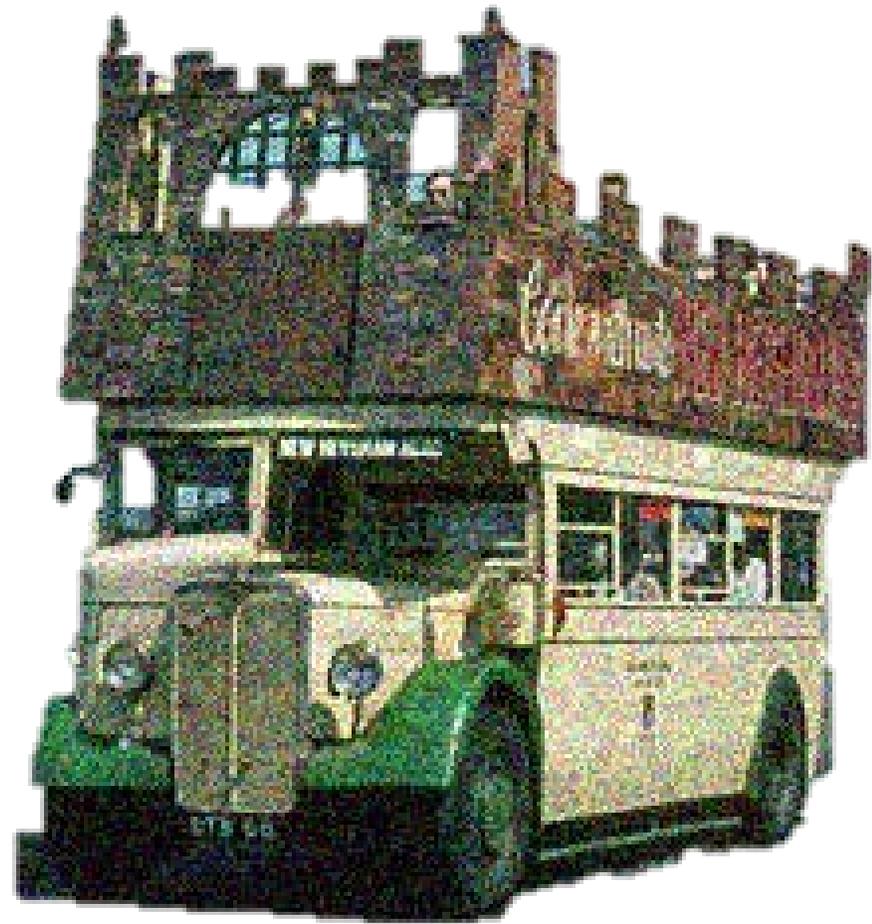




Netherlands Institute for Transport Policy Analysis



Identifying captives