

USING MOBILITY PANEL DATA TO ASSESS PHYSICAL ACTIVITY FROM ACTIVE TRAVEL OF INDIVIDUALS OVER TIME: INSIGHTS FROM GERMANY

TRB/ACSM Conference: **Moving Active Transportation to Higher Ground**

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Background

- Active travel (AT) can contribute to physical activity (PA);
- Policies designed to increase active travel, but...
- ...how stable are weekly health enhancing levels of PA from AT between years within the same individual?
- Problem 1: travel surveys are typically cross-sectional prohibiting assessment of AT and resulting PA within the same individual over time.
- Problem 2: travel surveys typically only capture travel behavior during one specific day and not a week.
- Our approach: Using German Mobility Panel (MOP) data to assess weekly physical activity from active travel of individuals in (three) consecutive years.

Background: Germany

- ~80 million inhabitants
- Federal system of government, local self-government
- Strong economy, high standard of living
- Important automobile industry
- High level of car ownership
- Most adults have a driver's license
- Extensive road networks (Autobahns)
- Much urban & suburban (re)development since WWII



Data Source:

The German Mobility Panel MOP (1)

- MOP is a rotating panel with individuals participating for three consecutive years before rotating off;
 - 7-day trip diary to capture weekly travel;
 - Annual sample size is about 750 households, 1,800 persons, and 45,000 trips
 - Weighted data assure that the findings are representative.

Data Source:

The German Mobility Panel MOP (2)

- Three connected databases
 - *Household file* with information about the household;
 - *Person file* with information about each person in the households;
 - *Trip file* with all trips per person made during a week.
- Variables measuring active travel:
 - Duration of trips by foot and bicycle;
 - Trips are defined from one address to another;
 - But duration of access to/egress from public transport to home.
 - Drawback: MOP does not include addresses and geocodes of trip origins & destinations.

Data, Measurement, Sample

Measuring active travel time:

- Pooled the panel data from 1996 to 2010;
- Aggregate minutes of active travel per person per week (self-reported duration of trips by foot, bicycle, and public transport access/egress);
 - Estimated '5 minute' public transport access/egress time for trips that do not start/end at 'home';
- Used person identifier codes to compare active travel for 5,597 individuals who participated in MOP for three consecutive years.

