Institute for Transport Studies
FACULTY OF ENVIRONMENT

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Effecting a Change in Transport Mode Choice

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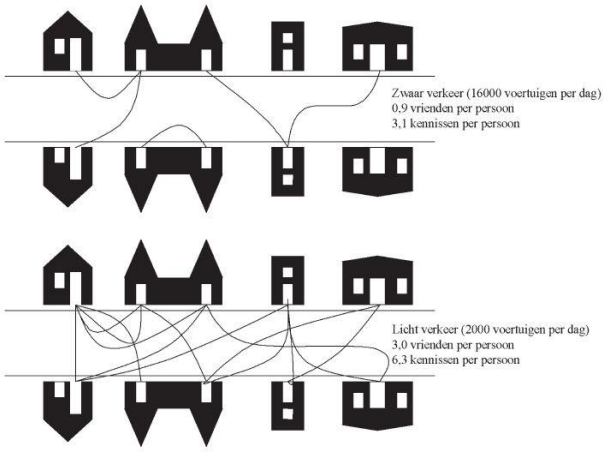
Societal problem

- Participate in activities
- Positive effect on the economy

- Environment: air and noise pollution
- Barrier effects
- Reduction in social contacts
- Health



Figuur 7. In twee straten met een verschillende verkeersintensiteit geven de lijnen weer waar bewoners aan hebben gegeven dat ze vrienden of kennissen hebben in de straat (gebaseerd op Appleyard, 1981).

Pollution
The air we breathe

European commission issues 'final warning' to UK over air pollution breaches

UK is one of five countries persistently contravening legal nitrogen dioxide levels with pollution from factories and vehicles, particularly diesel engines

London, seen from Greenwich. Air pollution is linked to the early deaths of about 40,000 people a year in the UK. Photograph: Stefan Rousseau/PA

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Staff and agencies

Wednesday 15 February 2017 16.20 GMT

Road traffic is responsible for approximately 40% of the nitrogen oxide (NOx) emissions in the EU.

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Societal problem

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To make cities more resilient, sustainable, and healthy, these negative externalities can be reduced/limited in several ways:

- Limiting impact, e.g. noise barriers.
- Reduce output, e.g. cleaner transport.

More effective is to **change individual behaviour!**

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Background

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Behavioural change has proven difficult. Various initiatives have not proven effective.

We need more and stronger (causal) evidence to accomplish behavioural change.

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Background

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What do we know?

Studies in various domains of health-related behaviour change suggest that existing behaviour predicts future behaviour.

Habits of using a specific mode of transport predict the use of this mode and are thought to hinder behaviour change (De Bruijn and Gardner, 2011; Aarts et al., 1998; Bamberg and Schmidt, 2003; Gärling and Axhausen, 2003).

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Background

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However, other characteristics of baseline behaviour may affect the inclination to change at least as much.

One of these may be: baseline variability of mode choice

- Related to transtheoretical models (Prochaska et al., 1992; Porchaska and Velicar, 1997): experimental phase
- Baseline variability may also increase an individual's self-efficacy

Aim:

To increase our understanding of the relationship between baseline behaviour and behaviour change over time, using the opportunity presented by an intervention study to discriminate between variability and change.