among Dutch bus users

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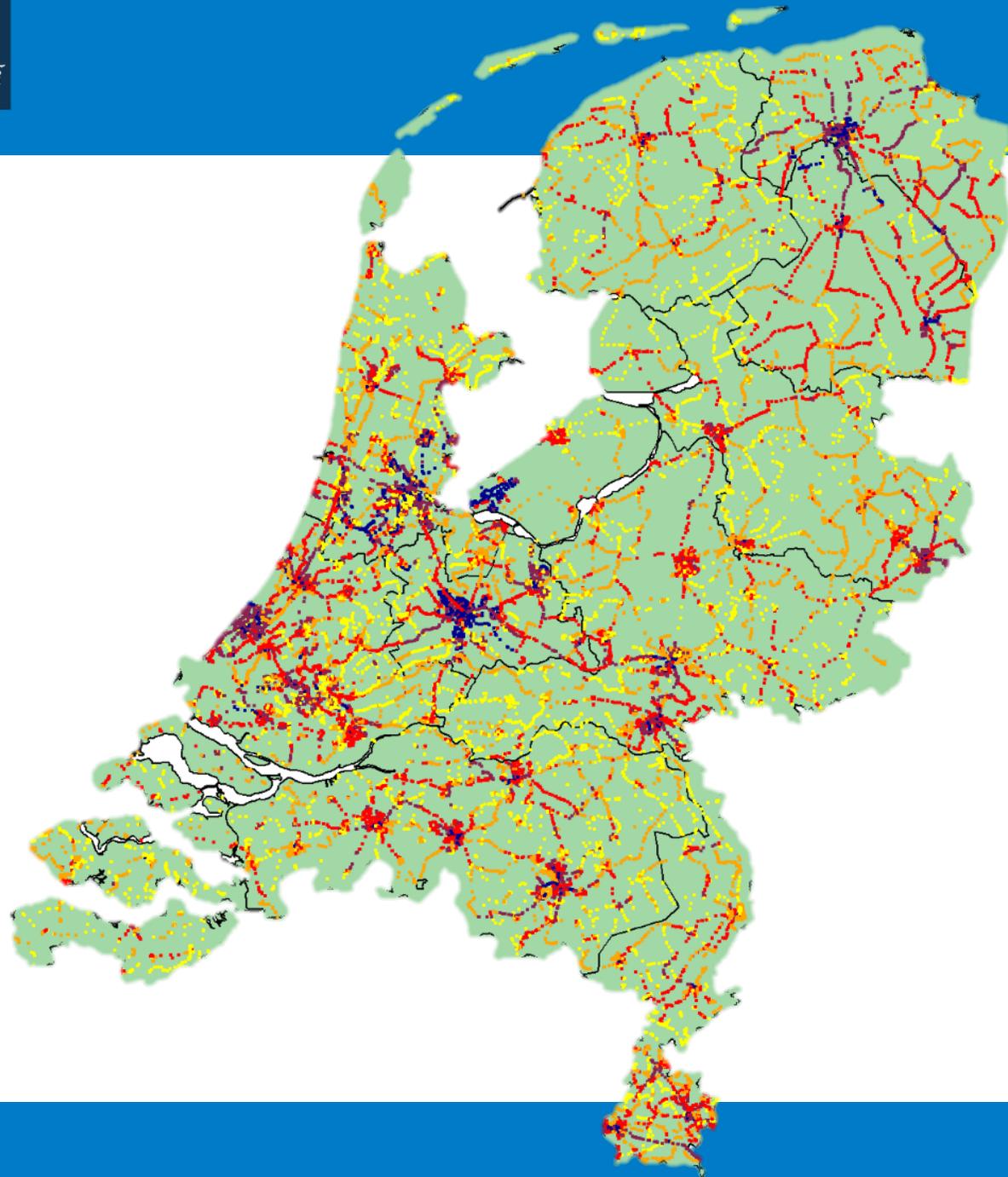


