}$).

3 Results and discussion

Classification of the rides

Projecting the variables via an FAMD first shows us the different axis of differences between the observed rides (see figure 4). These are consistent with the categories of variables as presented in table 1: PC1 corresponds to the calendar variables (day dummies), for 23% of the variance, PC2 to the duration/length of the trip, PC4 to the peak hour dummy, PC5 to the use of the bicycle network and PC6 to the geometric aspects. The first 8 components (out of 14) are kept for the clustering analysis, as they explain more than 80% of the variance.
Based on these projected variables, the k-means algorithm is applied. The knee method indicates to search for 8 clusters of rides. Values of each variable in the obtained clusters are presented in figure 5, as well as the name given to the clusters according to their stronger characteristics. The time of day (peak-hour or not) as well as the use of the bicycle network are crucial characteristics, and it is interesting to see that they are very differentiating. Most week-end trips (R5 and R6) happen off-peak hour, and use regularly the bicycle network (around 40% for the regular network), with longer trips than the weekday trips (R1 to R4). Long trips (R7) do not happen on week-ends, contrary to what is expected. Finally, there are very few trips with bad weather (R8, N=26, less than 1% of the trips), which is possibly due to the months of the trial. It could also be interpreted as participants not using the e-bikes under bad weather.

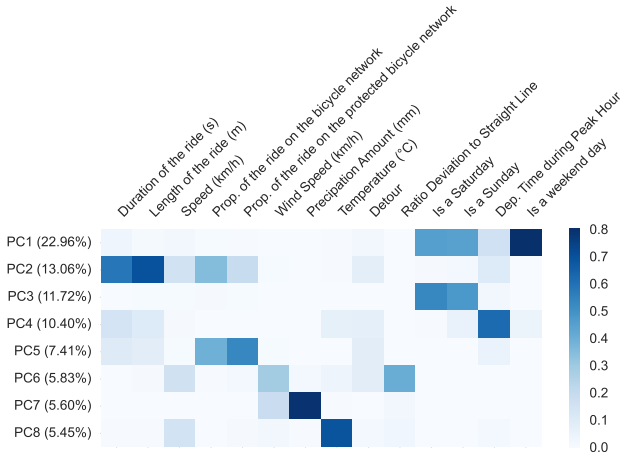


Figure 4: Results of the Principal Components Analysis. The heatmap values correspond to the loadings of each variable (x-axis) on the components (y-axis). The percentages correspond to the variance explained by each component. Only the first 8 components (out of 14) are presented.