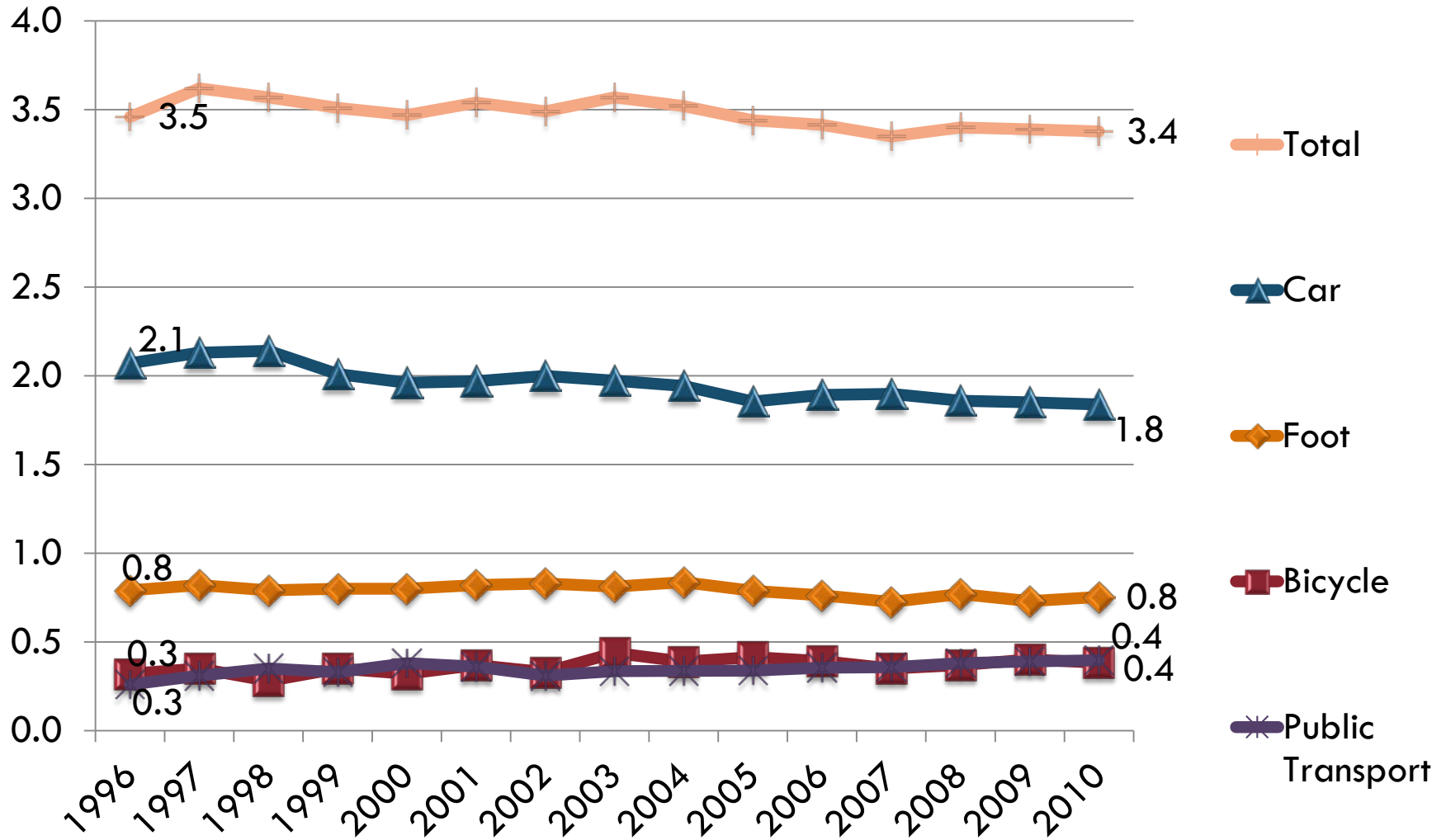
Analysis

- Calculated the share of the population achieving health enhancing (150+ minutes) of PA through AT per week:
 - in any year;
 - in TWO years;
 - in THREE years;
- Used poisson, ordered and multinomial logistic regression analysis to stratify the analysis by socioeconomic, demographic and land-use factors.

Stratified by Independent Variables

- Gender;
- Age group;
- Education level;
- Car ownership in household;
- Employment;
- Driver's license;
- Having a monthly transit ticket;
- Population size;
- Time period of panel participation.