Ministerie van Infrastructuur
en Waterstaat

Busgebruikers door dik en dun

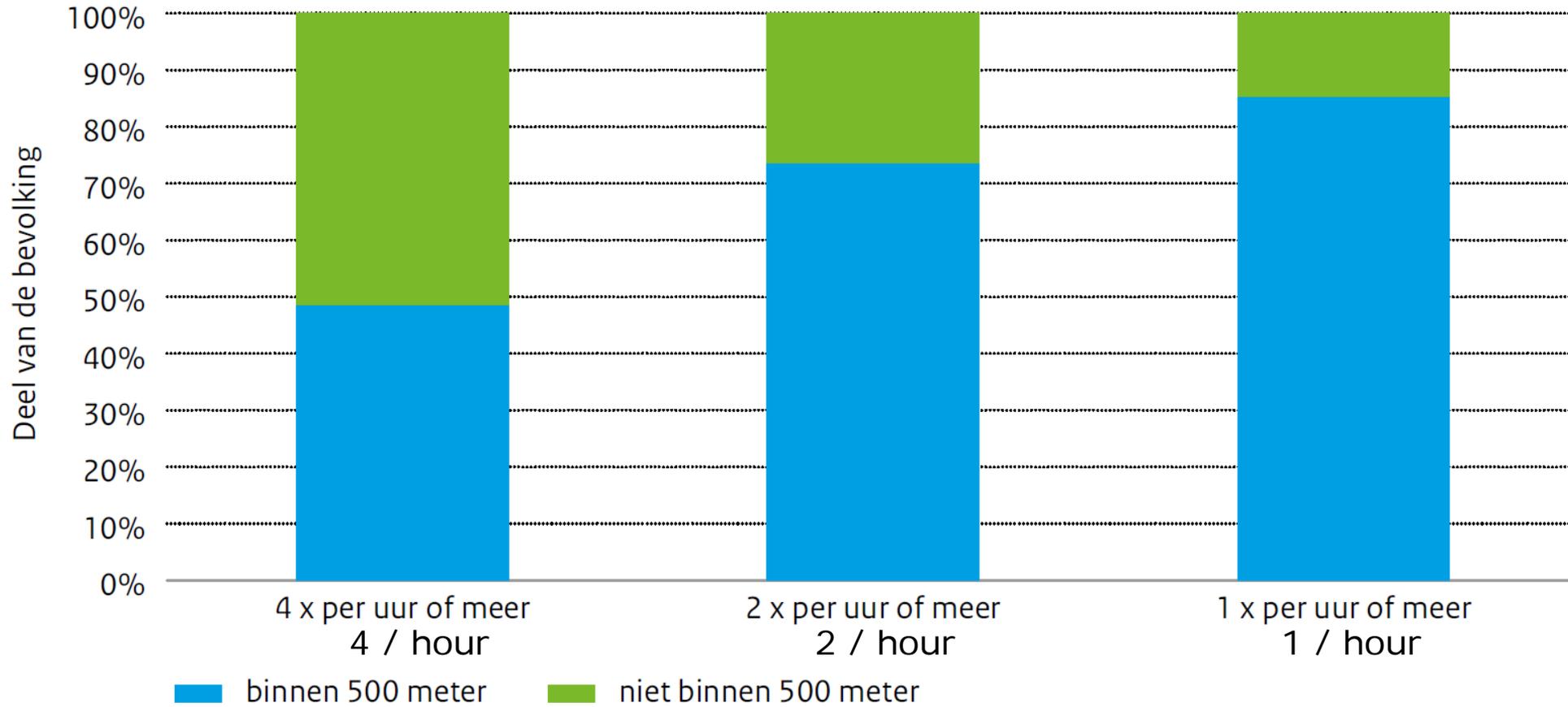
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Kennisinstituut voor Mobiliteitsbeleid | KiM





Share of the Dutch population (%)





Outline

- Introduction
- Brief overview of literature
- Method: confirmatory factor analysis
- Data: survey among bus users
- Results
- Conclusions





Research questions

- Who are the most captive bus users in the Netherlands?
 - How to measure the level of bus captivity?
 - How to identify bus captive users?
 - Are bus captive users more pessimistic about bus use?