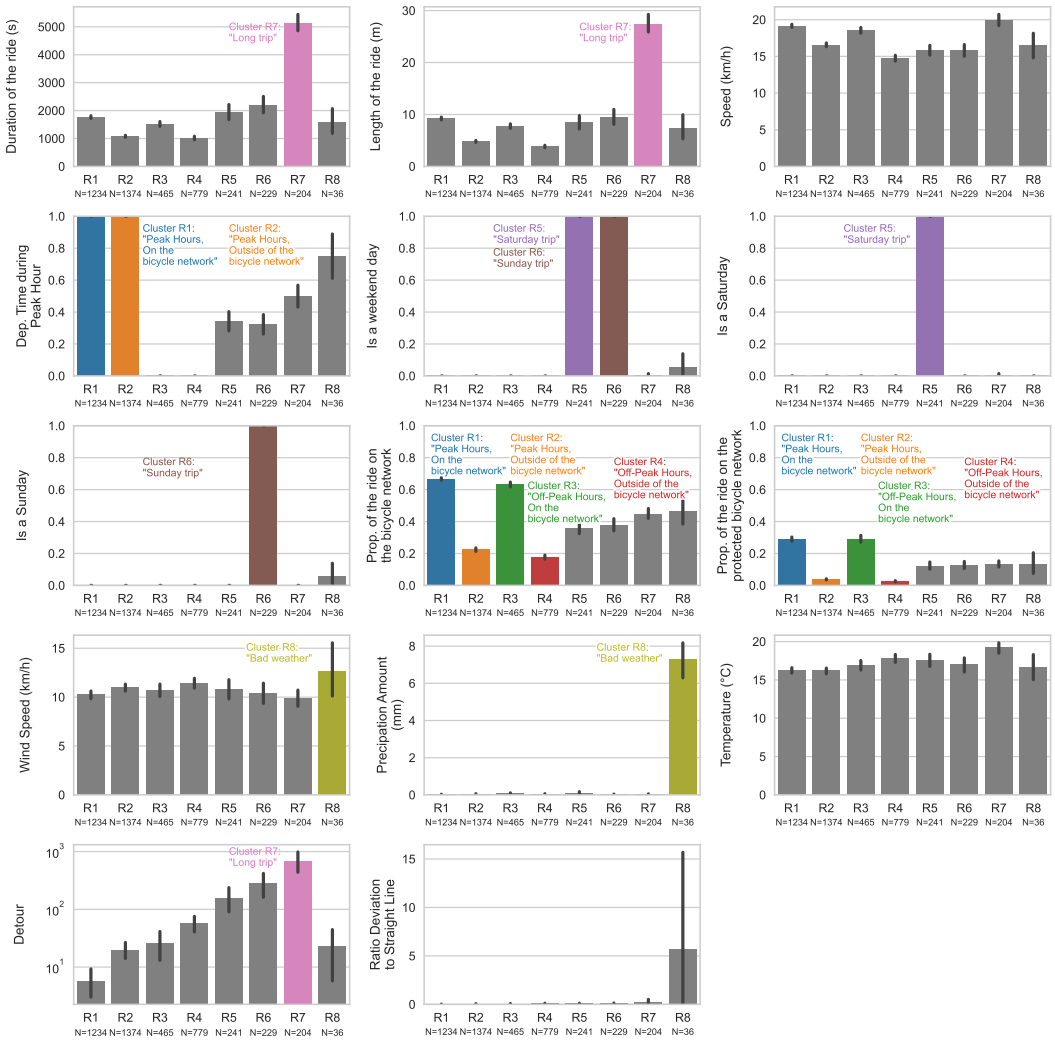


Figure 5: Distribution of the values of the variables in each cluster. The bars are presented in color when they are decisive to define a cluster. In these cases, the cluster number and names are shown on the plot.

Classification of the participants

Based on the proportion of each ride typology among their rides, the participants are then classified into 4 clusters also using k-means (see figure 6). These clusters show that most participants have a dominant ride typology :

- Clusters P1 and P2 : during peak hours, on (P1) or outside of (P2) the bicycle network. The prevalence of one typology in both cases is probably due to the bicycle network on the commuting trip of the participant, and less likely to a personal choice. Weekend typologies are found more often in Cluster P2 than Cluster P1, as well as off-peak hours trips.
- Cluster P3 and P4 : during off-peak hours, on (P3) or outside of (P4) the bicycle network. In these clusters, the variety of ride clusters is greater. Cluster P4 presents a larger proportion of longer trips.

Regarding their socio-demographic characteristics (see table 3), Clusters P1 and P2 have more women, with those of cluster P1 having more often children. Clusters P2 and P4 have more adult couples without children (with younger participants in P4), while clusters P1 and P3 have more families (with younger participants in P3). These observations seem to show a link between larger households and better bicycle networks, which could be due to residential neighborhood characteristics. Similarly, these characteristics seem to show that off-peak hours trips are more prone to be taken on by younger participants. Geographically, most participants from Sherbrooke and Trois-Rivières are in cluster P2, which could be due to a lack of bicycle infrastructure. Cluster P3 has a large majority of participants from the Montréal region, while Cluster P1 has a large part

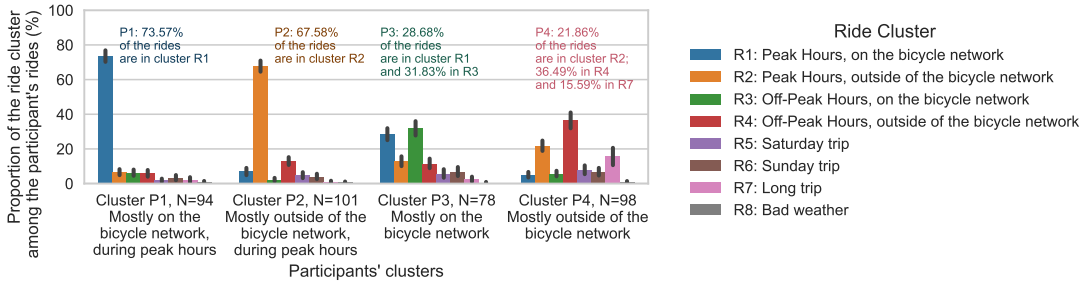


Figure 6: Obtained clusters for the participants of $\mathcal{D}^{GPS}$ (see figure 2), based on the proportion of each ride typology among their rides

of persons from the Québec region. Participants with a lot of rides are more found in Cluster P2 and P4 (no children). On the opposite, Cluster P1 has more Most participants did around 2 rides per day with e-bike use, which corresponds to a simple home-work-home loop. Days with more than 2 rides are more often found in cluster P2.