Transport Perspective: Number of Daily Trips Per Person '96-'10

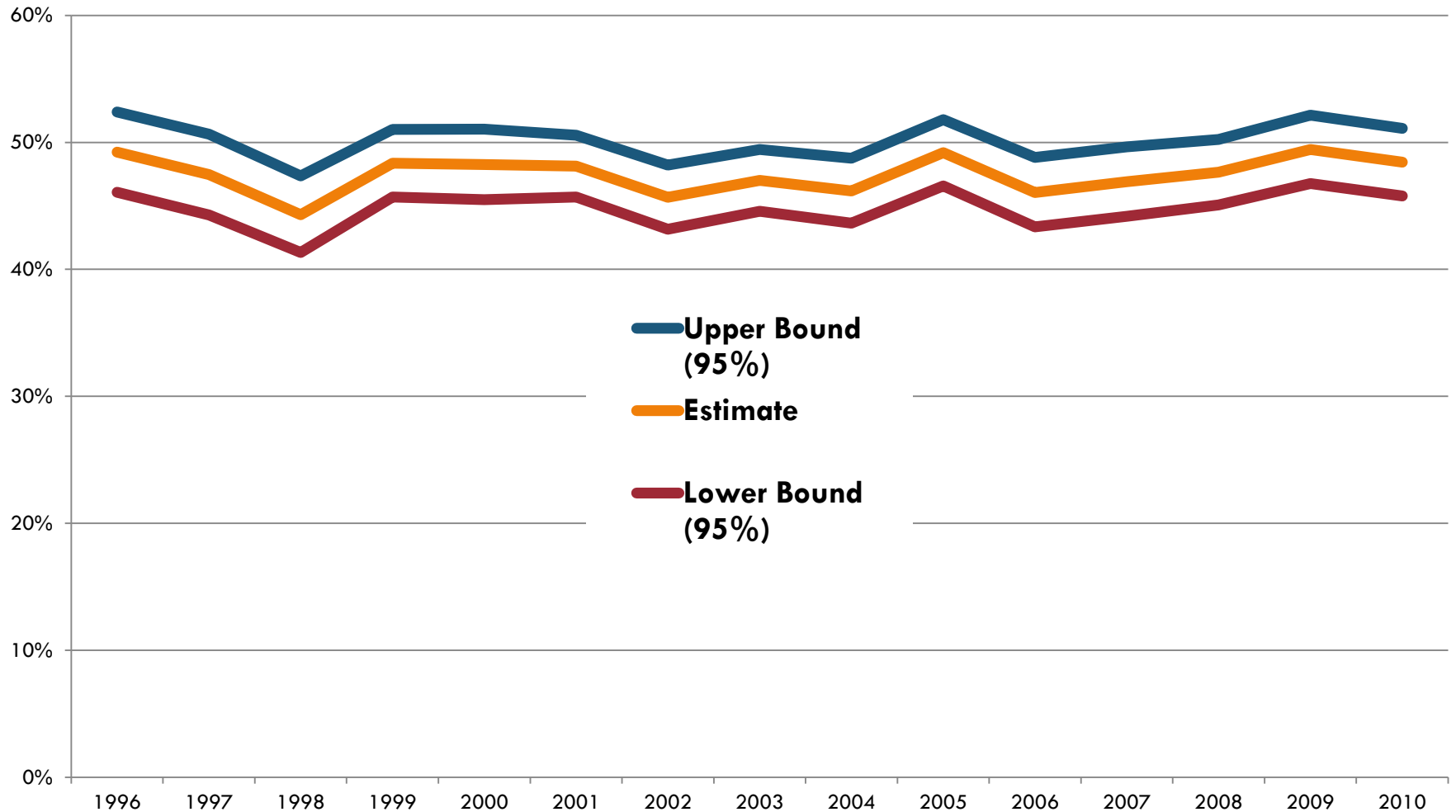


Transport Perspective:

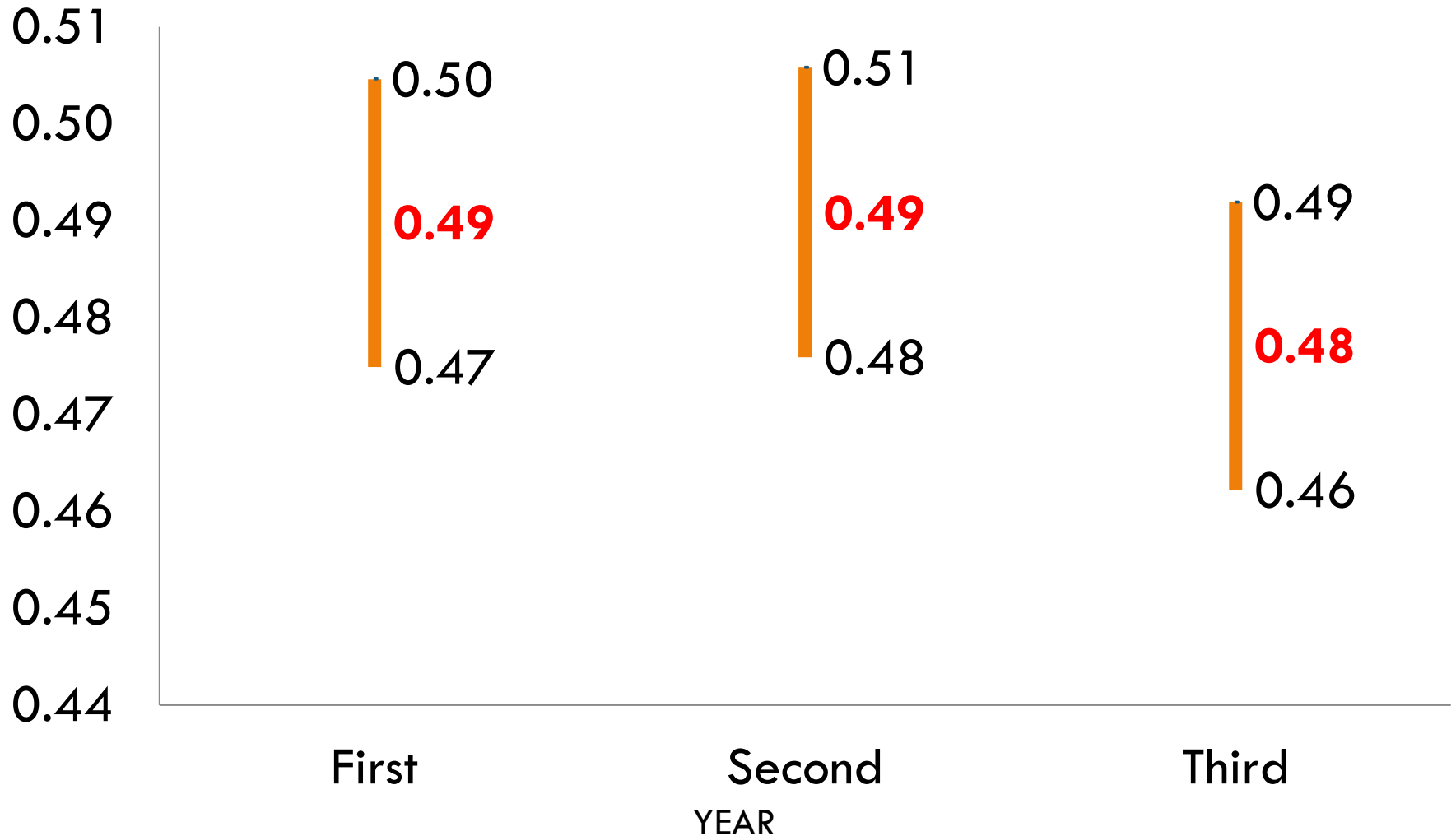
Modal Split and Daily Travel Time '96- '10