Brief overview of findings in literature

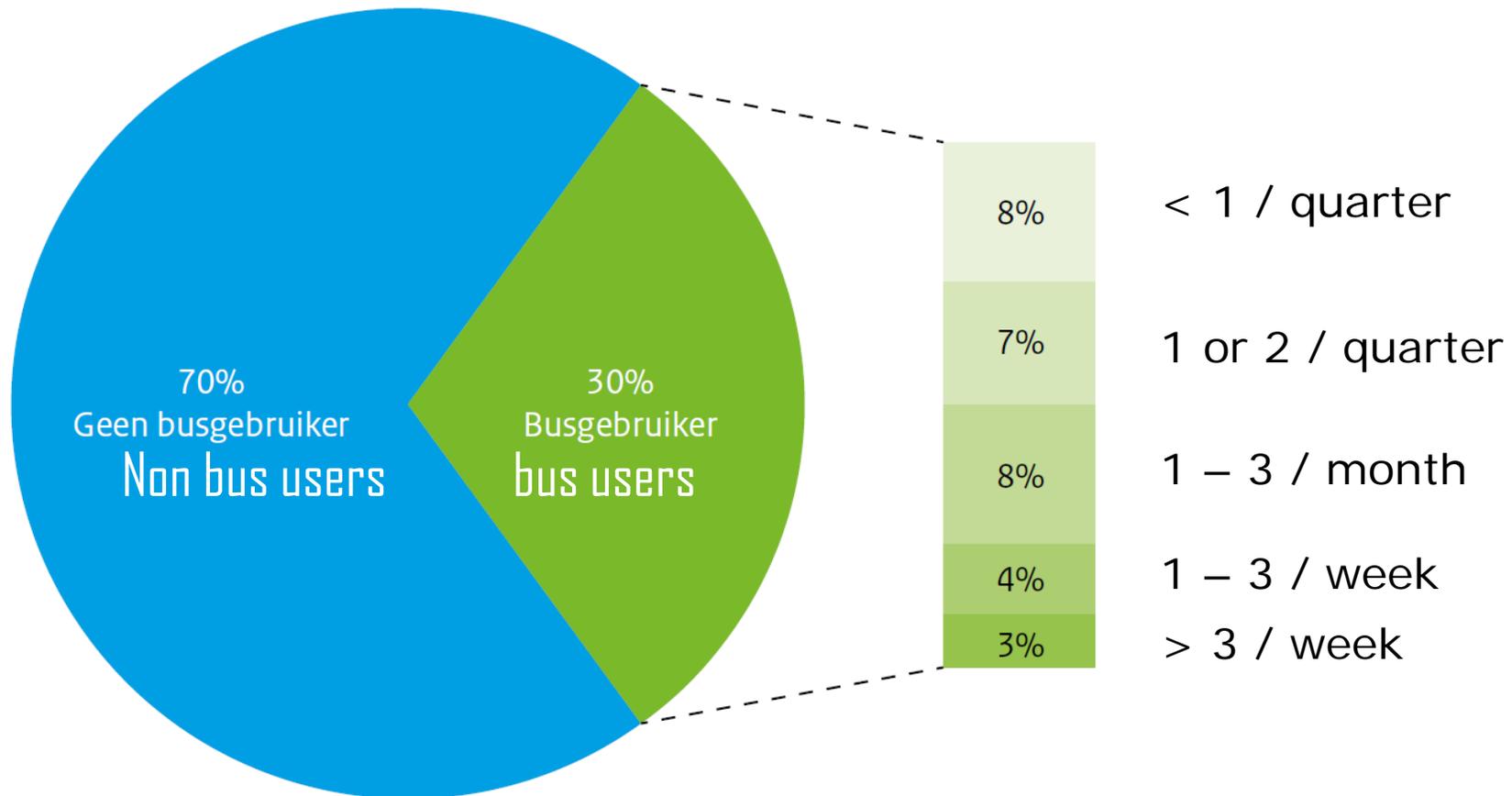
- Use of 'captive' transit for bus users originates from 1960s
 - Rise of car ownership
 - Critical mass for bus services declines
 - Rise of wages of drivers + Decline of patronage = poor business model
- US-based literature: strong focus on 'lack of car ownership' → bus captive
 - Other travel modes are neglected
- Dichotomy 'choice versus captive' travellers is oversimplification
 - Situation- or context-dependent
 - Scale from more or less reliant on bus services



Data

- Large commercial research panel
- Screening questionnaire: use of the bus in past 6 months ($n \approx 40k$ / 70k hh's members)
- Main questionnaire:
 - Most recent ride
 - General travel behaviour
 - Profile data
 - Travel alternatives

- Invitations = 2,680
- Response all = 1,729 (RR: 64.5%)
- Response by tg = 1,491
- Clean net sample = 1,344





Descriptive statistics

- Average age: 45 y
- Male - Female: 43.6% - 56.4%
- Bus use: 47.7% < less 1 / month
- Drivers licence: 75.0%
- Car: 60.0%
- Mobility impairment: 10.6%