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Method

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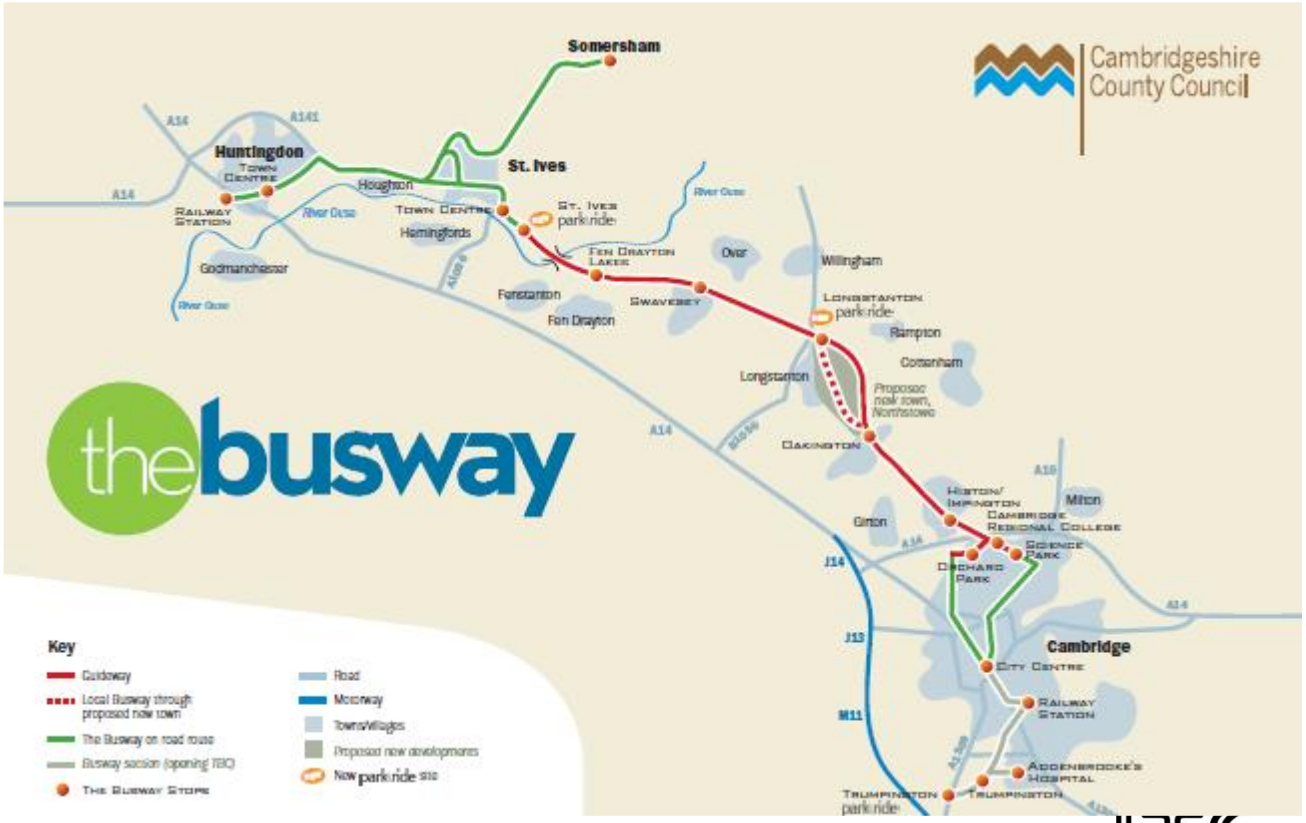
Intervention