	User's Cluster	Cluster P1 Mostly on the bicycle network, during peak hours	Cluster P2 Mostly outside of the bicycle network, during peak hours	Cluster P3 Mostly on the bicycle network	Cluster P4 Mostly outside of the bicycle network
	N=	94	101	78	98
Gender	Female	66% (N=29)	62% (N=29)	48% (N=12)	50% (N=22)
	Male	34% (N=15)	38% (N=18)	52% (N=13)	50% (N=22)
Age	[15, 25)	0% (N=0)	2% (N=1)	8% (N=2)	2% (N=1)
	[25, 35)	16% (N=7)	17% (N=8)	20% (N=5)	25% (N=11)
	[35, 45)	34% (N=15)	30% (N=14)	40% (N=10)	39% (N=17)
	[45, 55)	32% (N=14)	36% (N=17)	20% (N=5)	30% (N=13)
	[55, 65)	18% (N=8)	15% (N=7)	12% (N=3)	5% (N=2)
Occupation	Student	0% (N=0)	4% (N=2)	4% (N=1)	9% (N=4)
	Full time worker	100% (N=44)	91% (N=43)	96% (N=24)	89% (N=39)
	Part time worker	0% (N=0)	4% (N=2)	0% (N=0)	2% (N=1)
Household typology	Adult couple without children	27% (N=12)	49% (N=23)	32% (N=8)	50% (N=22)
	Traditional family	50% (N=22)	36% (N=17)	40% (N=10)	27% (N=12)
	Young family	23% (N=10)	15% (N=7)	28% (N=7)	23% (N=10)
Region	Montréal	30% (N=13)	30% (N=14)	56% (N=14)	36% (N=16)
	Ottawa-Gatineau	16% (N=7)	2% (N=1)	16% (N=4)	23% (N=10)
	Québec	34% (N=15)	15% (N=7)	16% (N=4)	14% (N=6)
	Saguenay	9% (N=4)	4% (N=2)	12% (N=3)	9% (N=4)
	Sherbrooke	5% (N=2)	30% (N=14)	0% (N=0)	11% (N=5)
	Trois-Rivières	7% (N=3)	19% (N=9)	0% (N=0)	7% (N=3)
Number of rides	(0, 10]	57% (N=25)	36% (N=17)	44% (N=11)	43% (N=19)
	(10, 20]	39% (N=17)	51% (N=24)	48% (N=12)	43% (N=19)
	(20, 40]	5% (N=2)	11% (N=5)	8% (N=2)	14% (N=6)
	(40, 250]	0% (N=0)	2% (N=1)	0% (N=0)	0% (N=0)
Nb of rides per day with e-bike use	(0, 1]	9% (N=4)	4% (N=2)	4% (N=1)	9% (N=4)
	(1, 2]	75% (N=33)	66% (N=31)	72% (N=18)	64% (N=28)
	(2, 3]	14% (N=6)	30% (N=14)	24% (N=6)	25% (N=11)
	(3, 4]	2% (N=1)	0% (N=0)	0% (N=0)	2% (N=1)

The % are given in regards to the cluster's population. For example, 63% of Cluster A's population are female.

Table 3: Socio-demographic and behavioral characteristics of each participants' cluster

Analysis of the purchase intent based on the participants' clusters

Comparing the participants' clusters (P1,P2,P3,P4) to their purchase intention, a main pattern appear: the impact of the built environment (bicycle network or not) on the purchase intention. Only participants from $\mathcal{D}^{GPS}_{all\ surveys}$ (N=160, see figure 2) are included to have both pre- and post-answers. The proportions of each answer in the clusters are presented in table 4. The cluster with the highest "No" answer is cluster P2, with most rides outside of the bicycle network. It is also the cluster with the larger negative evolution, with cluster P4 (outside of the bicycle network as well). Cluster P2 also presents the lower proportion of "Steady at Yes evolutions": participants who were initially convinced did not stay convinced. This shows an importance of the cycling

to convince participants of a trial to keep cycling after the end of the trial. Conversely, cluster P1 (mostly on the bicycle network) has the lower negative evolution. Finally, except for cluster P2, "Positive" and "Steady at Yes" proportions are quite similar among clusters: around 25% of the users have a "Positive" evolution after the trial, and it is always superior to the "Negative" evolution. Implementing a trial program is therefore a good way to encourage the adoption of the e-bike, even if some participants are not convinced.