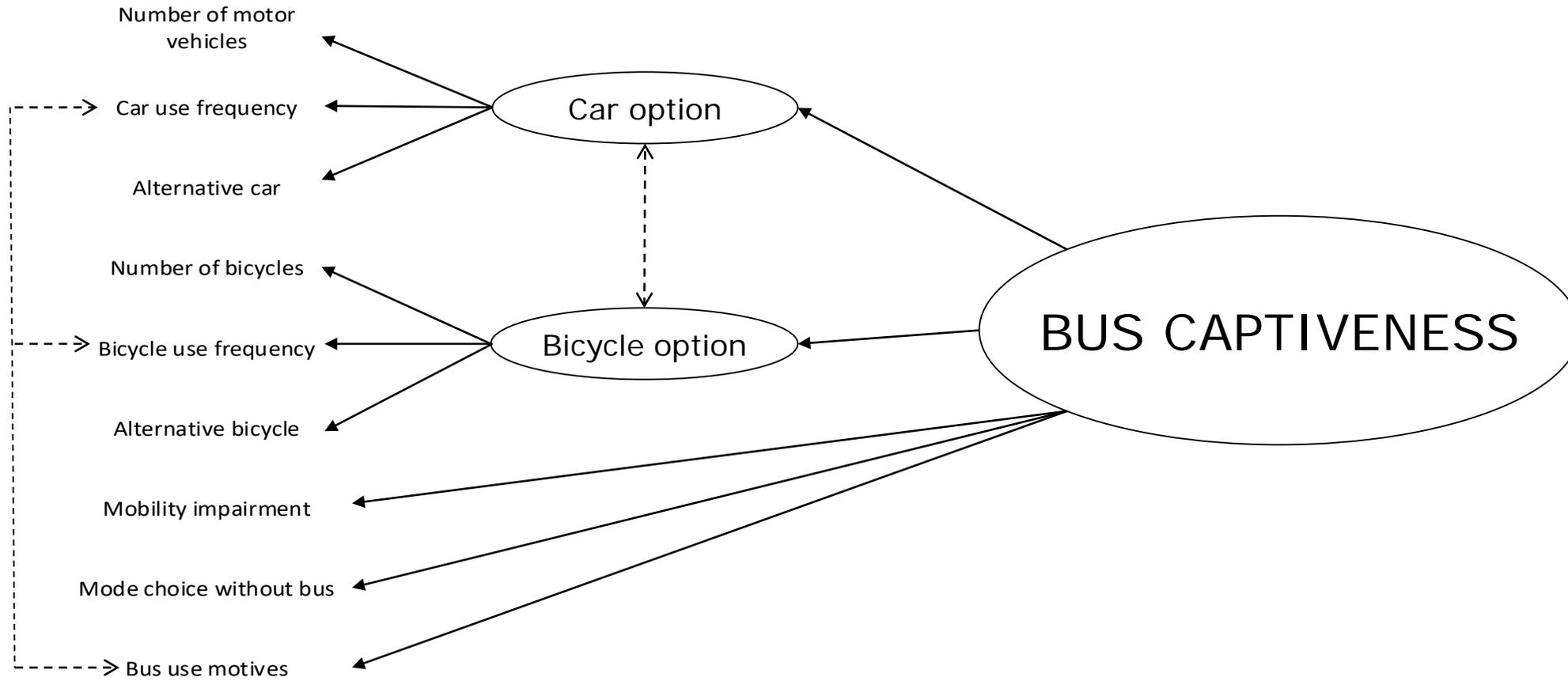


Method: confirmatory factor analysis

- Confirmatory factor analysis (CFA):
 - construct a latent variable
 - new factor is labelled as 'captiveness'
 - based on multiple indicators for captiveness
 - outcome is scaled interval
- CFA starts with **conceptual model**
- Model is tested on empirical data
- Model is validated using new / other dataset



Conceptual model





Model performance

Indicator	Threshold	Observed	Conclusion
Degrees of freedom	positive	22	+
P-value Chi-squared	0.05	0.000	++
Comparative fit index	0.950	0.992	++
Tucker-Lewis Index	0.950	0.987	++
RMSEA	0.100	0.059	+
SRMR	0.100 or 0.050	0.061	+ / 0