- 25-km guideway
- 3 P&R sites



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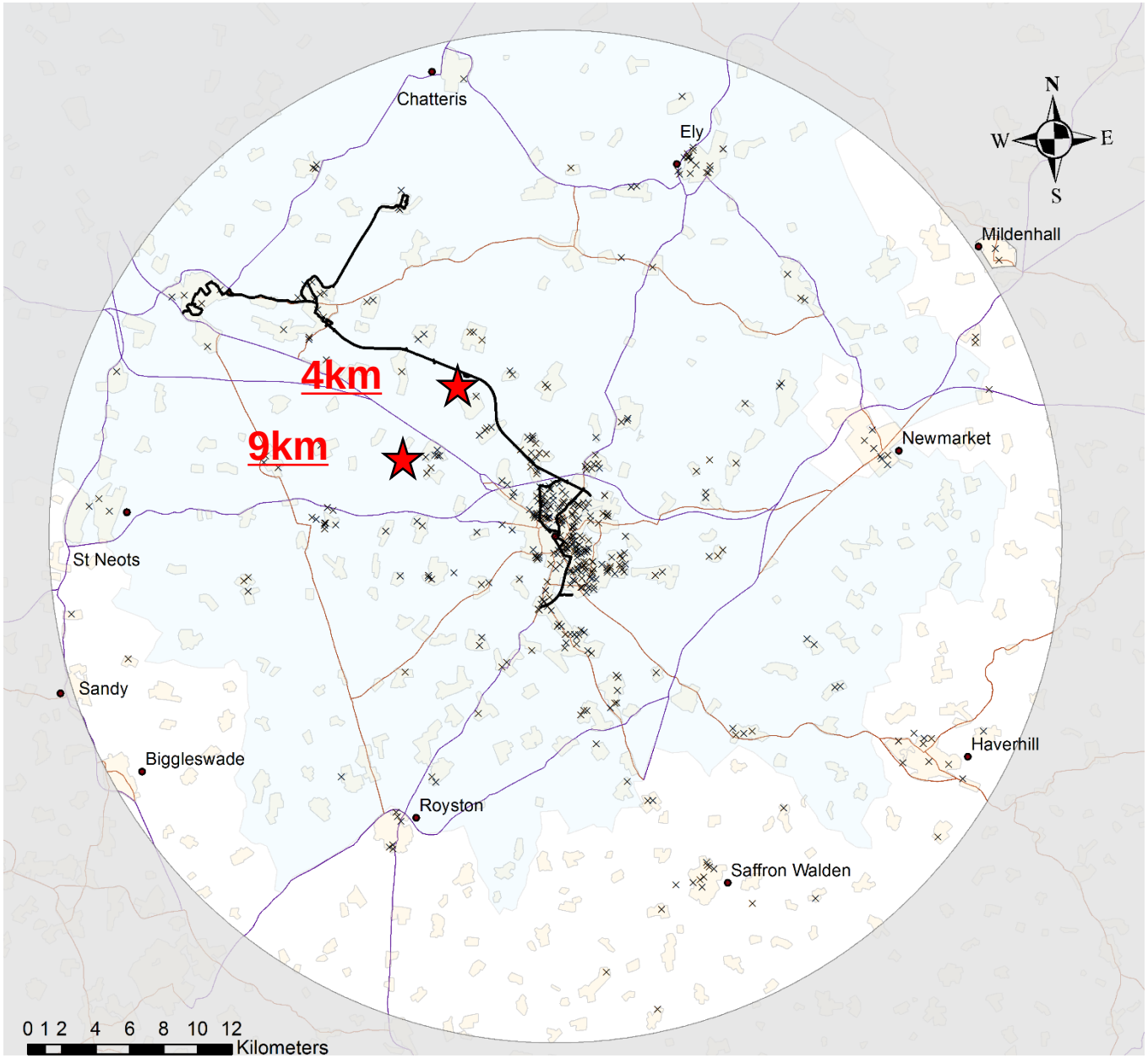

- Presented as a study on commuting and health
- Adults aged 16 years or older
- Working in areas of Cambridge to be served by the busway
- ≤ 30 km from the city centre

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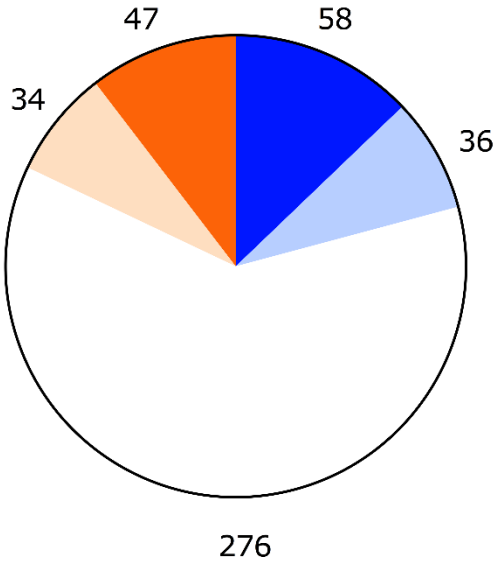
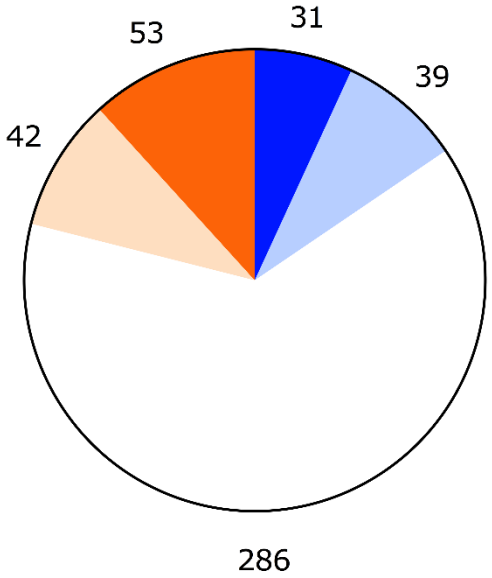
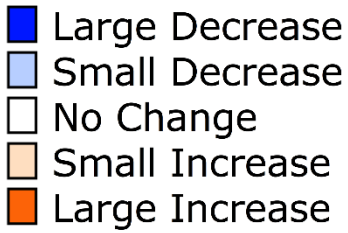
The exact location of the home addresses of the respondents have been altered to secure their anonymity