- Foot: 22.8% to 22.3% (US: ~11%)
 - Bicycle: 9.2% to 11.3% (US: ~1%)
 - Car: 59.8% to 54.4% (US: ~85%)
 - Public Transport: 7.5% to 11.7% (US: ~2%)
-
- 1996: 1:21h
 - 2005: 1:20h
 - 2010: 1:23h

Proportion Achieving 150+ Minutes by Year, '96-'10



Estimates: Proportion Achieving 150+ Minutes by Year of Panel Participation



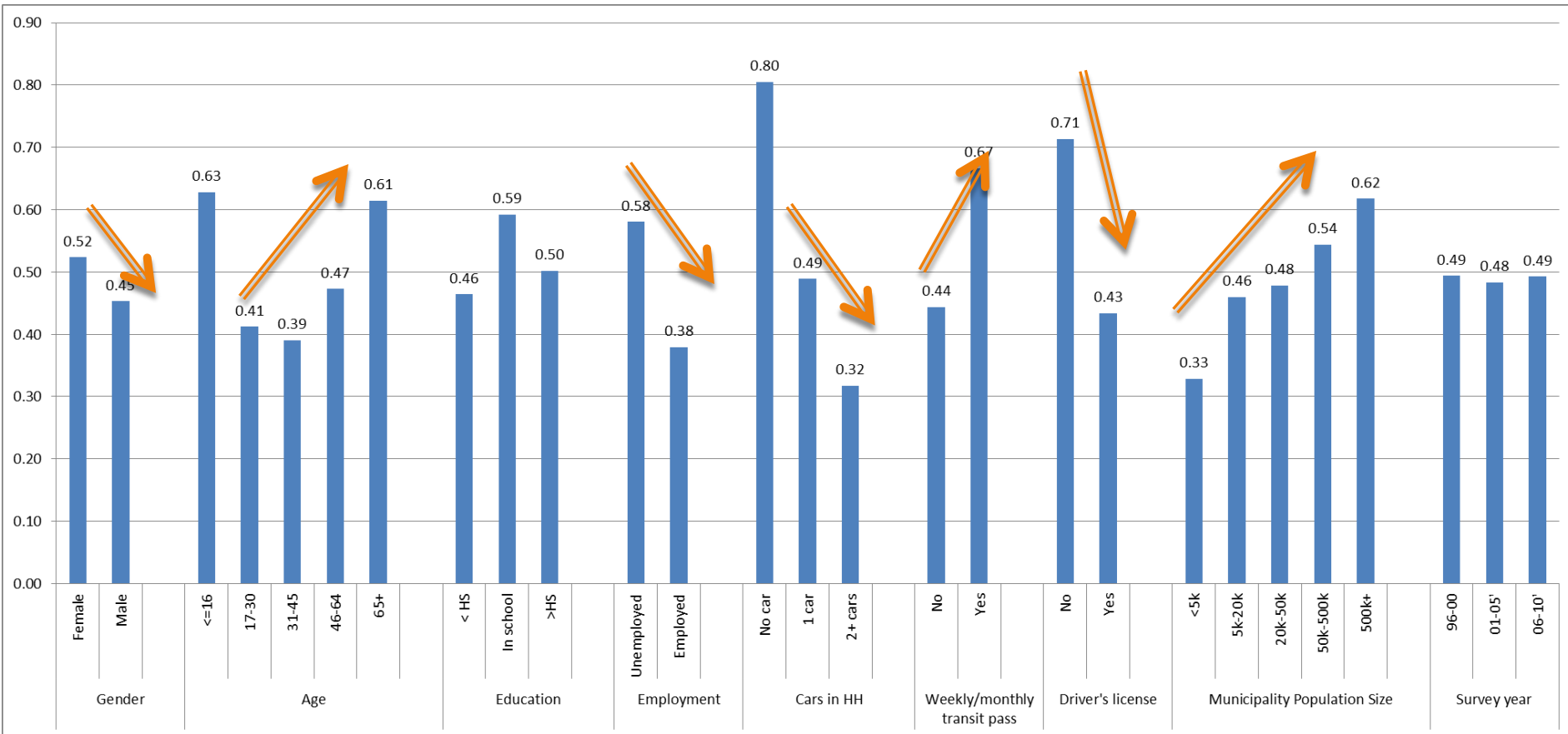
Transition Year 1 to Year 2 for the Same Individual

		<u>Year 2</u> Minutes of Active Travel	
		<i><150min</i>	<i>>=150min</i>
<u>Year 1</u> Minutes of Active Travel	<i><150min</i>	39%	12%
	<i>>=150min</i>	13%	35%