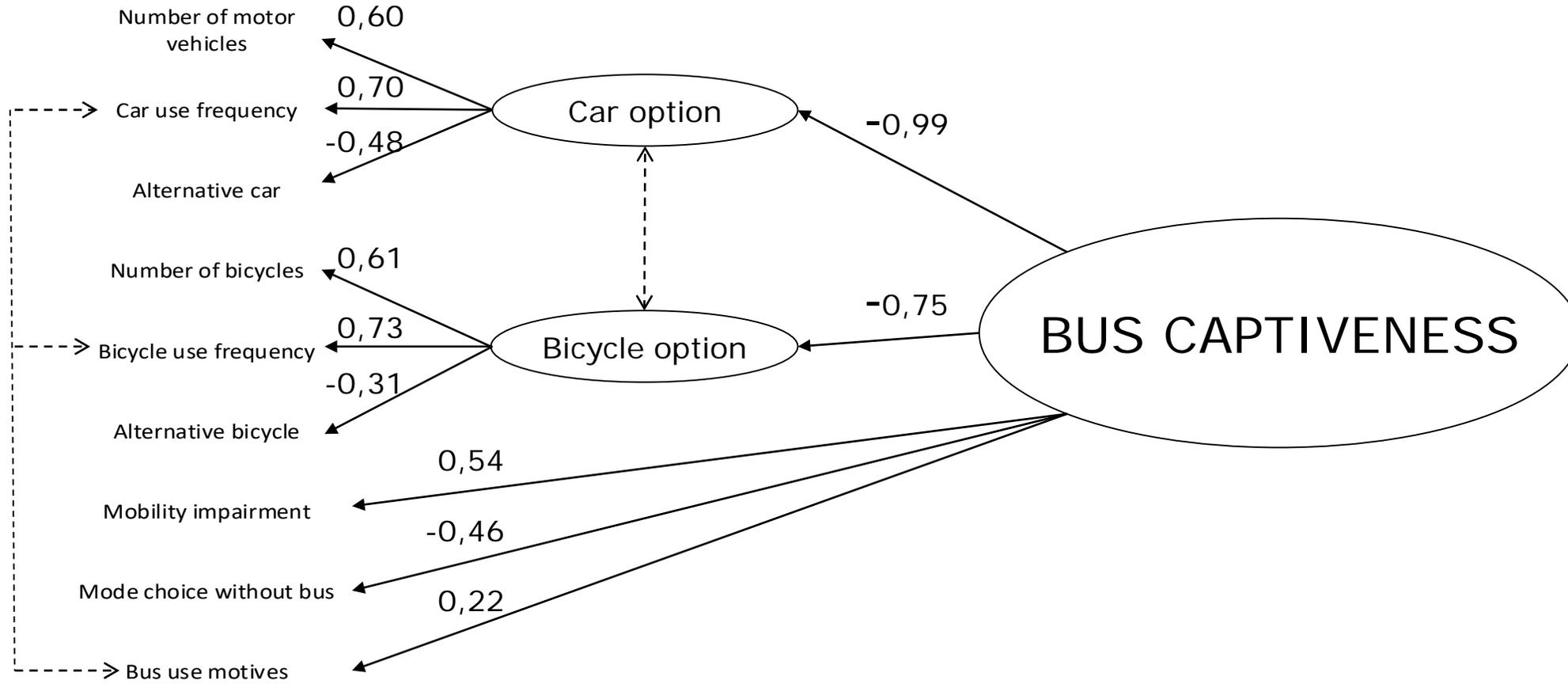
Thresholds based on Kline (2005) and Brown (2006)



Latent variable	Indicator	Est (s.e.)
Feasibility of car use	Number of motor vehicles	0.603 (0.056)***
	Freq. of car use (as driver)	0.700 (0.064)***
	Car driving as alternative	-0.478 (0.045)***
Feasibility of cycling	Number of bicycles	0.613 (0.051)***
	Freq. of bicycle use	0.727 (0.057)***
	Cycling as alternative	-0.312 (0.033)***
CAPTIVENESS	Feasibility of car use	-0.992 (0.182)***
	Feasibility of cycling	-0.745 (0.138)***
	Mobility impairment	0.543 (0.060)***
	Alternatives without bus	-0.464 (0.049)***
	Number of motives for bus use	0.215 (0.037)***

