

# The importance of sociodemographics in transport policy:

an application of latent class analysis to explore the impact of sociodemographics on travel behaviour profiles

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# How can (and do) people travel?

mode choice



travel time

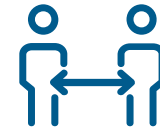


travel distance

## Relevant because



sustainable mobility transition



social exclusion, transport poverty, access to basic amenities

“To what extent are different travel behaviour patterns associated with specific sociodemographic profiles and what are implications for transport policy?”

“To what extent are different **travel behaviour patterns** associated with specific sociodemographic profiles and what are implications for transport policy?”

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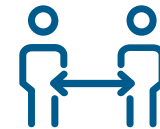


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# Factors that constrain or alter travel behaviour



## Sociodemographics



- economic circumstances
- responsibilities (e.g. children)



- gender



- ethnic background (cultural upbringing, safety considerations)



- health, age



- educational level



- car ownership

- household constellation

- Interactions thereof → e.g. single parent, elderly with low income ...



## Spatial aspects

- Urbanisation level



## Travel purpose

- Leisure
- Necessary travels (work/education)

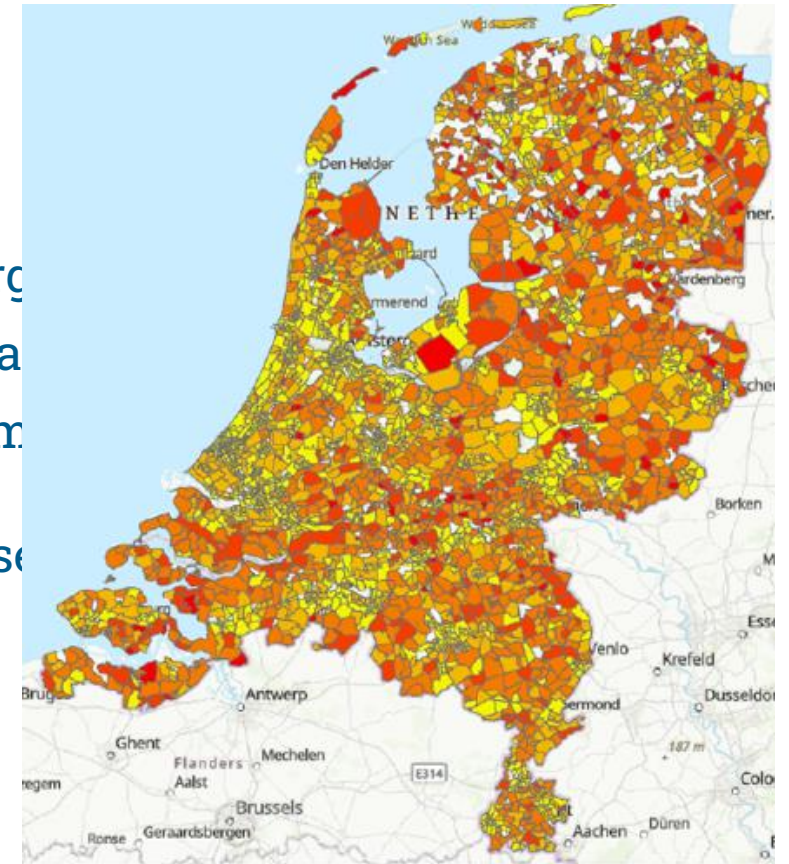


# Latent Class Analysis

- Clustering method
- Onderweg in Nederland (ODiN) datasets from 2018 and 2019 merged
- Latent Class Analysis in software Latent Gold performed for datasets filtered on purposes
- Travel behaviour indicators (mode choice, distance, time) to form clusters, sociodemographics as covariates (to predict class membership)
- Best fitting models in terms of statistical values and theory chosen
- Visualisation on map of the Netherlands with ArcGIS Pro

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Leisure travel purpose, Nearby activities class (<15 minute active trips)

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## Expert input: Focus group interview

- Crucial to interpret classes found in LCA carefully
- Expert opinions
- Input useful for both interpretation of classes and evaluation of relevance

## Three angles of analysis

travel behaviour patterns and similarities/differences across purposes

sociodemographic effects + ranking (logit re-parametrisation) and difference between purposes

substitution possibilities (same journey characteristics, different mode)

## Focus today:

*travel behaviour patterns and similarities/differences across purposes*

*sociodemographic effects + ranking (logit re-parametrisation) and difference between purposes*

