



Travel mode attitudes, urban context, and demographics: Do they interact differently for bicycle commuting and cycling for other purposes?

Jie Gao¹, Dick Ettema¹, Marco Helbich¹, Carlijn B.M. Kamphuis²

¹ Department of Human Geography and Spatial Planning, Faculty of Geosciences, Utrecht University, the Netherlands

² Department of Interdisciplinary Social Science, Faculty of Social and Behavioral Sciences, Utrecht University, the Netherlands

Background

Cycling, a clean and active transportation mode has become an increasingly important component of strategies to address issues of public health, climate change, air quality, and inner-city mobility (Oja *et al.*, 2011). Ecological models suggest that the combination of individual (i.e., intrapersonal sociodemographic) and environmental variables will best explain physical activity (Sallis *et al.*, 2015). Although cycling behavior is often believed to be influenced by both environmental and individual factors, little is known about the interaction effects between these factors in relation to cycling behavior. The conceptual framework for this study (Figure 1) is partly based on previous studies (Willis *et al.*, 2015; Xing *et al.*, 2018).

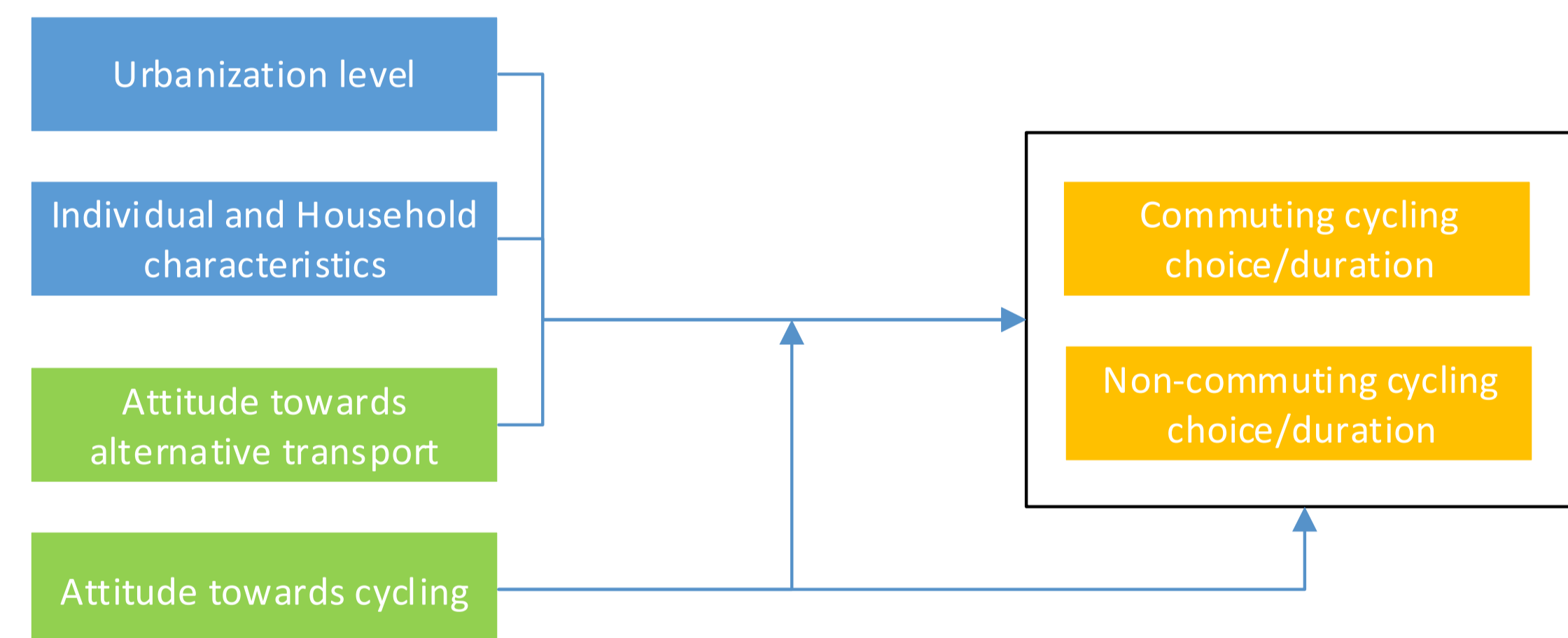


Figure 1 Conceptual framework

Aim

This study examined whether interactions between travel mode attitudes, urbanization level, and socio-demographics were different for bicycle commuting and cycling for other purposes.