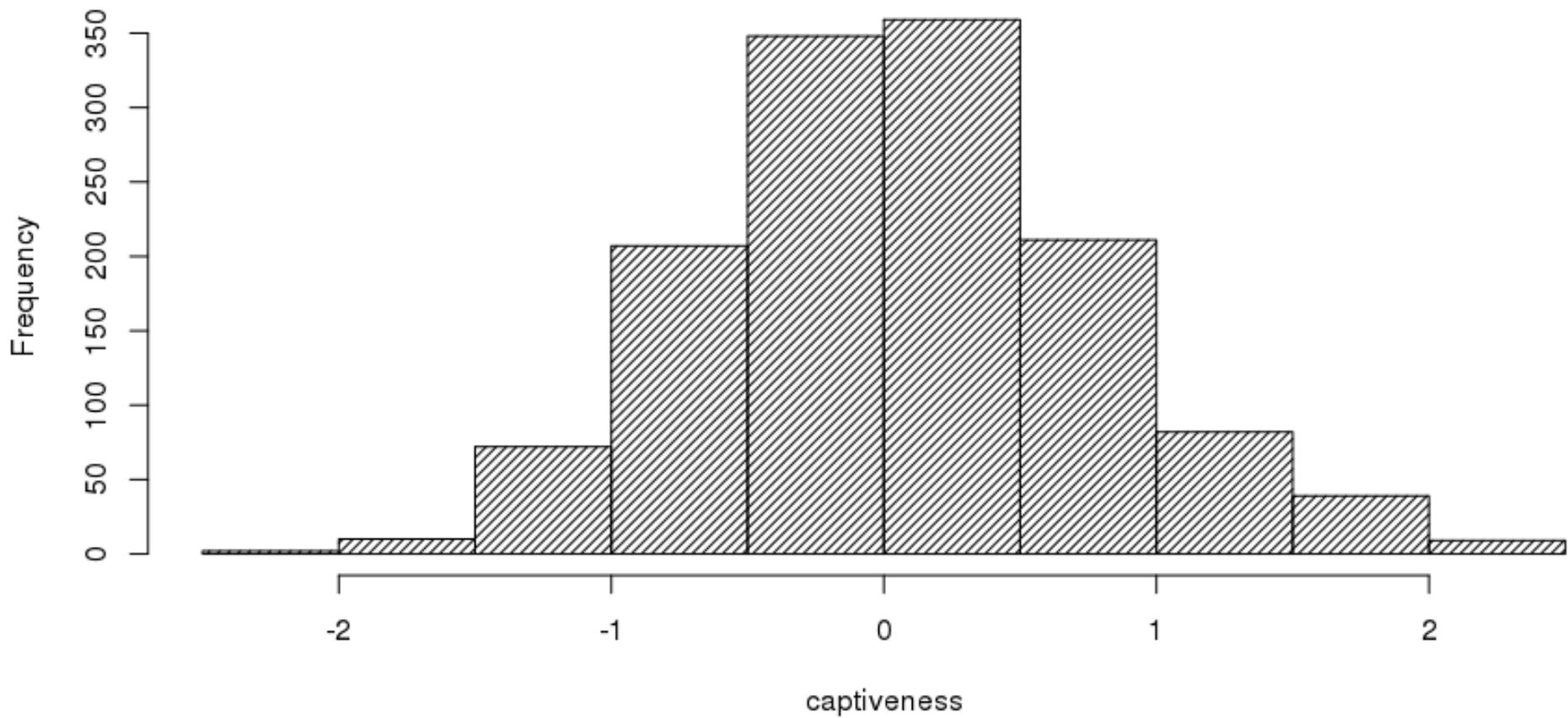


Model Results





Histogram of Captiveness index





Profile of bus captives

Label	Est. (s.e.)	Effect
Age (18-24 y)	-0.34 (0.09)***	-
Age (25-44 y)	-0.73 (0.08)***	--
Age (45-59 y)	-0.82 (0.08)***	--
Age (60-69 y)	-0.70 (0.08)***	--
Age (70+ y)	-0.44 (0.08)***	-
Gender (female)	0.03 (0.04)	0
Single	0.16 (0.05)**	+
Work disabled	0.65 (0.09)***	++
Job seeker	0.28 (0.09)**	+
Low HH income	0.23 (0.05)***	+
High HH income	-0.09 (0.05).	0
Urban	0.10 (0.04)**	0
Intercept	0.52 (0.07)***	

Bus captives are:

- Young (12-17 y); and to some extent young adults (18-24 y) and elderly (70+)
- Single
- Jobless / Work disabled
- From low income households