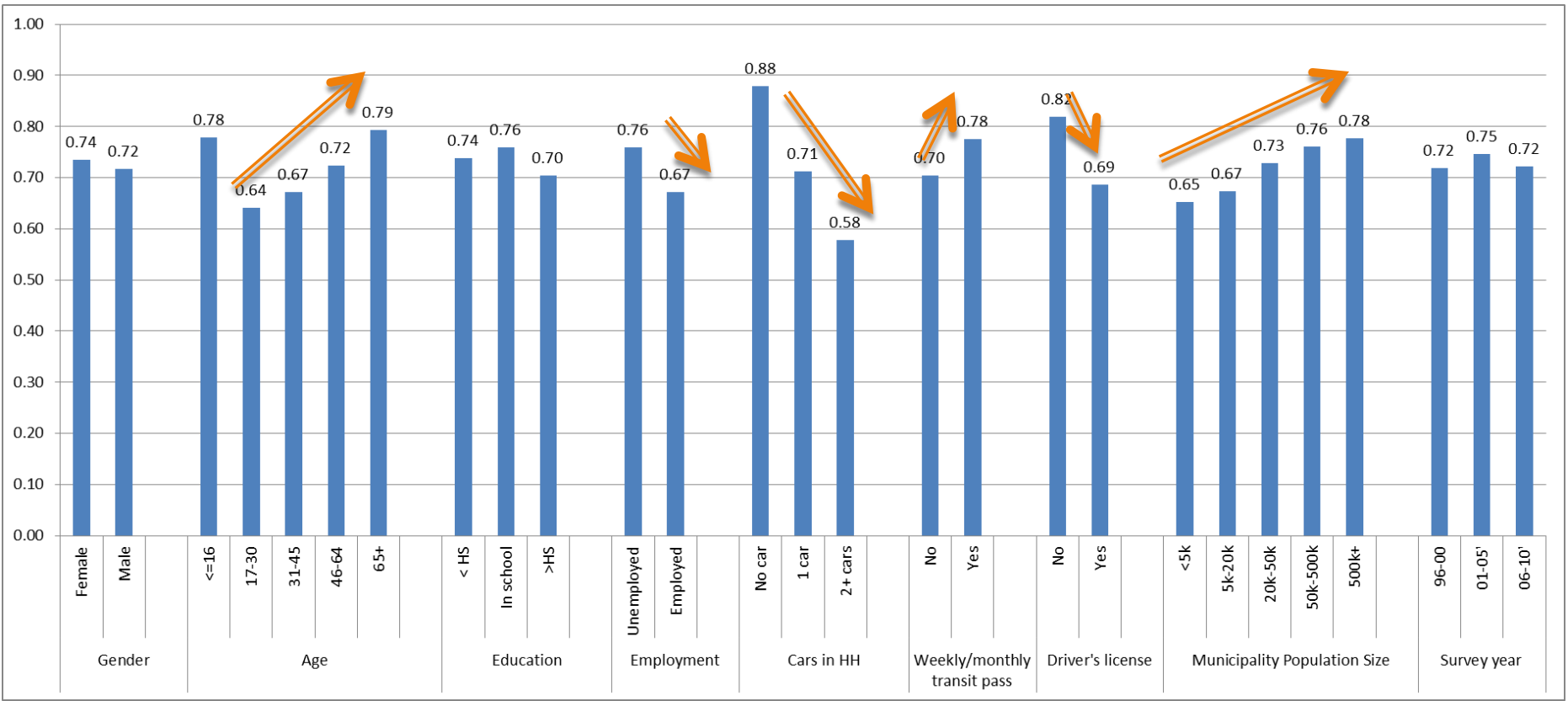
Transitions Year 1, Year 2, & Year 3 for the same Individual

		<u>Year 2</u> Minutes of Active Travel			
		<150min		≥150min	
		<u>Year 3</u> Minutes of Active Travel			
		<150min	≥150min	<150min	≥150min
<u>Year 1</u> Minutes of Active Travel	<150min	33%	7%	7%	6%
	≥150min	7%	7%	6%	27%

