Factors affecting perceptions in transport –
A deep dive into the motorbike ban in Hanoi, Vietnam

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Research questions

Motorbikes are woven into the fabric of Hanoi's society

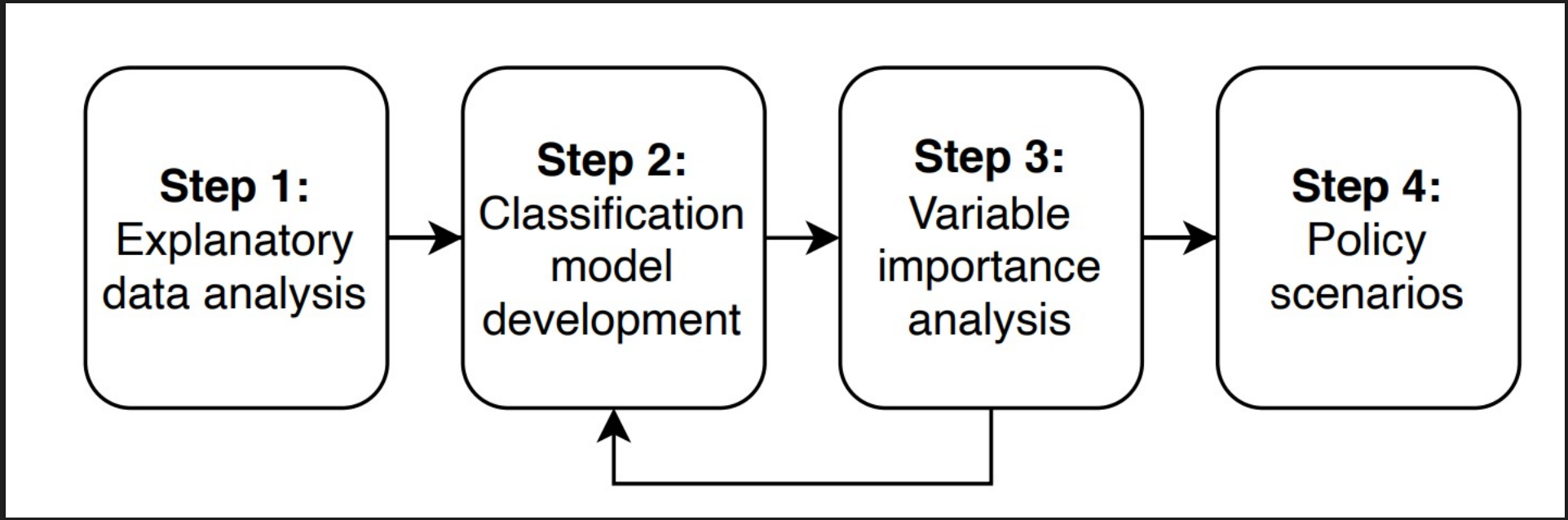
However, motorbike might also be main cause of traffic congestion, crashes and pollution in Hanoi

- 1. Can we predict an individual's perception of a future transport policy?
- 2. What policy implications can we obtain from the data and the modelling?
- 3. What factors are most and least important in explaining individuals' perceptions?

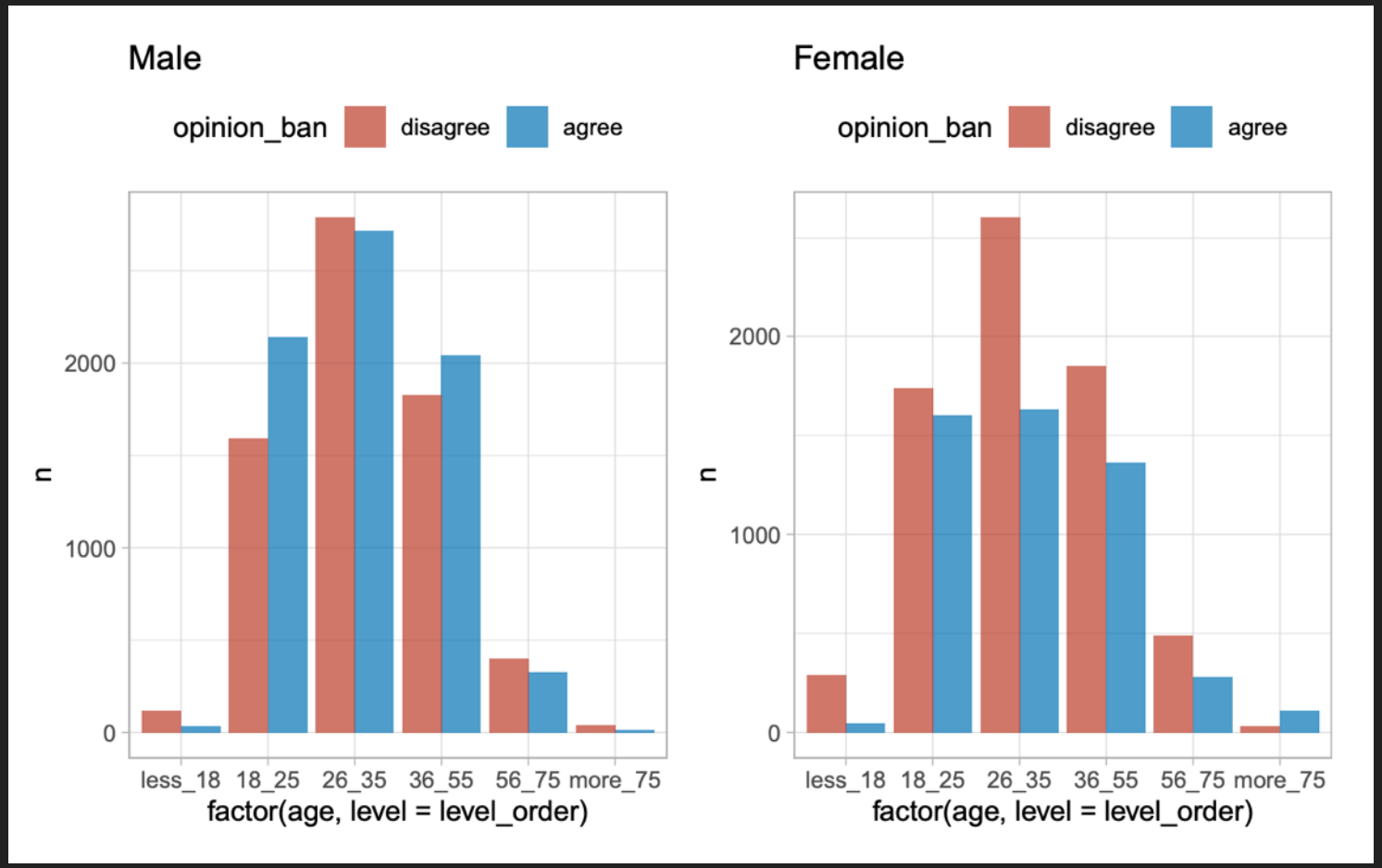
26,000 samples travel survey

Group	Questions (selected)
General info	Age, gender, home location, occupation
Living conditions	Living duration, property type, status, home ownership, water quality, open space, noise, school access, market access, hospital access, bank access, security, leisure access
Household composition and vehicle ownership	Age, household car ownership, household motorbike ownership, household e-bike ownership, household bike ownership
Primary trip	Origin, destination, travel purpose, mode choice, the reason for mode choice, travel time, frequency per day, frequency per week, frequency per month
Mode choice	Frequency usage of a car, motorbike, e-bike, bike, bus; future purchase; reason not to buy a certain vehicle; distance to public transport; opinion of of a certain transport mode
Motorbike ban	Awareness of the potential motorbike ban, opinion, alternative vehicle: car, e-bike, bike, taxi, bus, light rail, taxi, walk; reason for vehicle ban: convenience, cost, parking, other