Data

- 2014 wave of the Netherlands Mobility Panel (MPN).
- In total, **2,673** respondents (18+ years) who had recorded at least one trip on the days covered by the survey were included in the sample (see Figure 2).
- **Outcome variables** for commuting and other purposes: 1) any bicycle usage (yes vs. no); 2) average cycling duration (in hours per weekday).

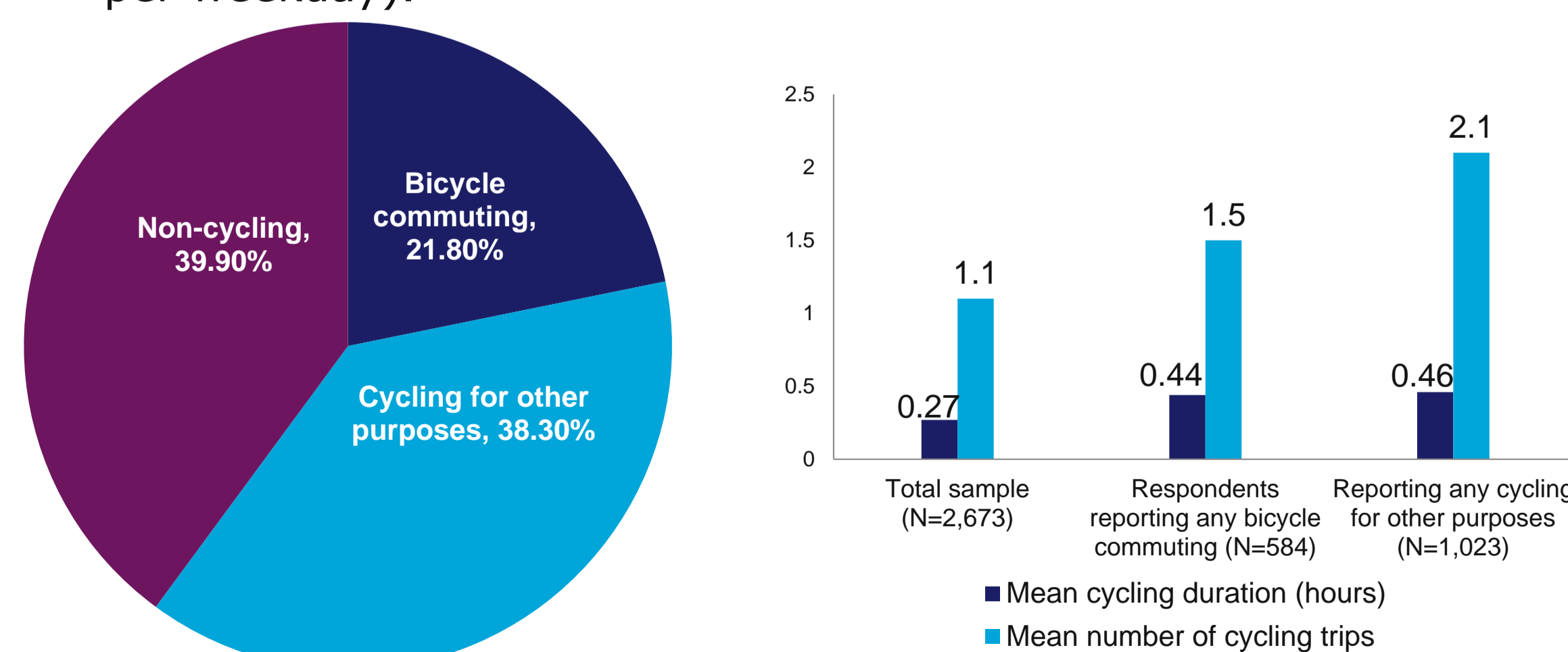


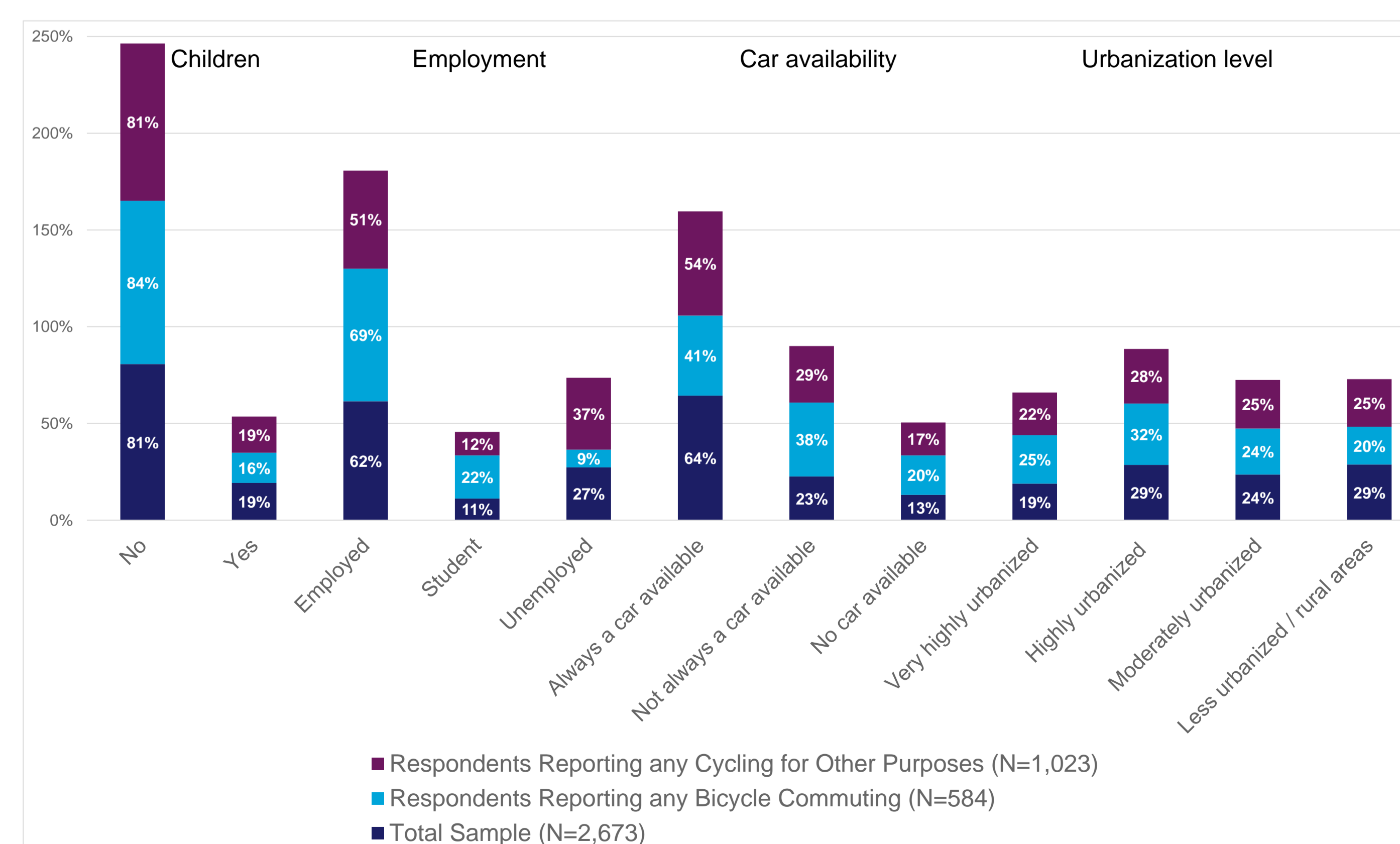
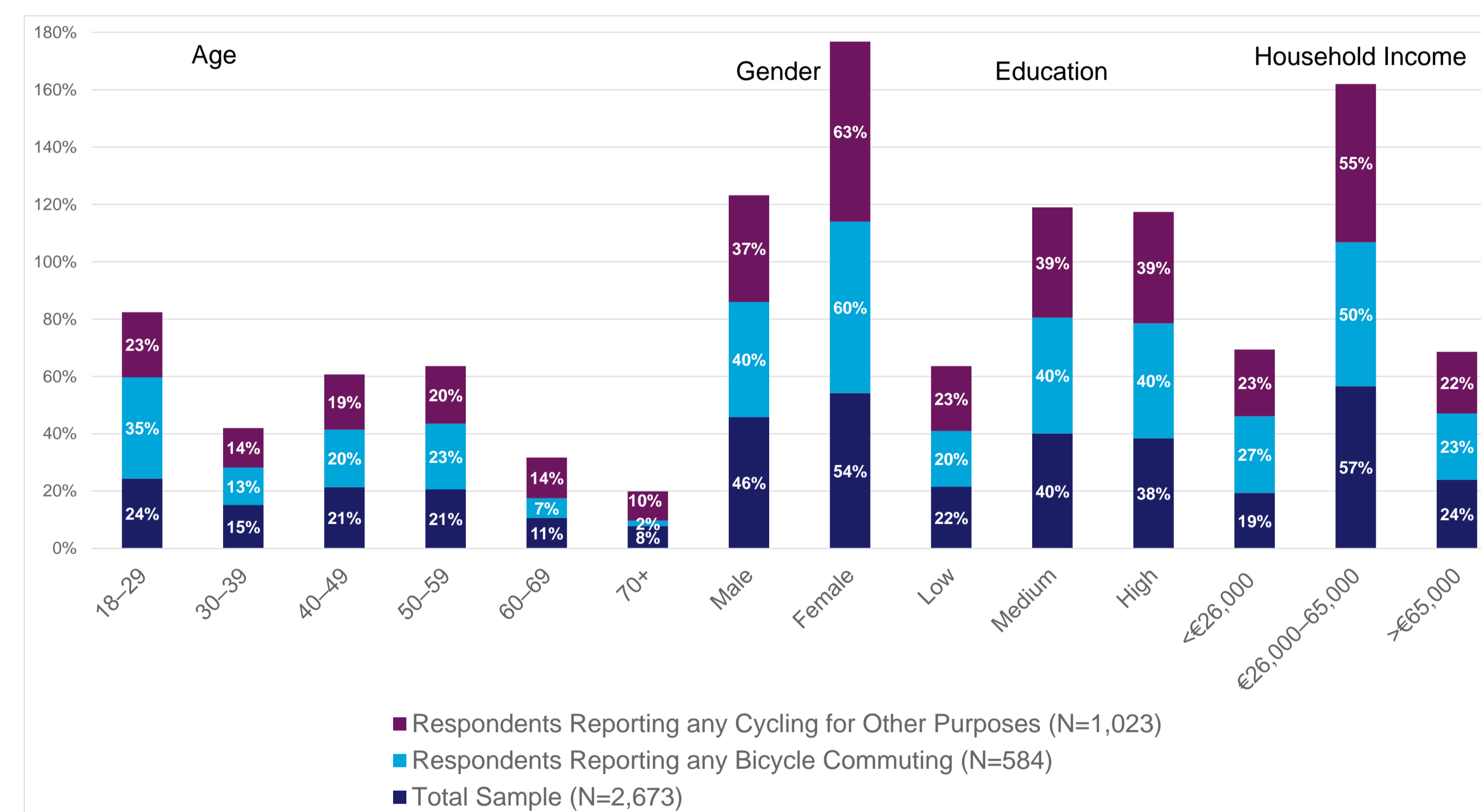
Figure 2 Distribution of Sample Size