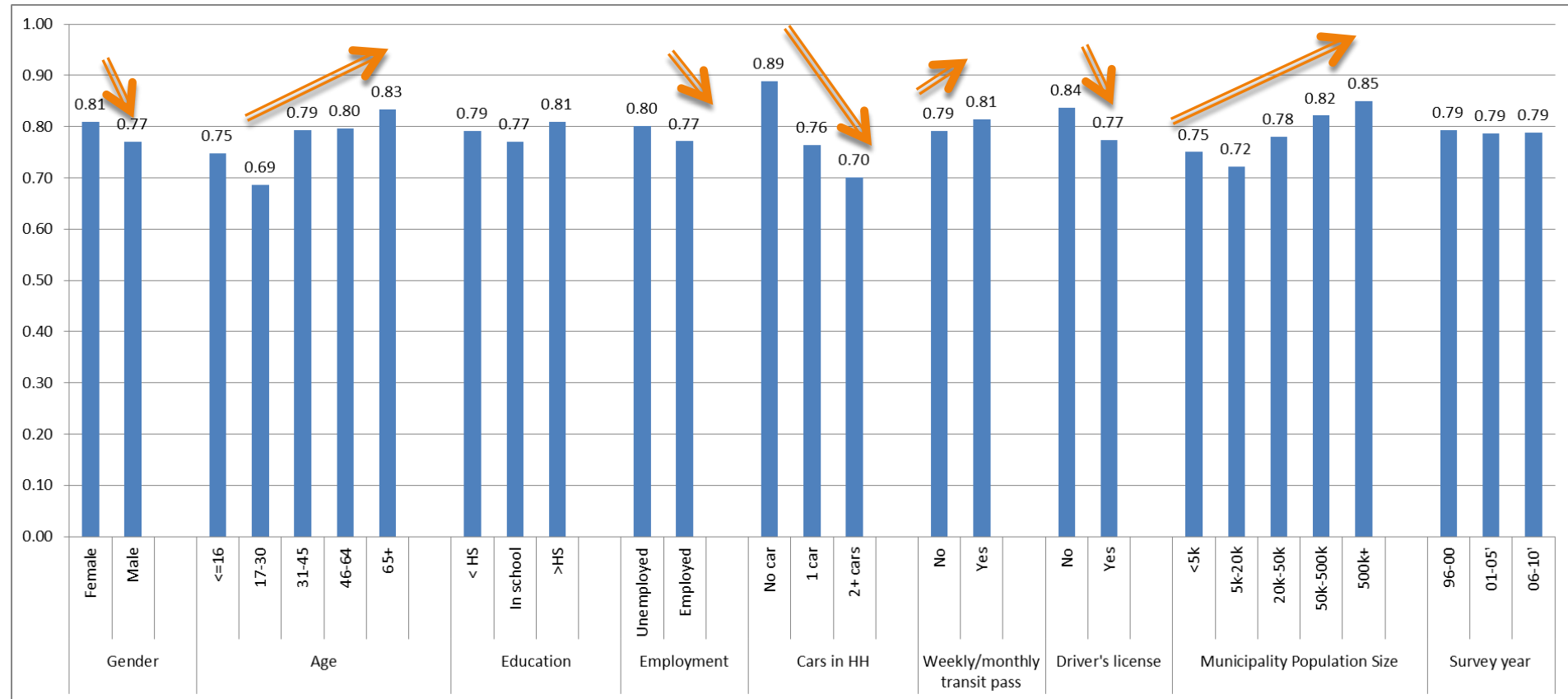
Proportion with 150+ minutes per week in Year 1



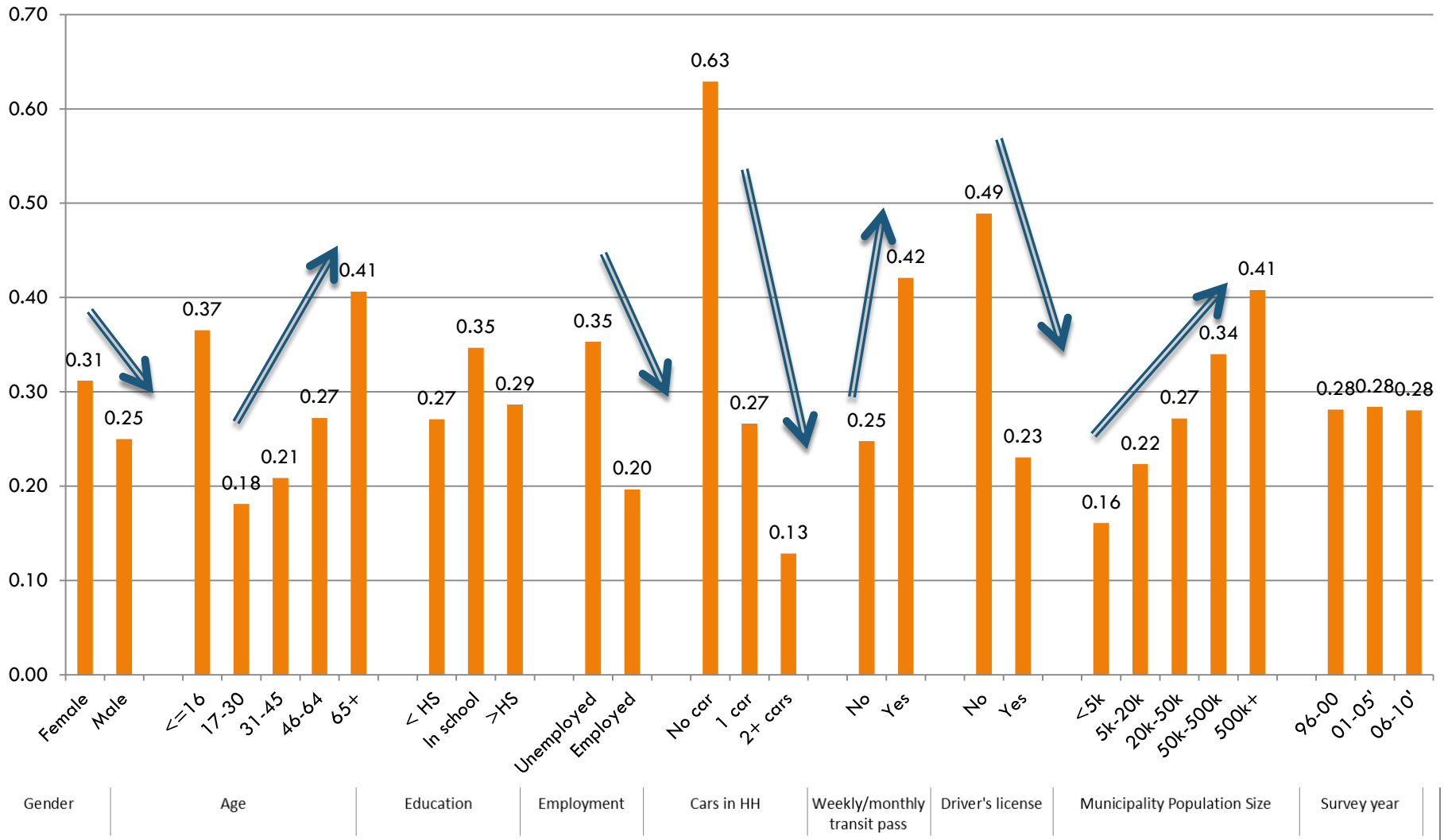
Stability: Share of 150+ min. in Year 1 who also Achieve 150+ min. in Year 2