Study framework



Step 1: Exploratory analysis


Male
opinion_ban
disagree
agree
n
2000
1000
0
less_18
18_25
26_35
36_55
56_75
more_75
factor(age, level = level_order)
Female
opinion_ban
disagree
agree
n
2000
1000
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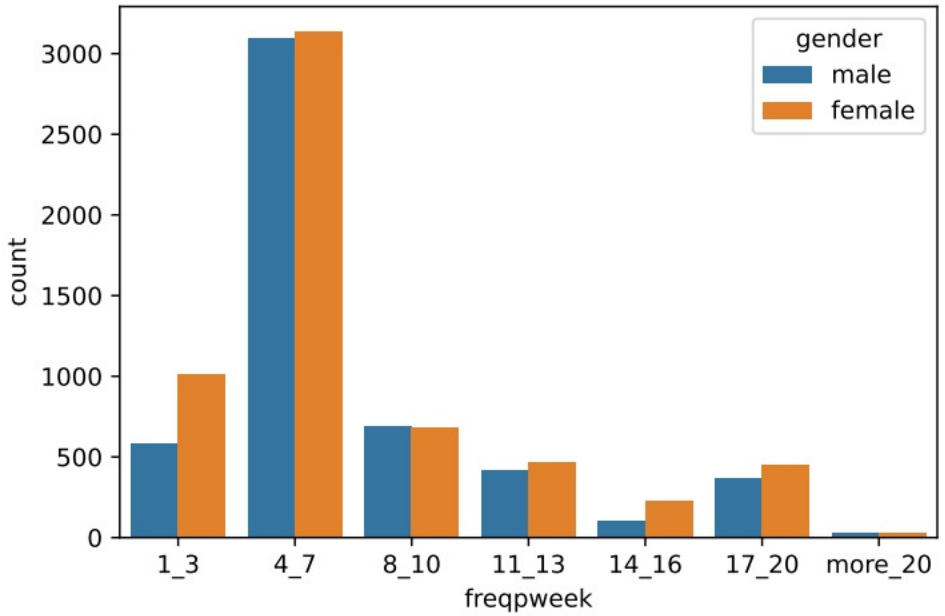
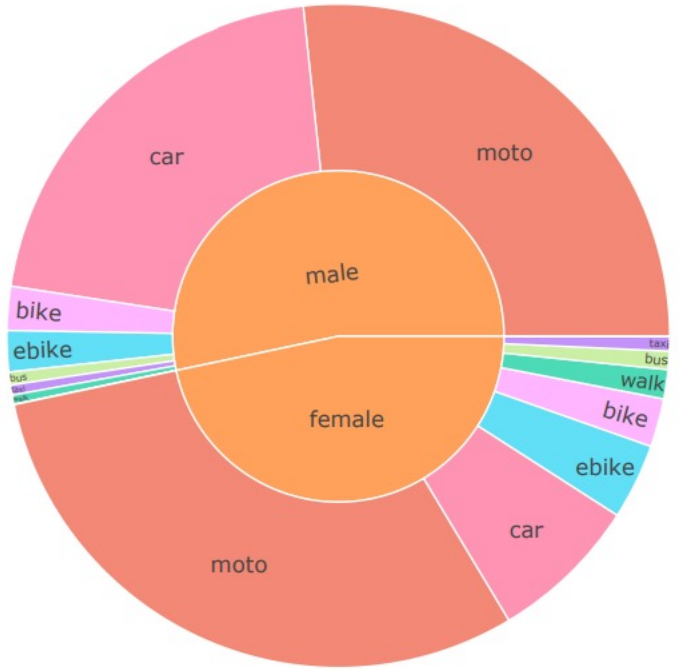
less_18
18_25
26_35
36_55
56_75
more_75
factor(age, level = level_order)