	User's Cluster	Cluster P1 Mostly on the bicycle network, during peak hours	Cluster P2 Mostly outside of the bicycle network, during peak hours	Cluster P3 Mostly on the bicycle network	Cluster P4 Mostly outside of the bicycle network
	N=	44	47	25	44
Post- answer	No	11.4%	**21.3%**	12.0%	13.6%
	Maybe	45.5%	46.8%	40.0%	38.6%
	Yes	**43.2%**	31.9%	**48.0%**	**47.7%**
Evolution	Negative	**4.5%**	**23.4%**	12.0%	**20.5%**
	Steady at No	6.8%	6.4%	8.0%	0.0%
	Steady at Maybe	38.6%	29.8%	32.0%	31.8%
	Steady at Yes	27.3%	**12.8%**	24.0%	25.0%
	Positive	22.7%	27.7%	24.0	22.7%

Table 4: Link between the cluster the participant belongs to and the evolution of their intention to buy an e-bike, for participants of dataset $\mathcal{D}^{GPS}_{all\ surveys}$.

Analysis of the participants' opinions on measures that could be implemented to encourage e-bike use according to their clusters

To complement section 3, focused on which cluster is more prone to buy an e-bike after the trial and therefore to adopt the e-bike as a regular transportation mode, this section looks at which measures could be implemented to encourage the shift and which barriers prevent them from doing so.

In both the pre- and the post- surveys, almost 2/3 of the participants did not declare any barrier to using an e-bike for their commute ("Empty" answer, see figure 7). The next most chosen question is "Other". In the pre- survey, these "Other" answers are mostly the cost of the e-bike (38% of the "Other" answers, 7% of the sample) and the weather (28%). In the post- answers, the cost drops to 16% of the "Other" answers (4.4% of the sample), the weather stays the same (33% of "Others", 9% of the sample). Organizational constraints are mentioned in both the pre- and post-surveys, staying under 5% of the sample. Unexpectedly, the "lack of infrastructure on the way to the workplace" is declared as a barrier almost as strongly in all clusters, whether it is clusters with a large use of the bicycle network, or clusters with a lower use. It therefore seems that the bicycle networks, even if they exist, are never perceived as good enough. Finally, the issue of picking up someone along the way is not as strong after the trial as it was before for clusters P1 and P3, which are also the clusters with the higher proportions of families, showing an adaptability of participants. Clusters P1 and P3 are also the one with the higher proportion of participants with a "Steady at Yes" or "Positive" evolution.

Participants were also asked which measures could be implemented to encourage a shift towards e-bike, by public practitioners (figure 8) or by their employer (figure 9). Subsidies for purchasing an e-bike are the most declared measure, as expected. Participants from Cluster P1 do not mention as often as participants from other clusters the quantity of cycling infrastructures, probably because the bicycle network already answer their needs as they mostly use it. Interestingly, they are the one who mention the most the "improved snow removal" and "lighting" of the cycling infrastructures (with participants from Cluster P3, also using mostly the bicycle network). This seems to show that expectations shift: if one already has access to a good bicycle network, one would like to have a better maintenance of said network. On the other hand, participants from Clusters P2 and P4 (mostly cycling outside of the bicycle network and not wanting to purchase an e-bike after the trial) ask for a better increased accessibility to e-bike sharing services than the other clusters.

Regarding measures from the employer, measures are quite similar among clusters, with a preference for monetary incentives (access to an e-bikesharing service provided by the employer, reimbursement depending on the distance). A lower share of cluster P1 declare an interest in the distance based reimbursement, possibly because they make on average shorter trips. Access to

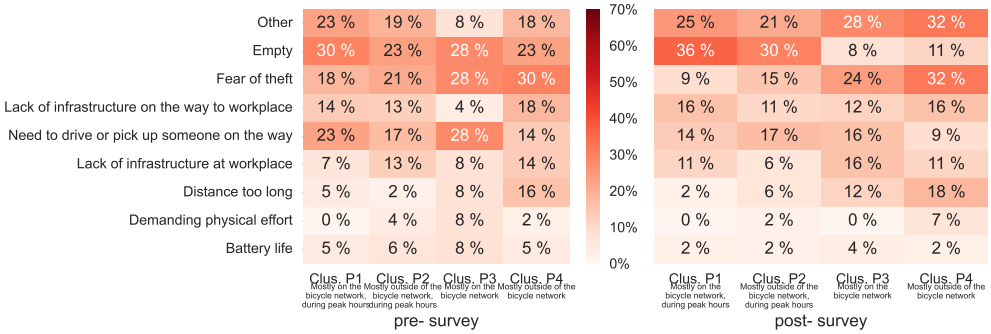


Figure 7: Answers to the question: "What are the barriers to using an e-bike to get to work?" [translated by the authors], according to the participants' clusters. Multiple answers were allowed. Sample used: $\mathcal{D}^{GPS}_{allsurveys}$ (N=160)