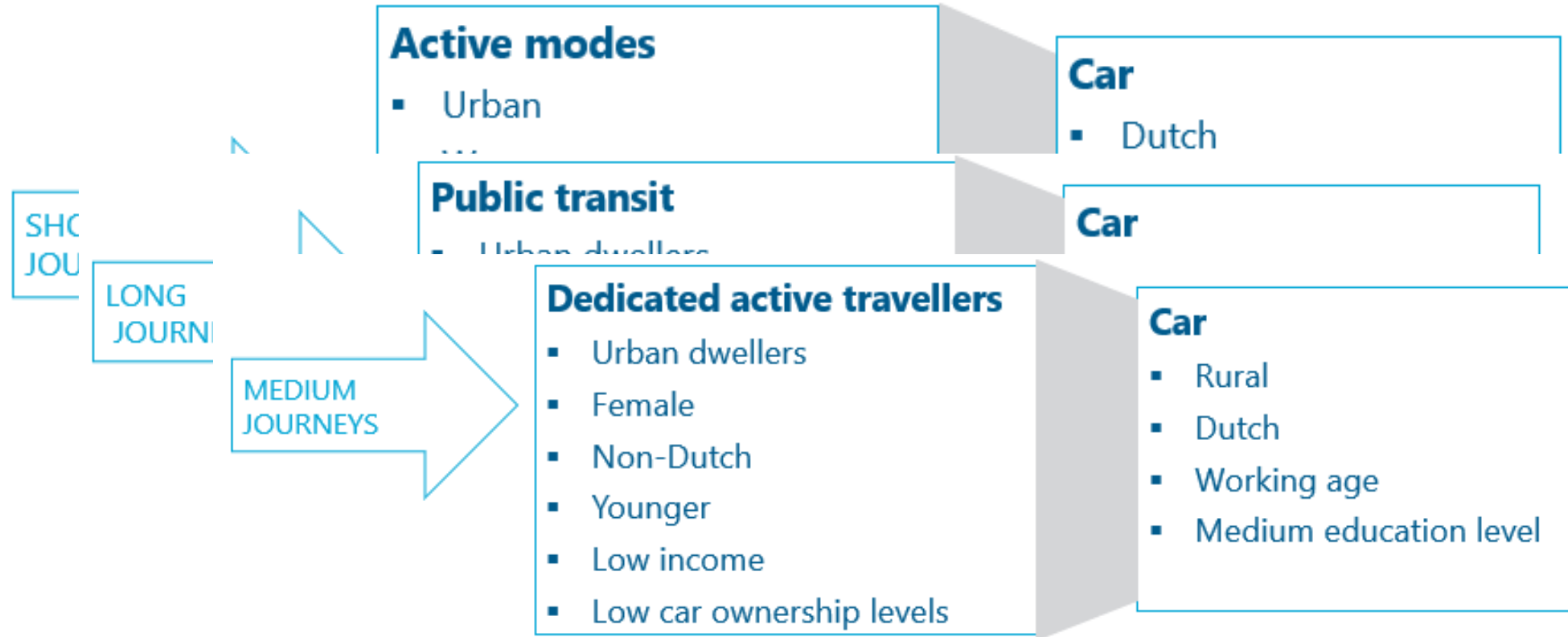
**substitution possibilities (same journey characteristics, different mode)**

# Overview

- 8 classes for necessary travels, 7 for leisure travels
- Clustered by: mode, distance and travel time
- 3 car classes, 3 active classes, 1 public transport class
- Can each be grouped in short, medium and long distance classes, travel times as additional information but similar to distance most of the time
- Public transport class only for long journeys (time + distance)

# Substitution possibilities in terms of mode choice when facing similar journeys (distance/time) identified

## Necessary travels



Clear patterns, 7 (8) classes, with different distances/times and modes

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Sample
Cluster size	21%	17%	17%	12%	11%	8%	8%	5%	
Indicators (mean)									
Mode choice	car	car	active	car	active	active	public transit	other	
travel distance									
0-1.5km	0%	0%	0%	0%	100%	0%	0%	0%	
1.5-7.5km	0%	1%	95%	100%	0%	24%	0%	0%	

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7.5-20km	3%	98%	0%	0%	0%	76%	15%		
20+ km	97%	1%	0%	0%	0%	0%	85%		
mean	3.97	3.00	1.95	2.00	1.00	2.76	3.85		
travel time									
0-5 min	0%	0%	0%	0%	65%	0%	0%		
6-15 min	0%	33%	57%	81%	35%	0%	0%		
16-30 min	30%	65%	42%	2%	0%	42%	2%		
30+ mins	70%	1%	0%	0%	0%	57%	98%		
mean	3.70	2.68	2.42	1.84	1.35	3.57	3.98		