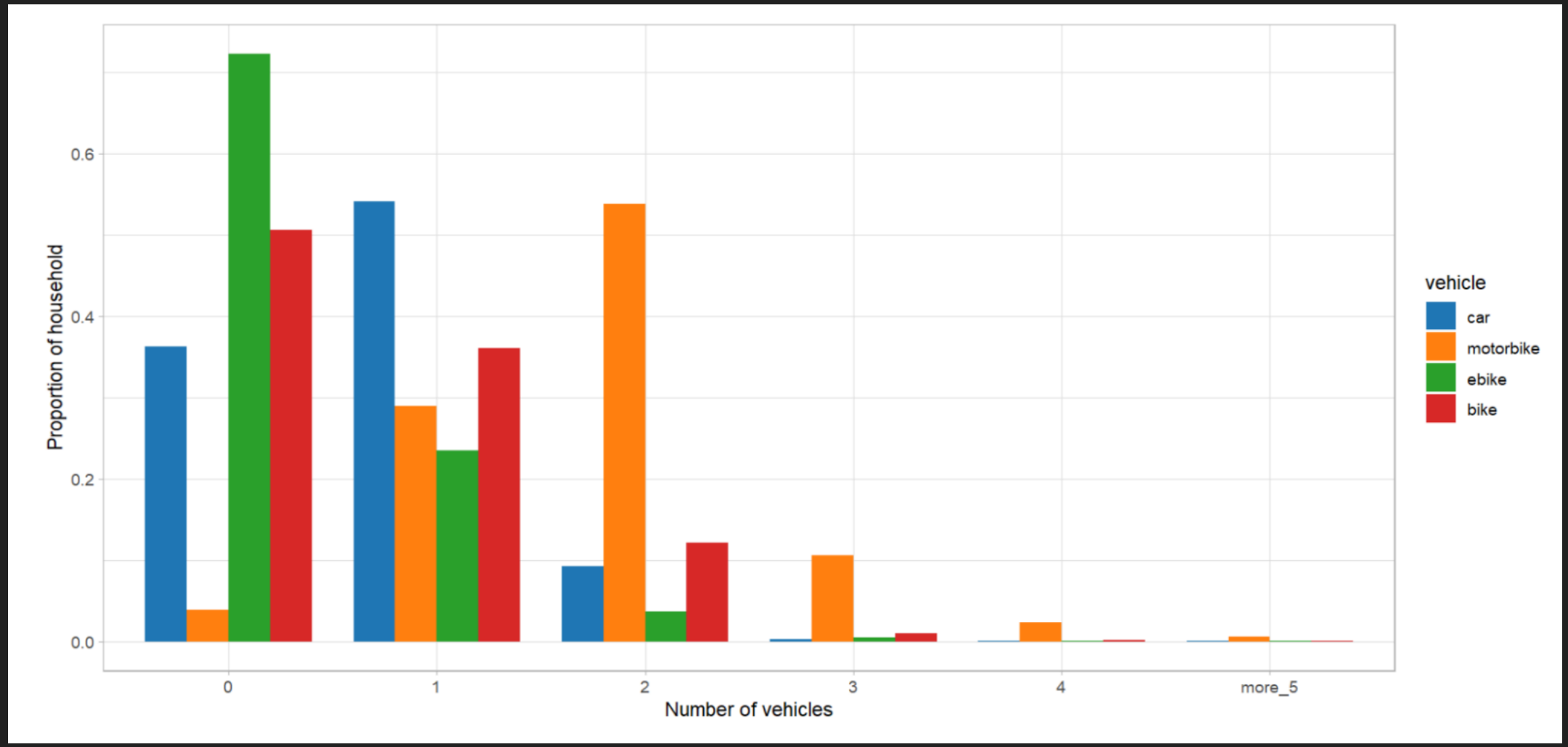


(a) Gender vs frequency of travels with motorbikes

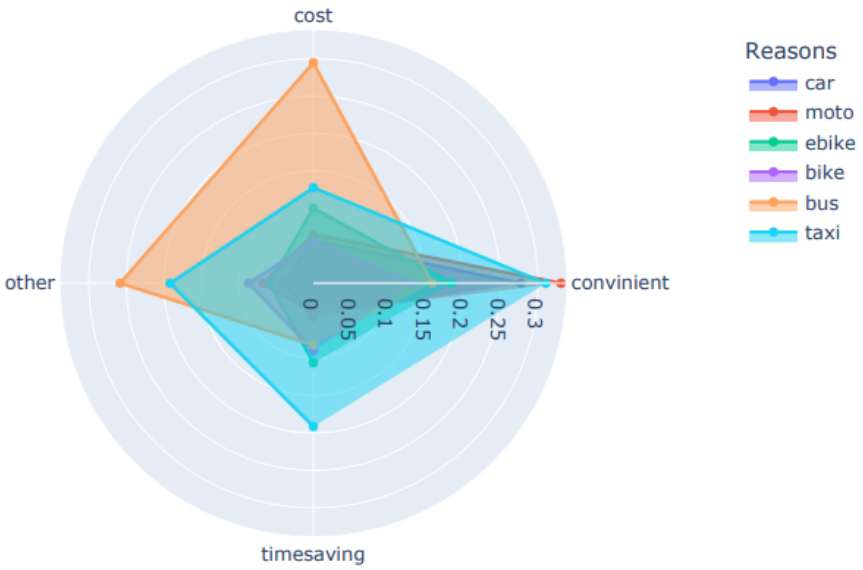


(b) Gender vs mode choice for the primary trip

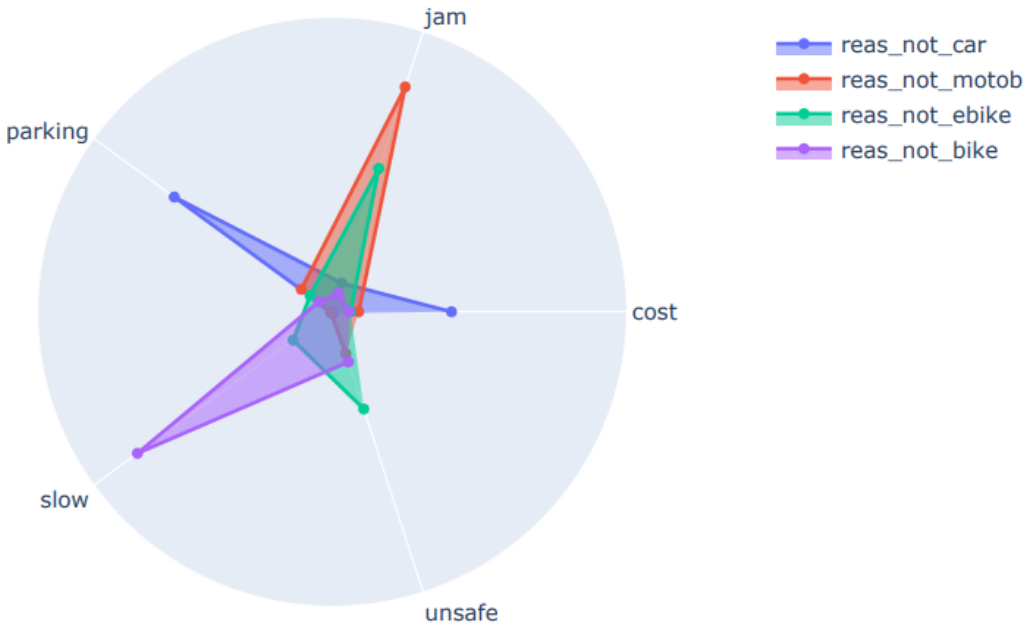
- There are more males than females in the survey
- Males are using more cars, while females are using more motorbikes



- Half of the households has a car now!
- Majority of families are having >2 motorbikes

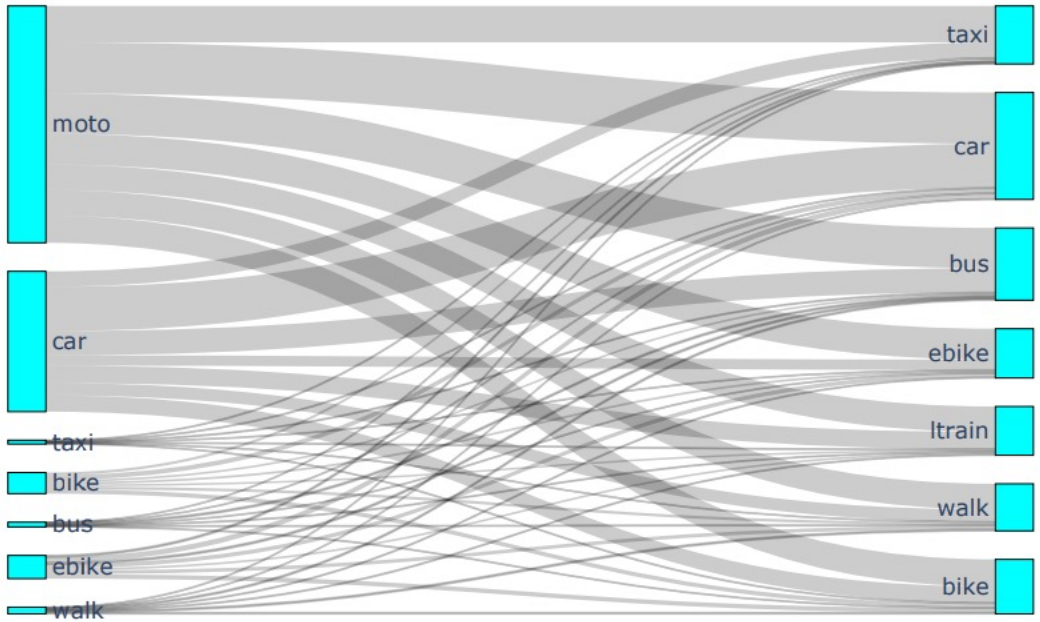


(a) Reasons for a travel mode to be chosen

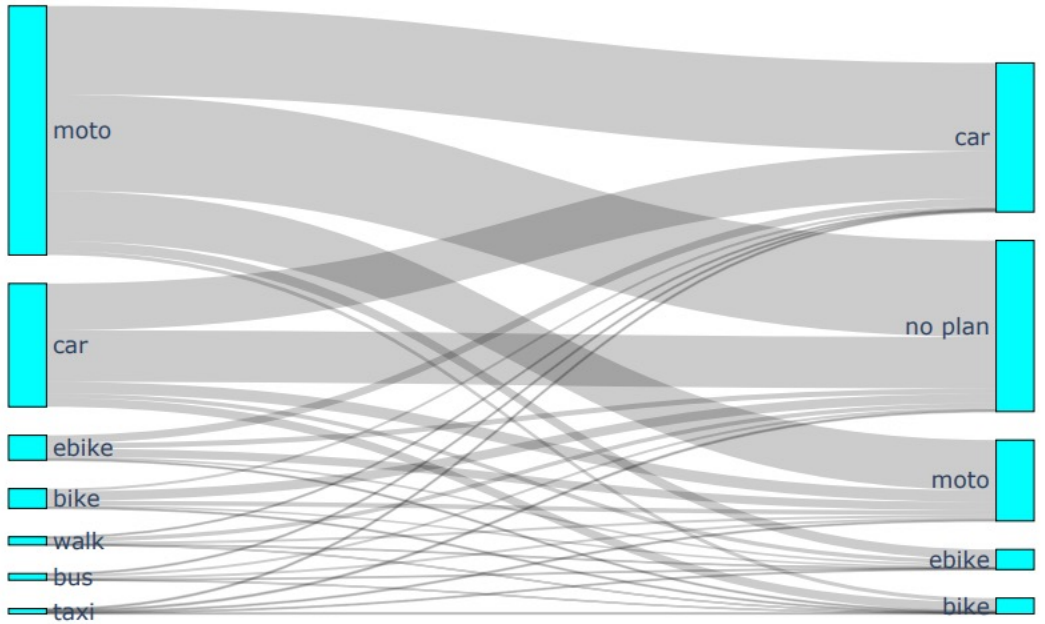


(b) Reasons for a travel mode NOT to be chosen

- "Convenient" is the main reason why private modes of transport are chosen
- Reasons for choosing Buses are "cost" and "other"
- Traffic jam is NOT a concern for car users
- "Unsafe" is not a concern for motorbike users