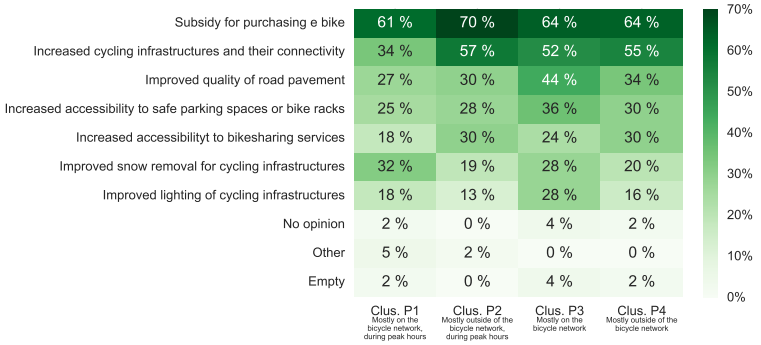


Figure 8: Answers to the question: "In your opinion, what incentives could your municipality or government implement to encourage cycling or e-bike use?" [translated by the authors], according to participants' clusters. Multiple answers were allowed. Sample used: $\mathcal{D}^{GPS}_{allsurveys}$ (N=160)

safe parking is mostly declared in clusters P3 and P4, with lockers and showers for cluster P3. Clusters P3 and P4 are also the one asking for more flexible hours, which is coherent as these are the clusters with a lower share of off-peak hour trips. The declared share of showers is quite low to what is observed for regular bikes

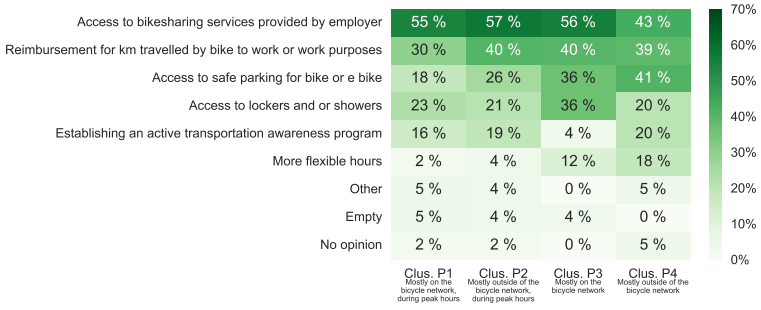


Figure 9: Answers to the question: "In your opinion, what incentives could your employer implement to encourage cycling or e-bike use?" [translated by the authors], according to participants' clusters. Multiple answers were allowed. Sample used: $\mathcal{D}^{GPS}_{allsurveys}$ (N=160)

Discussion

These first results are interesting and show the importance of having a good infrastructure for users to shift to e-bikes, with differences depending on the clusters users belong to. However, our study suffers from limitations: the GPS data and the surveys were not matched beforehand, which could induce errors, and the samples are fairly small which limits the analyses that can be conducted from a statistical point of view. Finally, the survey was initially designed to conduct policy-oriented analyses and not a research project, which can sometimes be hard to adapt. The obtained results can seem expected and not groundbreaking, but are still necessary to adapt policies to encourage modal shift towards e-bikes.

4 Conclusions

Our main findings consist in identifying different behaviors when having access to e-bikes, the impact on their intention to purchase an e-bike, and the measures that can be implemented to target the groups that are convinced by the trial. They underline the importance of the density of the bicycle infrastructure for participants who do not have already use it, but also the quality of the infrastructure for those who already have access to it. Since that participants who already have access to the bicycle network are also those who are the most interested in purchasing an e-bike after the trial, emphasizing the maintenance of existing infrastructure could be recommended from a policy point of view. Finally, our results also show the importance of the employer's role, whether it is implementing an e-bike sharing system or allowing for more flexible hours. These results are promising and could be completed with more detailed analysis on the itineraries.

Acknowledgements

We thank Equiterre for giving us access to the data from the Velovolt project. We thank Tom Villenet (iaelyon School of Management - Université Jean Moulin, France) for his proofreading of this work and his advices.

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