Change in Active Travel Share

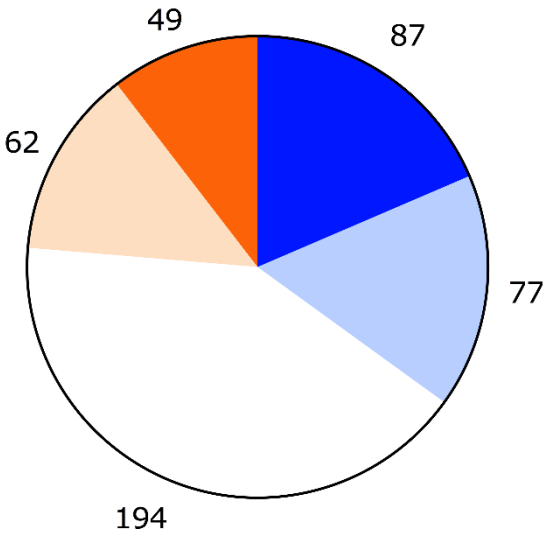


Change in Car Share

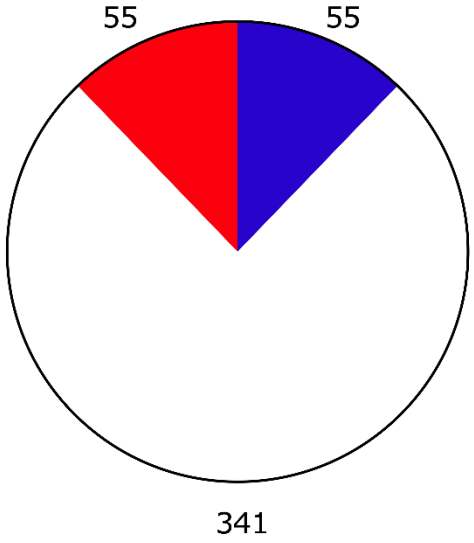


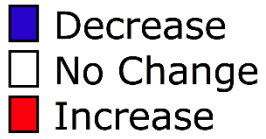


Change in Number of Trips

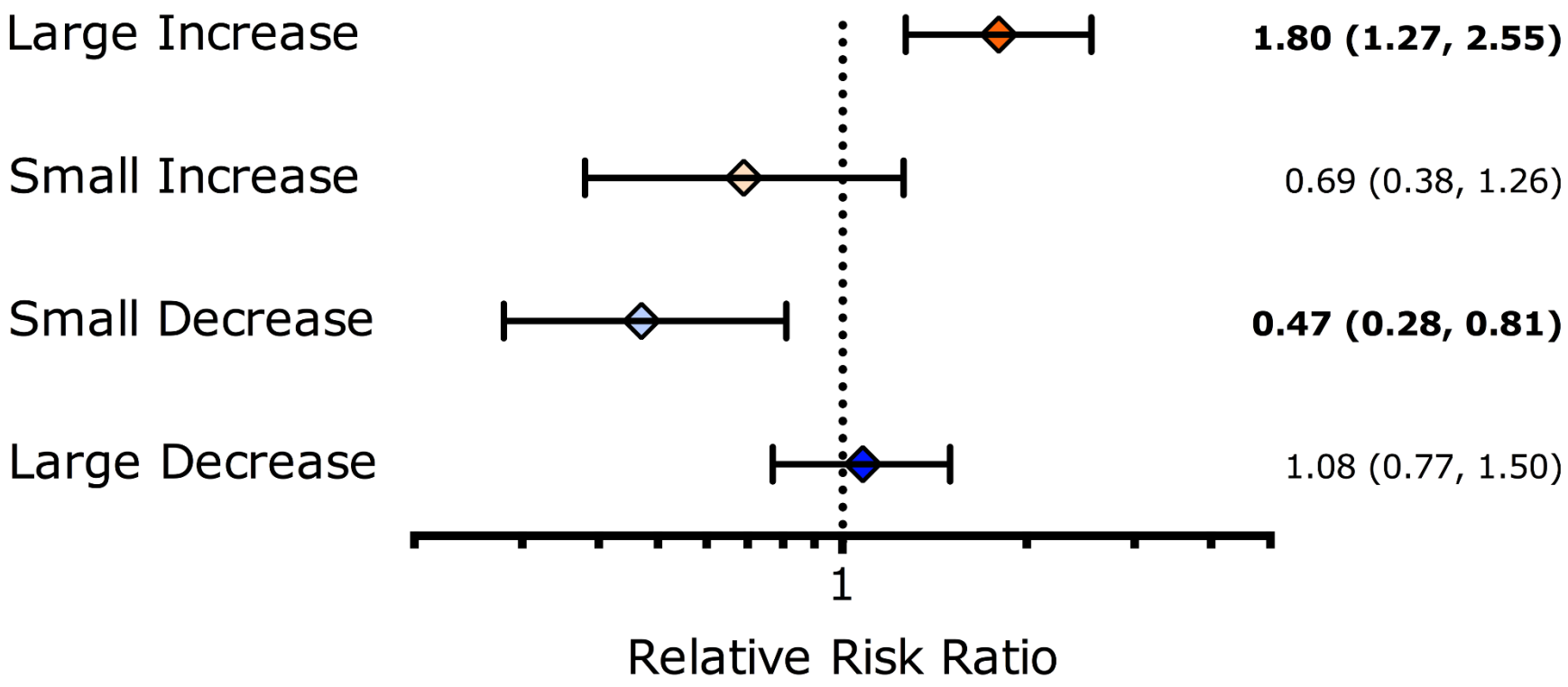


Change in Public Transport Share





Associations between exposure to busway and changes in active travel mode share



Heinen E; Panter J; Mackett R; Ogilvie D (2015) Changes in mode of travel to work: a natural experimental study of new transport infrastructure, International Journal of Behavioral Nutrition and Physical Activity, 12, .

Method

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Variability was measured over the course of a week at baseline and defined in three ways:

- The Herfindahl–Hirschman Index (HHI): the sum of the squared values of the share of each mode. We normalised the HHI between 0 and 1, and we used 1-HHI in the analyses.
- The number of modes of transport used.
- The share of the main (combination of) mode(s).

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Results

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Active travel:

- All indicators of variability were associated with a decrease and an increase in active travel share.
- Individuals who had a greater level of variability at baseline were more likely to increase their active travel share upon greater exposure to the intervention.