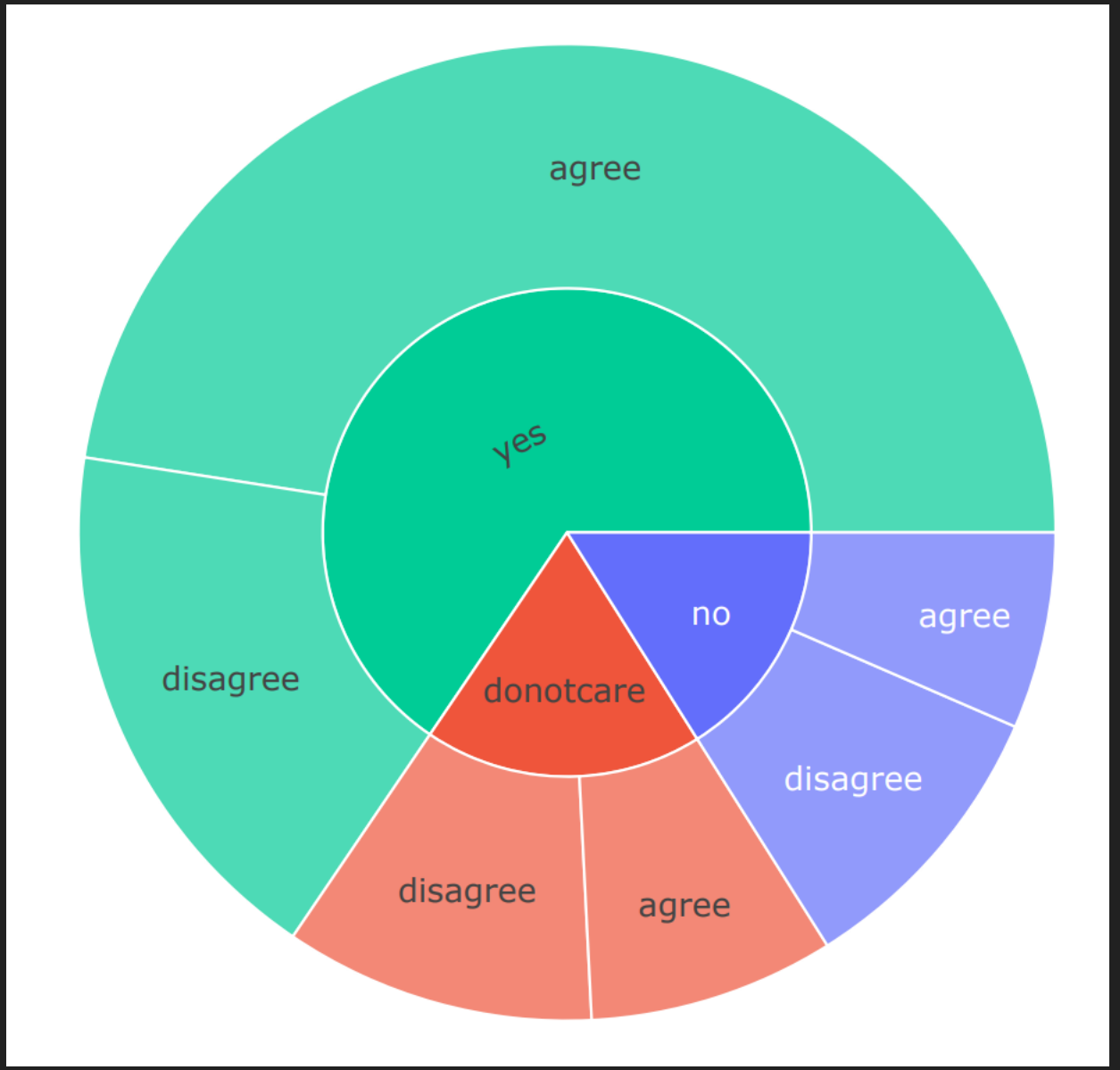


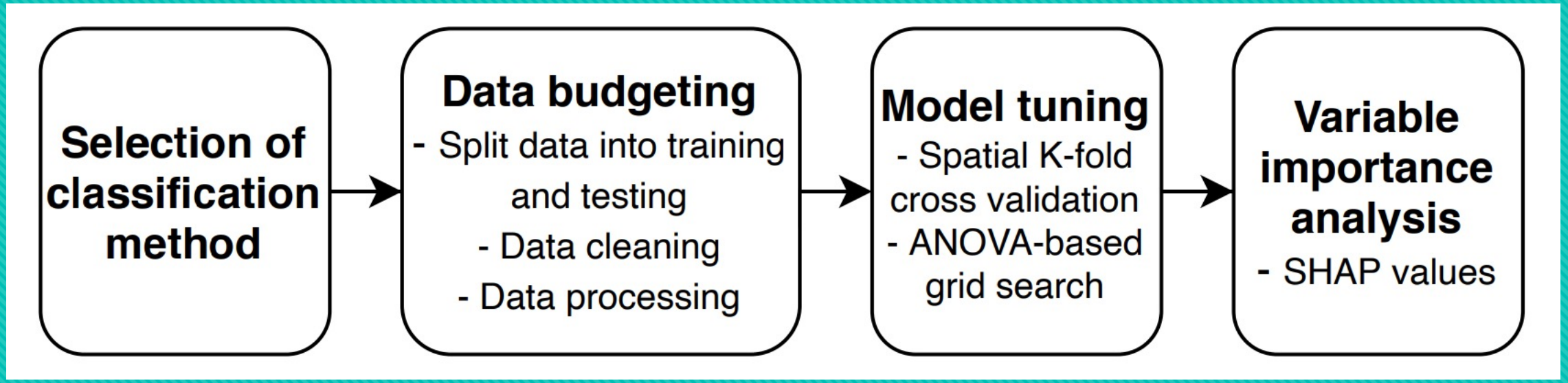
(a) Individual plan for an alternative travel mode