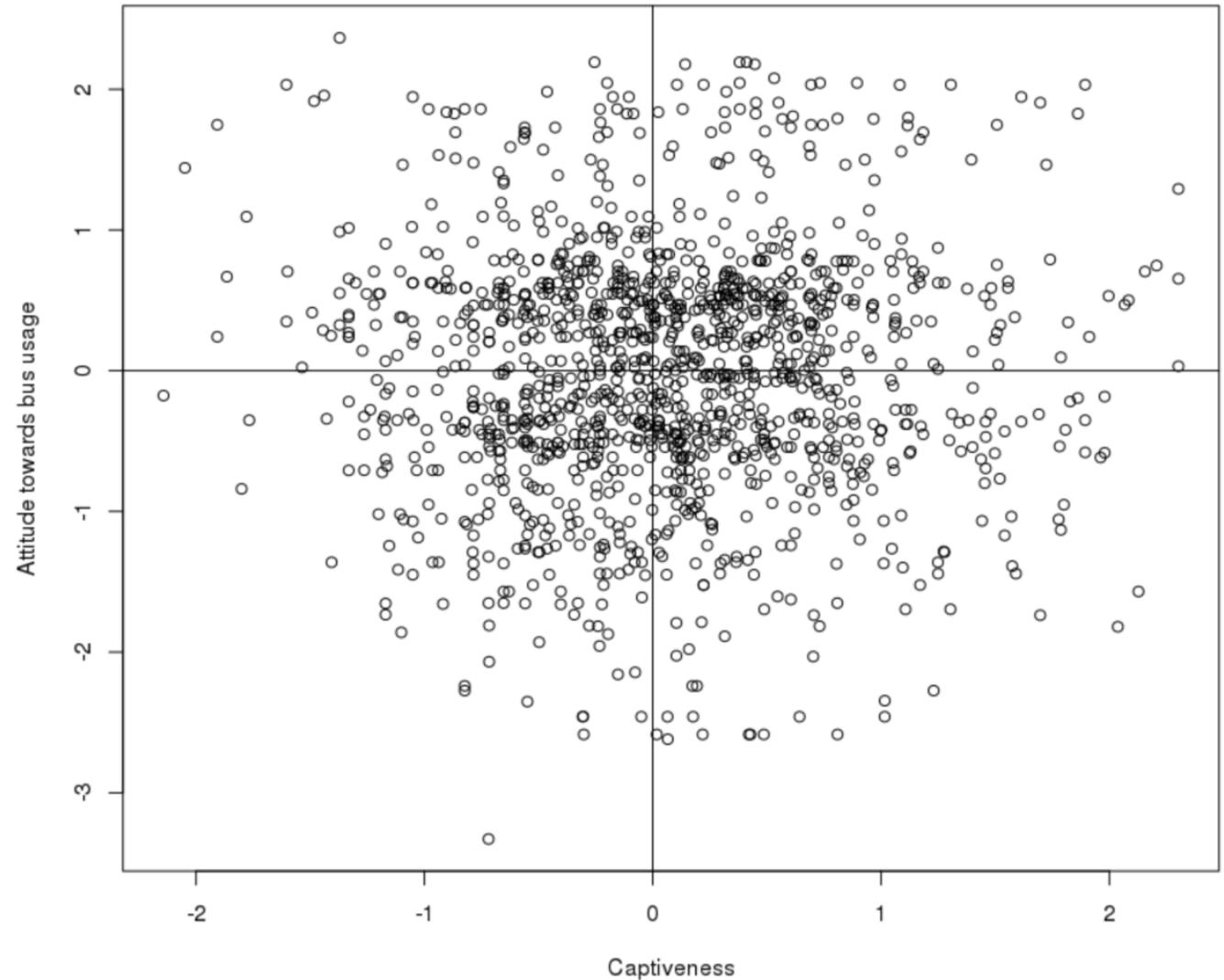
Ref. cat:

12-17 y. men. not single.
Not incapacitated. no jobseeker.
Medium household income. non-urban

Adj R-squared = 0.16



Relationship captiveness and attitude towards bus usage





Conclusions

- We developed a bus captiveness-index based on nine factors:
 - Beyond the dichotomy 'choice versus captive' travellers
 - Beyond the carless; account for bicycle option in the Netherlands
 - Many observations. excellent goodness-of-fit
- Bus captives:
 - Linear regression model for profile of captive bus user
 - Clear differences in: age class. work situation. household income
 - No differences in: gender. level of urbanisation. ...
 - Youngsters and mobility-impaired are among the most captive groups
- Bus captives are not more optimistic or pessimistic about bus usage



Further research

- Further improvements in this diagnostic tool are welcome
- Dutch bias due to importance of the bicycle?
- Test with other datasets. in other countries and/or with other modes
- Develop mode and country independent tool