Methods

- Attitudinal factors concerning different travel modes, namely bus, car, cycling, and train, were constructed by means of factor analysis.
- Multivariate Tobit model: Censored distribution (Excess of zeros due to lack of cycling trips).
- Separate models for commuting and other purposes cycling duration and bicycle usage were used to test the interaction of each of the included variables with cycling attitudinal factors.

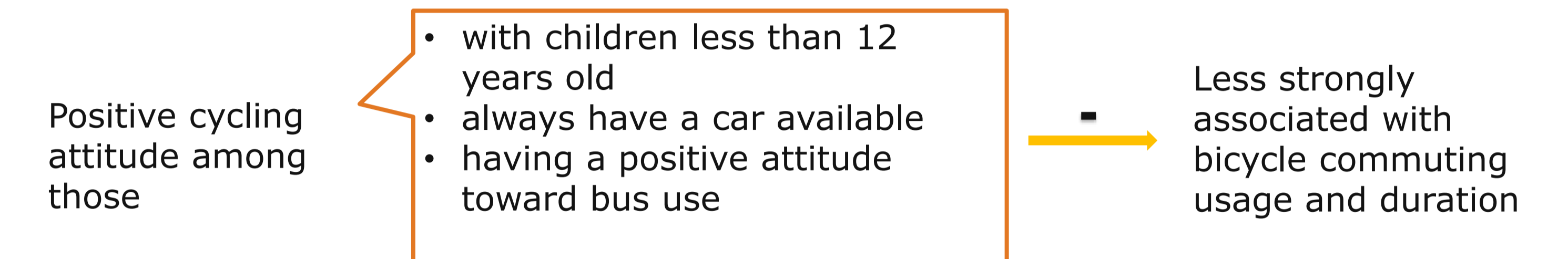
Results

Descriptive Statistics

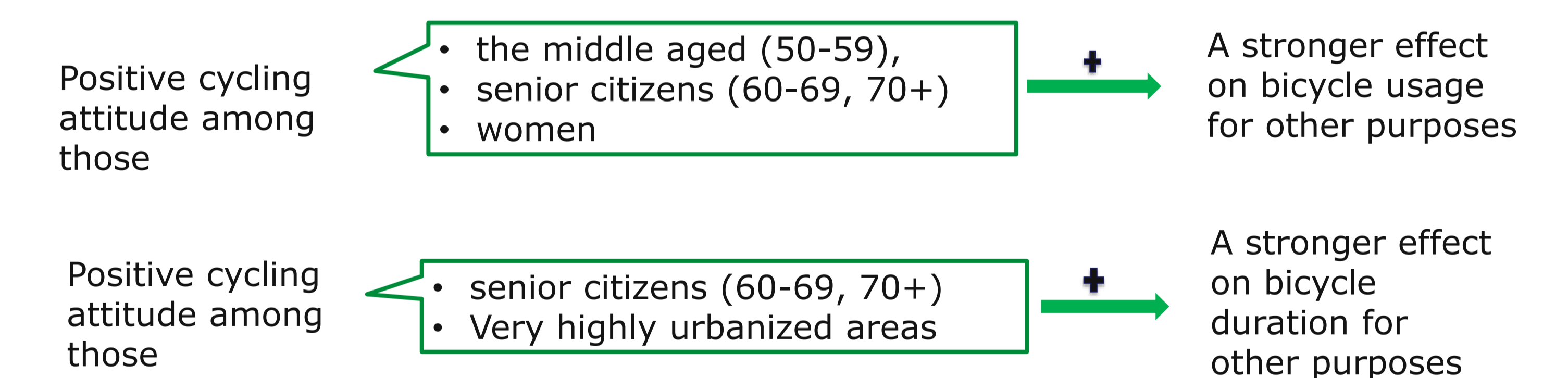


Interaction analysis results

Compensatory mechanism



Synergetic mechanism



Conclusions

- Our findings provide partial support for the interactions between environmental and individual factors in relation to cycling behavior, as postulated by socioecological models (Sallis *et al.*, 2015).
- A positive attitude toward cycling was positively related to bicycle commuting duration, but this association was less strong among those with a positive attitude toward bus use.
- Having a positive cycling attitude had a weaker association with both bicycle commuting usage and duration in those who do not always have a car available.
- Regarding cycling for other purposes, cycling attitude had a stronger positive association with cycling duration among residents of very highly urbanized area, compared to residents of less urbanized areas.
- The available evidence, though limited, suggests that targeting attitudes can have a measurable impact on bicycling, but not to the same extent among all people.

References

Oja, *et al.* (2011). Health benefits of cycling: a systematic review. *Scand J Med Sci Sports*, 21(4), 496-509.
 Sallis, *et al.* (2015). Ecological models of health behavior. *Health behavior: theory, research, and practice*. 5th ed. San Francisco: Jossey-Bass, 43-64.
 Willis, *et al.* (2015). Cycling under influence: summarizing the influence of perceptions, attitudes, habits, and social environments on cycling for transportation. *International Journal of Sustainable Transportation*, 9(8), 565-579.
 Xing, *et al.* (2018). Why do people like bicycling? Modeling affect toward bicycling. *Transportation Research Part F: Traffic Psychology and Behaviour*, 56, 22-32.