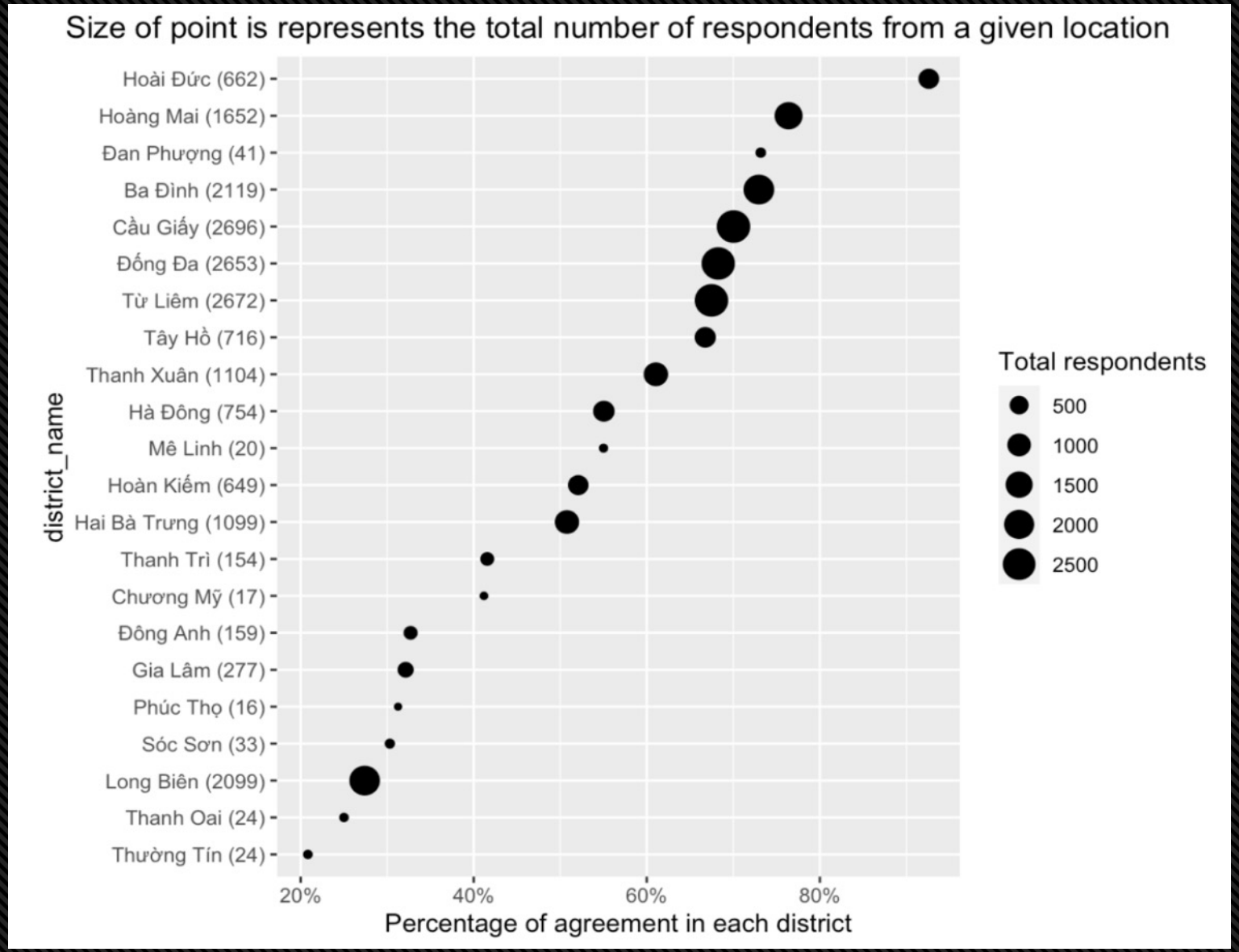
(b) The intention to buy a future vehicle

- Distributions of alternative vehicles are relatively equal
- Among the alternative vehicles, "car" is the most popular
- There are around 1/3 of motorbike users who are thinking about buying a car
- Just a small proportion of people who are planning to buy an active transport option: ebike or bike