		Measure of baseline variability					
		HHI		Number of modes		Proportion main mode	
		RRR	95% CI	RRR	95% CI	RRR	95% CI
Decrease in AT share	Baseline variability	**40.82*** **	**[10.63, 156.70]**	**3.23*** **	**[2.04 5.12]**	**46.32*** **	**[8.10, 264.90]**
	Exposure	1.61*	[1.06, 2.44]	1.18	[0.87, 1.59]	1.20	[0.89, 1.62]
	Interaction	0.48	[0.17, 1.33]			1.06	[30.34, 3.23]
Increase in AT share	Baseline variability	**5.48****	**[1.71, 17.5296]**	**2.95*** **	**[1.81, 4.79]**	**106.40*** **	**[14.97, 756.40]**
	Exposure	1.62**	[1.16, 2.26]	1.75***	[1.27, 1.42]	1.68**	[1.21, 2.35]
	Interaction	**3.34****	**[1.41, 2.10]**			**6.97****	**[1.63, 29.88]**

Heinen E; Ogilvie D (2016) Variability in baseline travel behaviour as a predictor of changes in commuting by active travel, car and public transport: A natural experimental study, Journal of Transport and Health, 3, pp.77-85.

Results

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Car Use:

- All indicators of variability were significantly associated with both a decrease and increase in car share.
- Individuals who had a greater level of variability at baseline were more likely to decrease their car share upon greater exposure to the intervention.

		Measure of baseline variability					
		HHI		Number of modes		Proportion main mode	
		RRR	95% CI	RRR	95% CI	RRR	95% CI
Decrease in car share	Baseline variability	**6.00***	**[1.51, 23.79]**	**3.31*****	**[1.85, 5.91]**	**210.50*****	**[22.01, 2013.20]**
	Exposure	1.85**	[1.26, 2.72]	2.12***	[1.44, 3.11]	1.85**	[1.27, 2.70]
	Interaction	**7.50*****	**[2.52, 22.34]**	**1.60***	**[1.04, 2.44]**	**18.23****	**[3.02, 110.20]**
Increase in car share	Baseline variability	**14.10*****	**[4.42, 44.96]**	**2.57*****	**[1.62, 4.07]**	**29.01*****	**[5.16, 163.30]**
	Exposure	1.22	[0.86, 1.73]	1.13	[0.83, 1.55]	1.10	[0.81, 1.49]
	Interaction	0.93	[0.41, 2.10]	1.17	[0.88, 1.56]	2.22	[0.71, 6.92]

Heinen E; Ogilvie D (2016) Variability in baseline travel behaviour as a predictor of changes in commuting by active travel, car and public transport: A natural experimental study, Journal of Transport and Health, 3, pp.77-85.

Conclusions

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Baseline variability was associated with changes in modal split for commuting over time.

This indicates that, on average, individuals with higher levels of baseline variability were more likely to change their travel behaviour.

Individuals with higher levels of variation at baseline were more likely to increase their active travel share and reduce their car share with an increase in exposure to the intervention (shown by the significant interaction effects).

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Conclusions

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Several possible explanations:

Higher levels of variability may indicate that an individual is in an experimental phase and is open to changes.

Higher levels of variability indicate the use of a variety of modes. This use may result in higher levels of self-efficacy to use these modes of transport and subsequently increase their responsiveness to an intervention.

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Background

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However, two other mechanisms may also explain these findings.

- measured change is variability
- not-independent measures (statistical coupling, regression to the mean)

One essential step towards a better understanding of the relationship between multimodality and changes in travel behaviour is to investigate the relationship between multimodality and the intention to change.

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Method

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Dependent variable :

‘To what extent do you intend to increase or decrease the use of the following modes (in the coming years)?’

Predictors: based on a self-reported travel diary

Indicators: 2 stage level: number of modes; Herfindahl–Hirschman index
2 trip level: number of modes; highest share

Predefined modality groups: unimodal (UM) car users, UM cyclists, multimodal users who relied on a single combination of modes, and other multimodal travellers

Cluster analyses on the individual mode shares.

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Conclusion

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Our analyses did not provide conclusive evidence that the level of multimodality is associated with the intention to change.

The more multimodal individuals were, the more likely they intended to decrease their car use.

A strong association between car availability and the level of multimodality. Individuals who always had a car available had, on average, lower levels of multimodality.

Additional research will be necessary to test the proposed link between multimodality and behaviour change.

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Conclusion

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This research, and additional explorations, show that individual travel behaviour is more complex than is often acknowledged. We need a deeper understanding of existing patterns and patterns of change.

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Acknowledgements

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