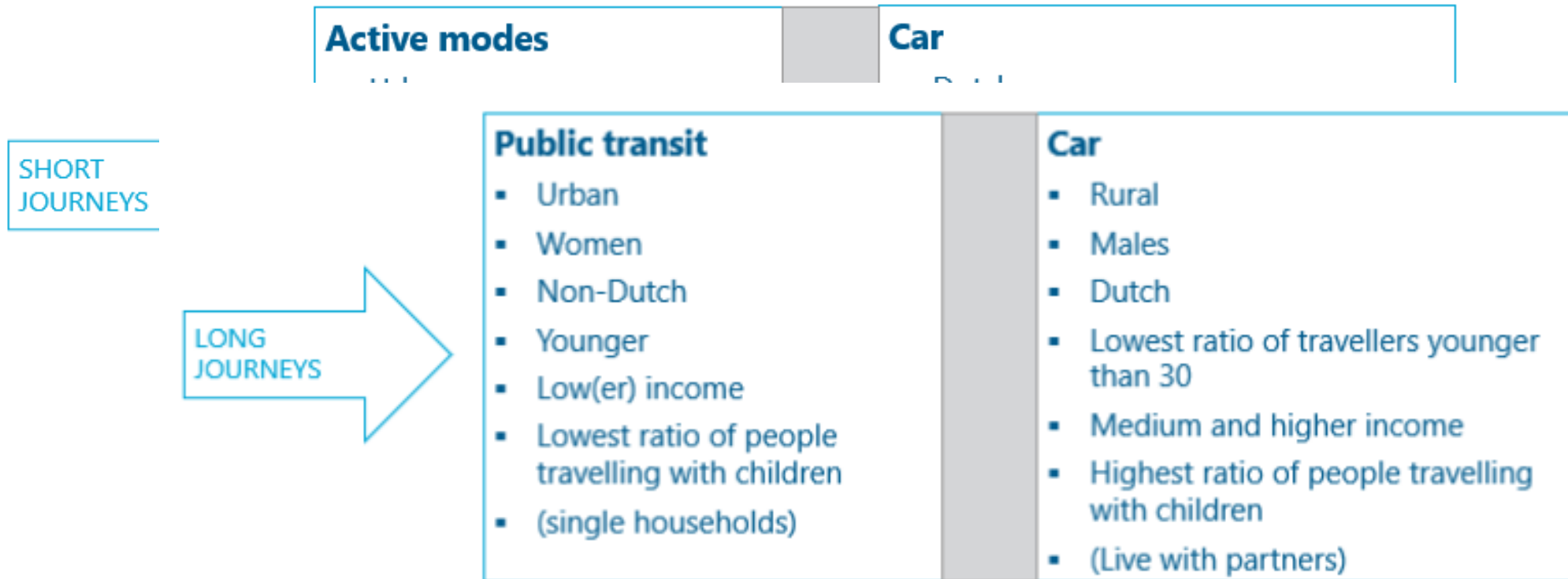
70-100%	63%	54%	44%	52%	48%	48%	47%	46%	51.7%
Education level									
in edu/unknown	1%	2%	3%	2%	3%	4%	2%	2%	2.4%
low education	1%	2%	5%	4%	7%	4%	1%	7%	3.5%
medium education	39%	50%	46%	65%	57%	44%	27%	78%	49.9%
high education	59%	37%	46%	29%	33%	48%	69%	13%	44.2%
Travel with child									
younger than 6									
No	99%	99%	99%	98%	99%	99%	99%	99%	98.0%
Yes	0.7%	1.0%	1.0%	1.6%	1.4%	1.5%	1.1%	0.8%	1.1%
Inactive covariates									
Car ownership									
0	3%	5%	24%	7%	18%	25%	30%	8%	13.6%
1	35%	41%	47%	44%	48%	46%	45%	47%	42.5%
2	47%	39%	22%	34%	25%	22%	20%	34%	32.3%
3+	16%	16%	7%	16%	10%	7%	6%	11%	11.6%
Children aged 12 and									
younger in household									
No	73%	77%	81%	78%	80%	80%	81%	75%	77.7%
Yes	27%	23%	19%	22%	20%	20%	19%	25%	22.3%
Household constellation									
Single	20%	22%	29%	20%	25%	28%	31%	20%	24.4%
Couple	80%	77%	70%	80%	75%	71%	68%	80%	75%
Other	0%	0%	1%	0%	0%	1%	1%	1%	0.6%

Table 5.5: Latent Class Proportions; work travel purpose



# Substitution possibilities in terms of mode choice when facing similar journeys (distance/time) identified

## Leisure travels



# Across purposes, sociodemographic profiles 'opposites' for different substitution classes

## Factors that were especially interesting



- Life-stage association



- Car ownership

- Context of urbanisation level



## Synthesizing the analyses and experts' input

### 4 general categories of travellers:

feasible active modes

forced sustainable modes

convenient car users

rely on car users

# Recommendations along the lines of the 4 trends

## Foster use of active modes:

- Flexibility in work

## Counter trend of convenience drivers

- Other modes for work travel
- Make public transit more appealing

## Counter trend of need for car

- Intersect the moment of the need to buy a car
- Make public transit more 'accessible'
- Car sharing
- First/last mile feeder system for public transit

## Support those that have no choice:

- Ensure safety/well-being on public transit

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- clear connections that warrant specific policy interventions rather than 1-fits-all
- clearer understanding of effect of certain factors (as co-terms, independently, only in connection with other terms)
- Sociodemographics had different magnitude of effect depending on travel purpose
- Clear avenues for future research

**Thank you!**  
**Questions?**



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