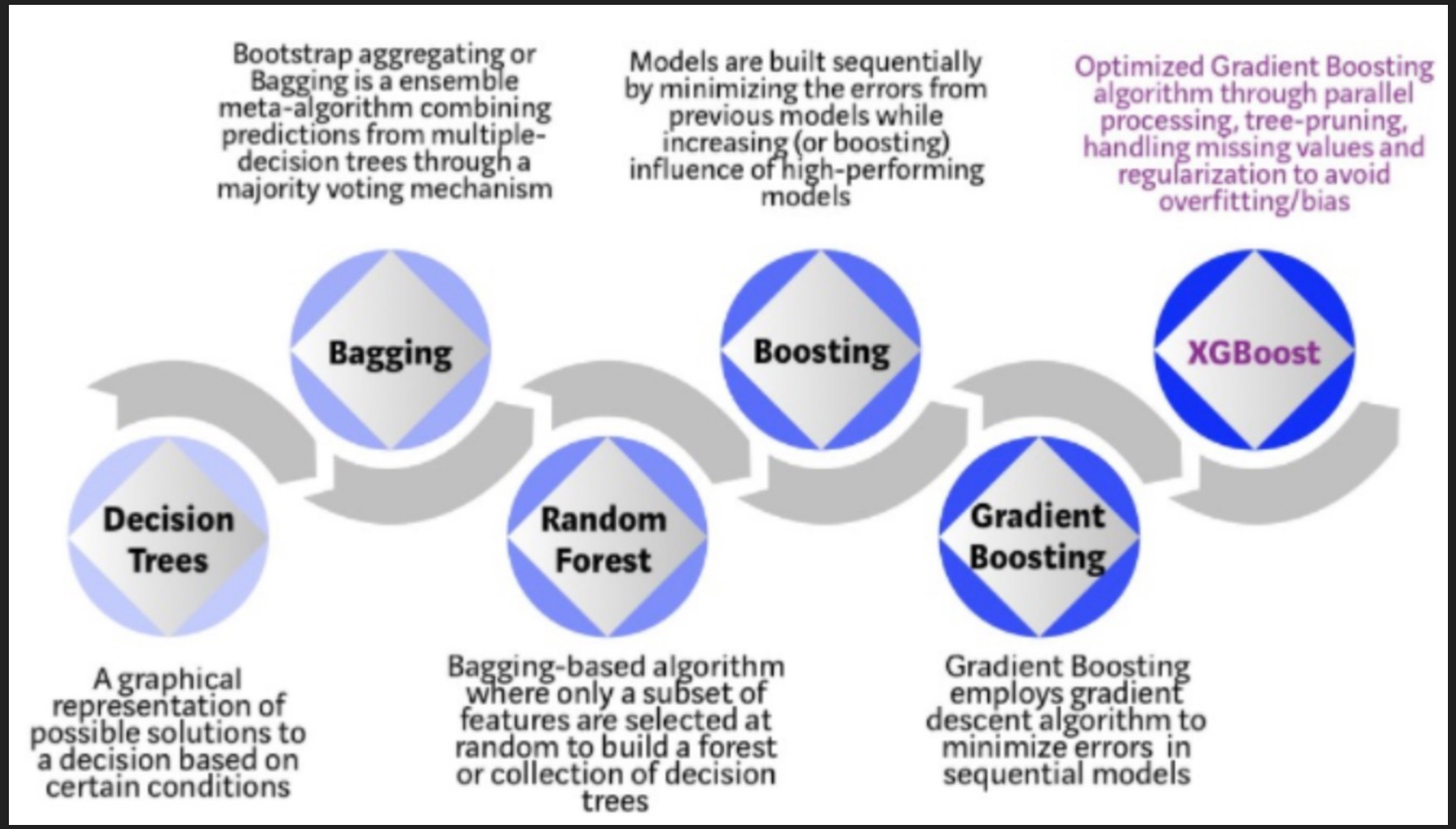

agree
yes
disagree
donotcare
disagree
agree
no
agree
disagree



Step 2: Classification analysis



- Geo-spatial cross validation

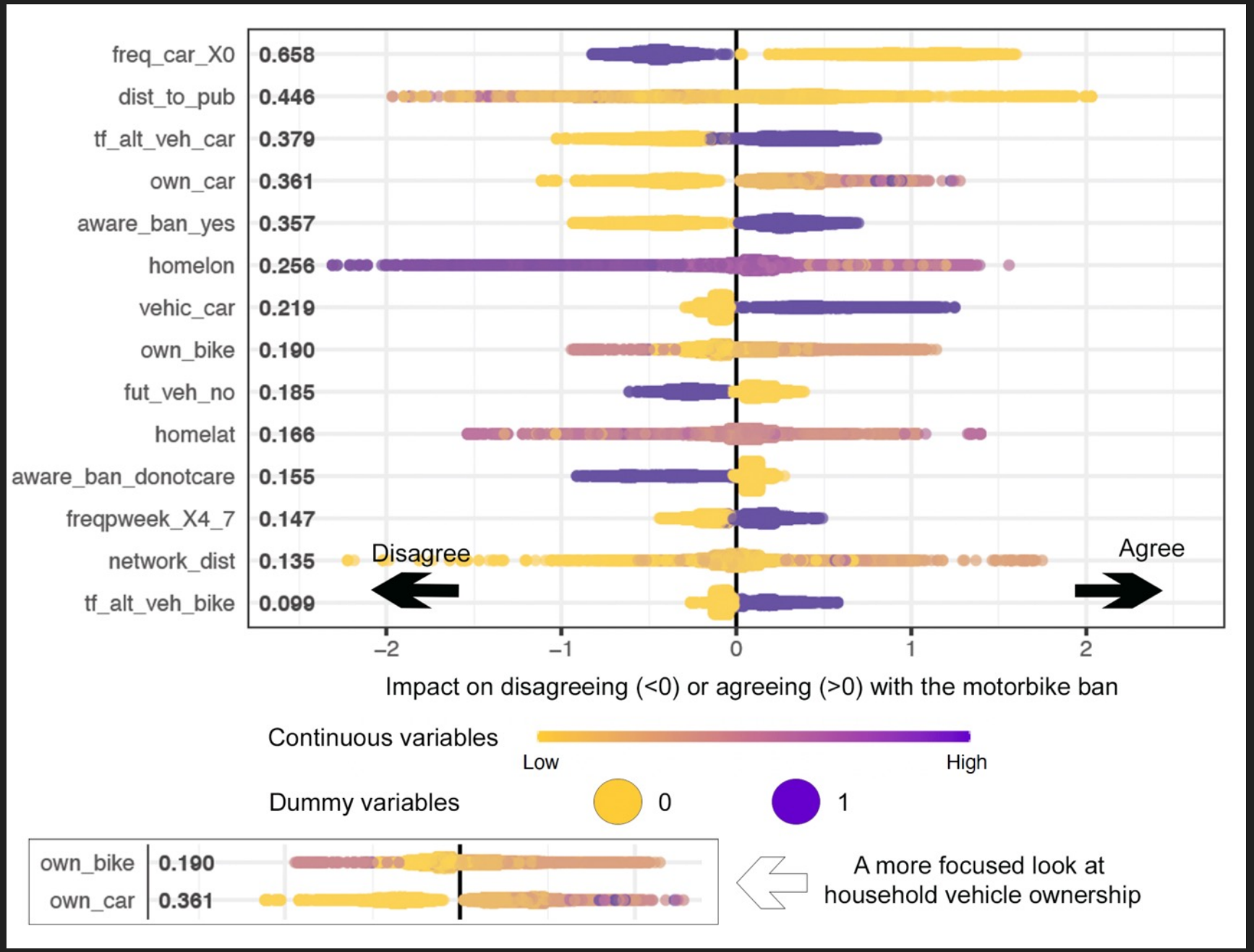


- Model performance

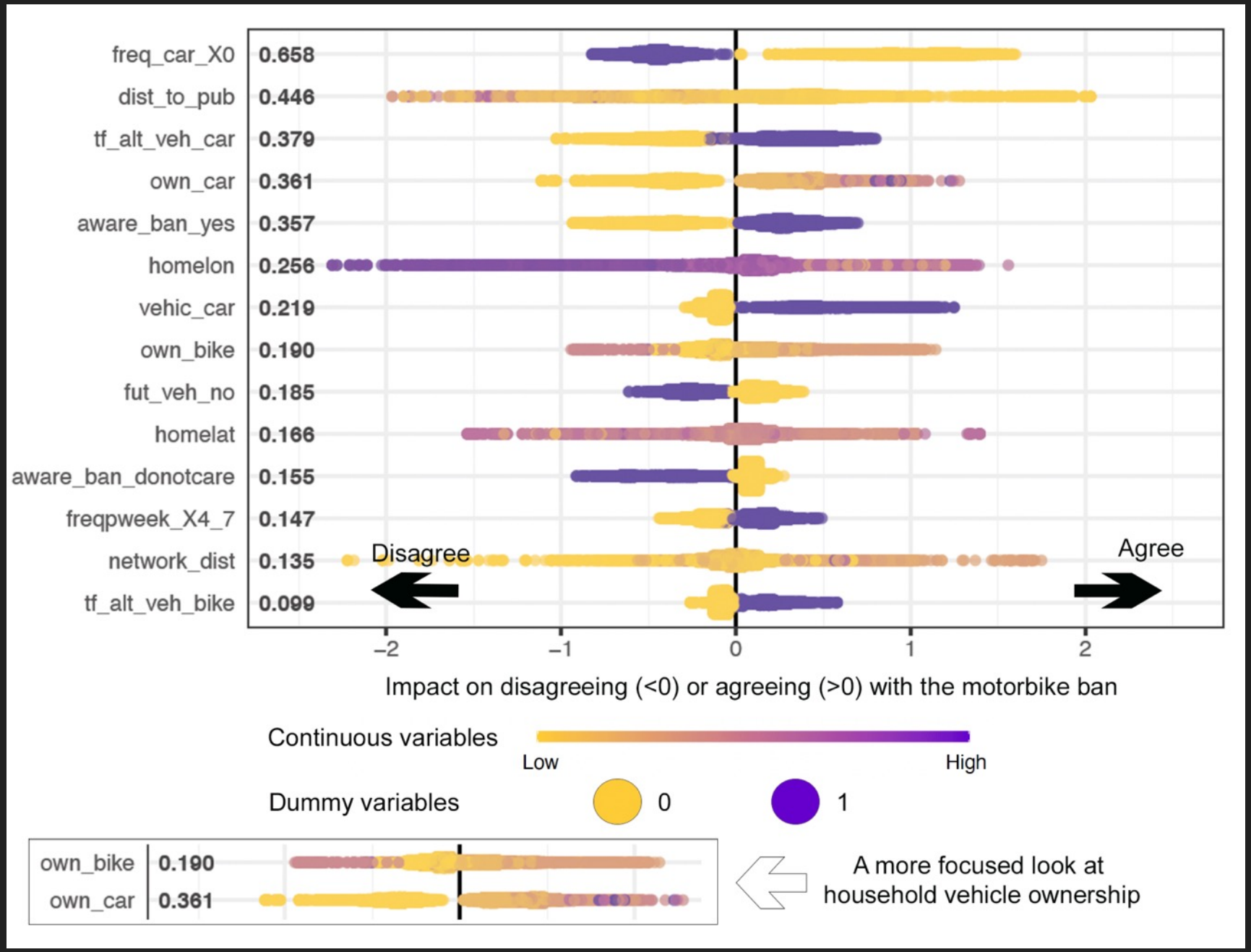
Metric	Value
Accuracy	0.878
Recall	0.853
Specificity	0.919
PPV	0.945
F-measure	0.897
ROC-AUC	0.953