Stability: Share of 150+ min. in Year 1&2 who also Achieve 150+ min. in Year 3



Proportion with 150+ Minutes per week in 3 Consecutive Years

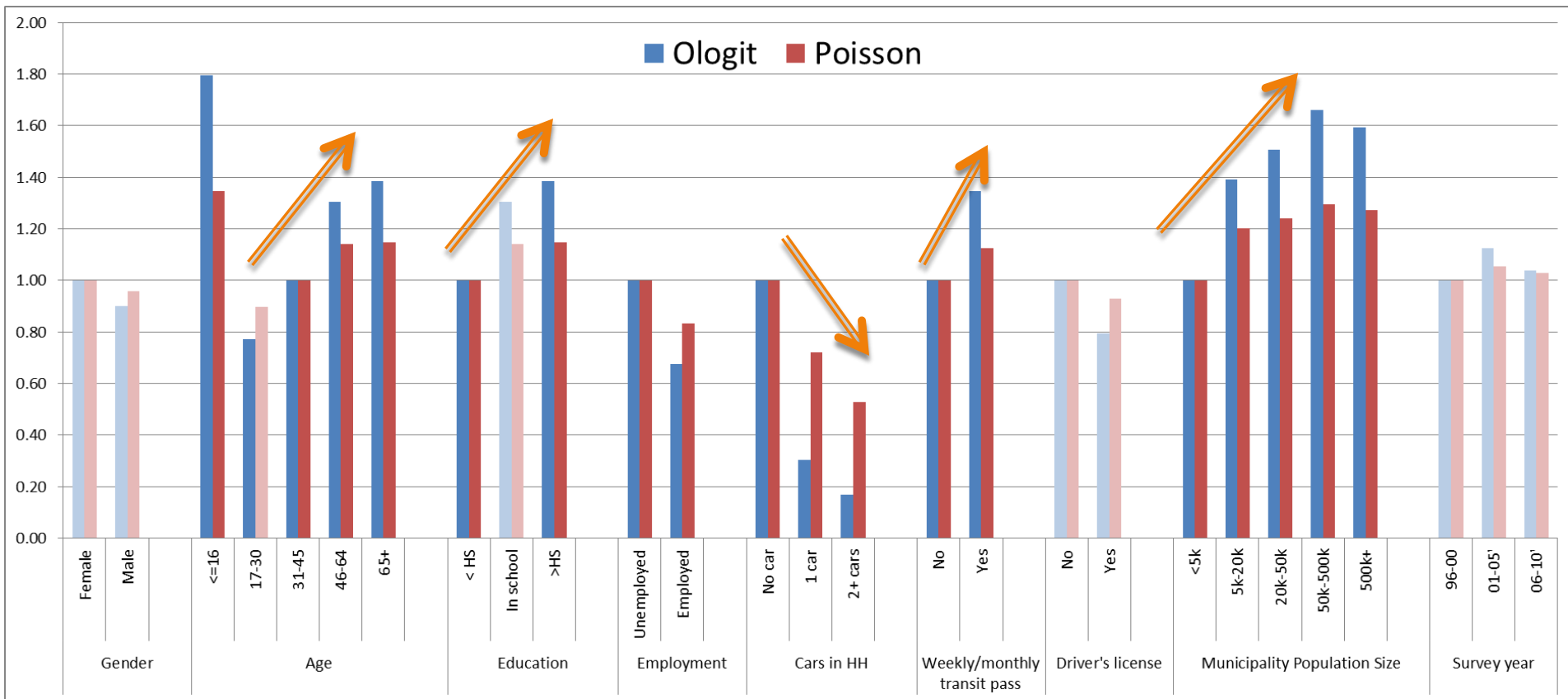


Ordered Logit and Poisson Regressions

- Dependent variable:
 - ▣ Years of AT > 150 minutes
 - ▣ 0, 1, 2, 3
- Ologit and poisson yield identical sign and significance of coefficients for independent variables (overview see next slide);
- Differences in magnitude of coefficients within each model are also comparable.