Step 3: Variable importance analysis

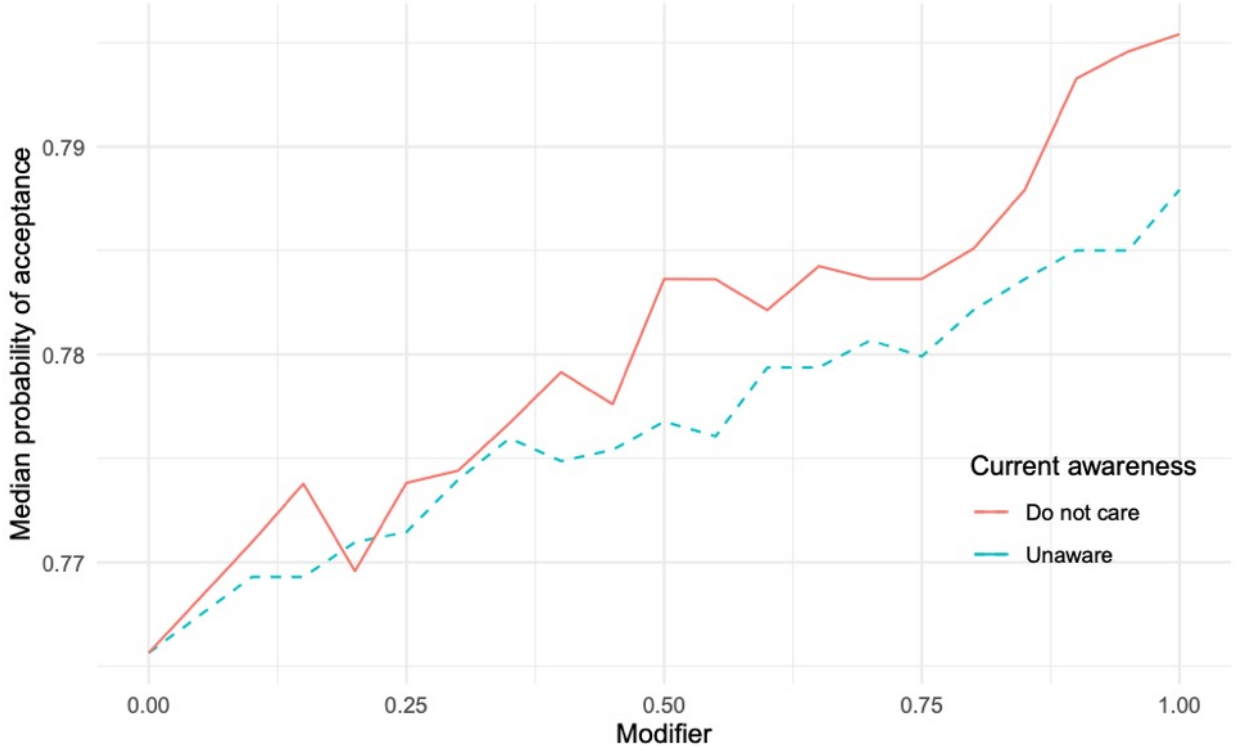
- If one does not use a car (*freq_car_X0* equals 1) then they are less likely to agree with the ban.
- Higher distances to public transport are associated with the disapproval of the potential motorbike ban
- motorbike ownership is not as important
- If a person thinks that cars are their alternative vehicles (high *tf_alt_veh_car*), it is more likely that they would approve the potential motorbike ban



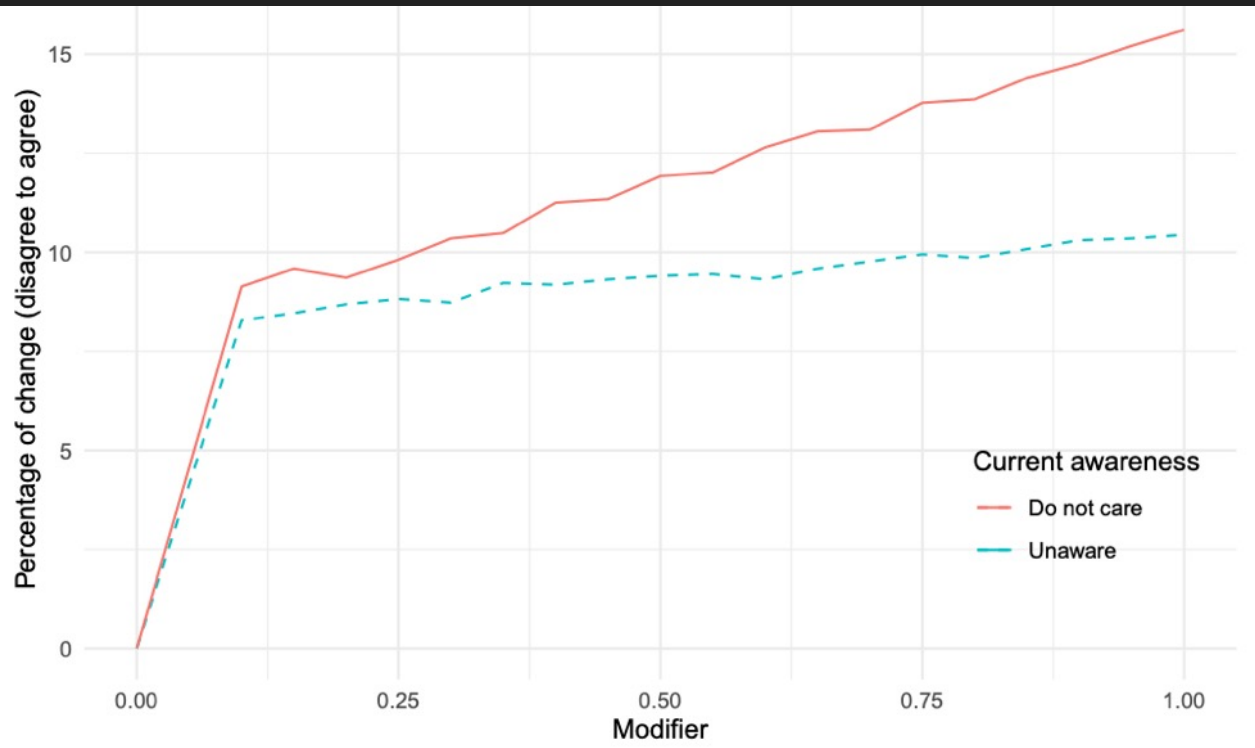
- If an individual is aware of the ban (*aware_ban_yes* equals 1), they are more likely to accept the ban, and vice versa. If the person does not care about the ban (*aware_ban_donotcare* equals 1), it is likely that they will reject the ban
- Spatial variables such as home location play important roles in individual perceptions of the ban.
- Socio-demographic attributes such as age, gender, and occupation are not as important as we expected



Step 4: Policy scenarios

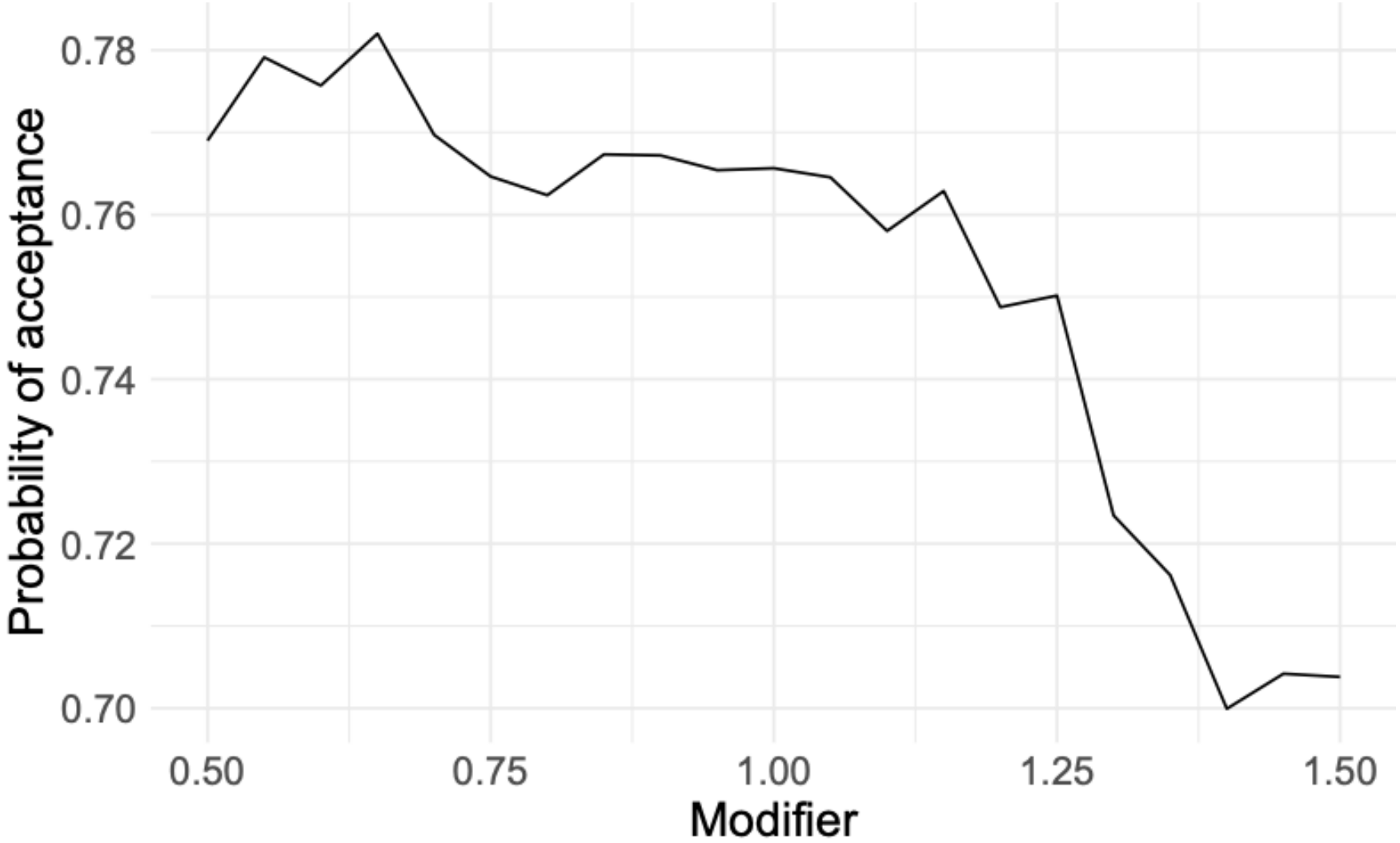


(a) Median probability of acceptance

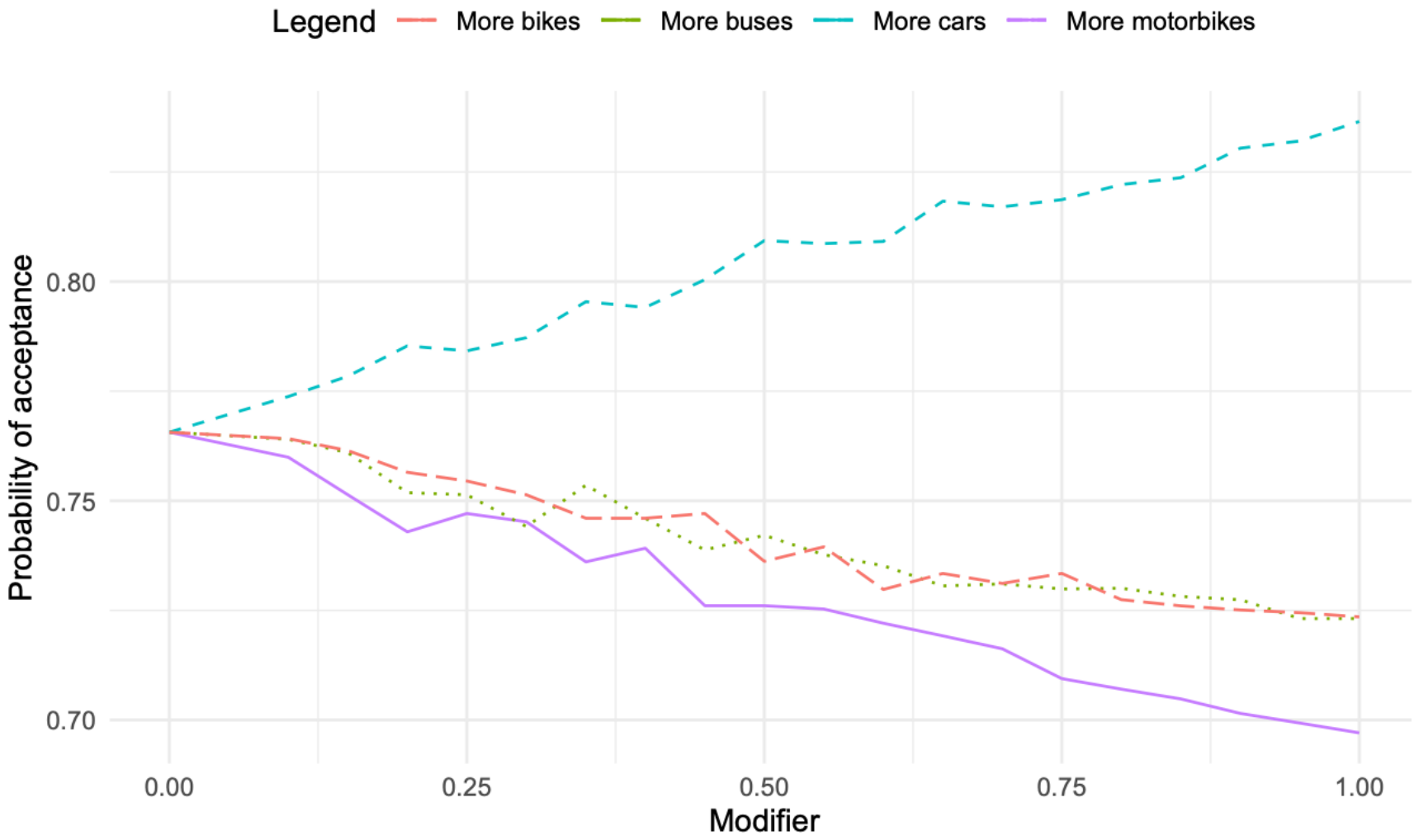


(b) Proportion (%) of people who changed from disagreement to agreement with the ban

- Scenario 1: How individual probability of acceptance changes as people become more aware of the motorbike ban



- Scenario 2: Distance to public transport



- Scenario 3: Changes in individual mode choices

Conclusion

- Can we predict an individual's perception of a future transport policy?
  - Yes, with 80% of accuracy
- What policy implications can we obtain from the data and the modelling?

- What factors are most and least important in explaining individuals' perceptions?

Policy implications

- The decision of which area to ban motorbikes can be crucial for transport authorities in Hanoi.
- While residents are still relying on motorbikes, providing more alternative travel modes may lead to reduction in motorbike usage.
- Socio-demographic attributes are not as important as we expected. Perhaps more travel survey data of a wider population is needed in the future development of the survey.

Most important factors

- Hanoi does have a dependency on motorbikes. However, congestion may be caused not only by motorbikes but also by cars.
- Convenience is the main reason why people in Hanoi chooses private transport modes (e.g motorbikes and cars) as their main mode of travel.
- To promote active transport and encourage people in Hanoi to use more pedal bikes and e-bikes, it is necessary to deal with their main concerns of being ‘slow’ and ‘unsafe’.
- ‘Traffic jams’ are the main concern of people in Hanoi regarding motorbikes and e-bikes as modes of transport, but surprisingly, traffic jams are not a concern for cars.
- Around a third of motorbike users are planning to buy cars in the future, and one fourth of them plan to buy more motorbikes .
- The awareness of the motorbike ban is essential to decide whether an individual would be more likely to accept or reject it.

Questions?