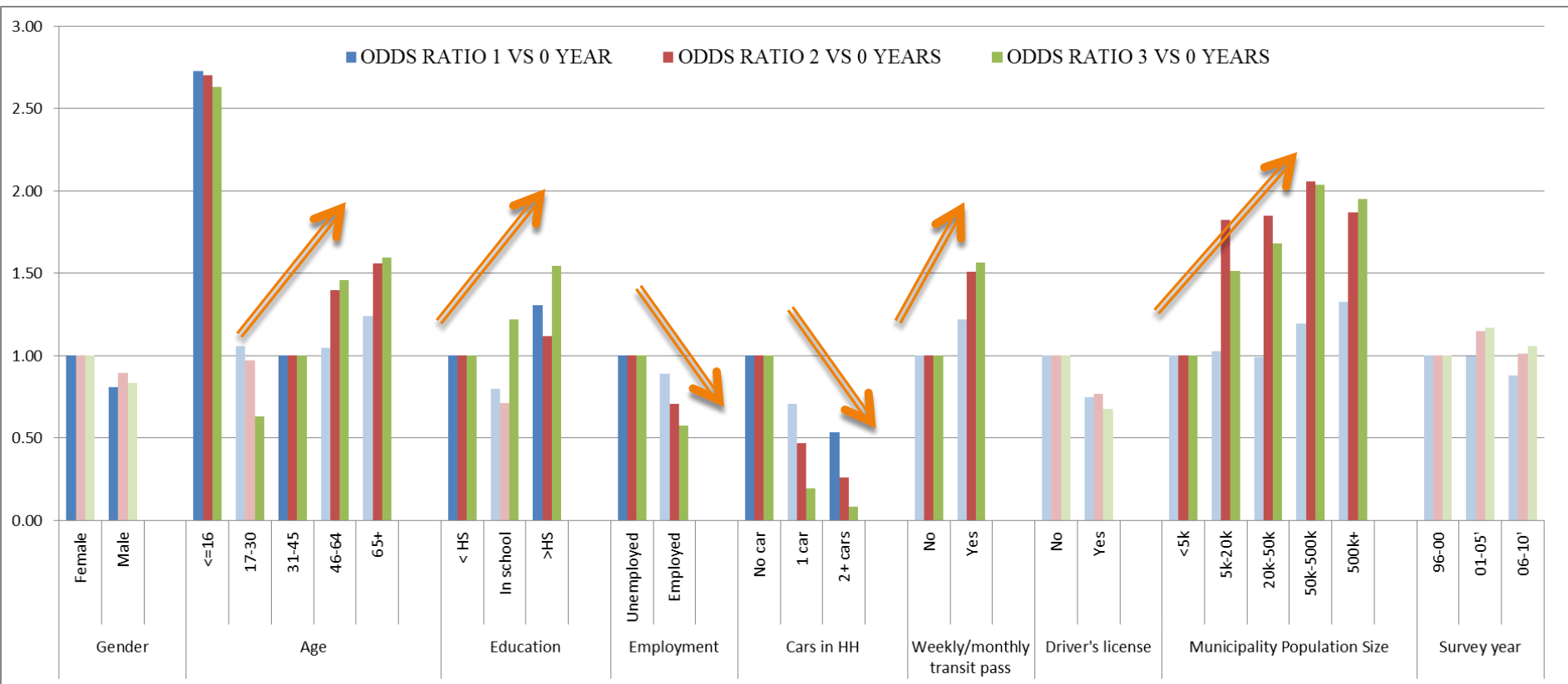
Odds Ratios for Ologit and Poisson Regression ($p < .01$)

Dependent variable: 0, 1, 2, 3 years of > 150 minutes of PA from AT



Odds Ratios for MNL Regression ($p < .01$)

Dependent variable: 0 vs 1, 2, or 3 years of > 150 minutes of PA from AT



Results 1

- Slightly less than 50% of the population achieve 150+ minutes of PH from AT per week;
 - ▣ This share has been stable between '96 and '10 ($p < .05$);
- Similarly, about 50% of respondents achieve 150+ minutes in their 1st, 2nd, or 3rd year ($p < .05$);
- 35% achieve 150+ minutes in year 1 and 2;
- 27% achieve 150+ minutes in years 1, 2, and 3;
 - ▣ 33% never achieve 150+ minutes;

Results 2

- Unadjusted correlates of achieving health enhancing PA (150+ min per week):
 - ▣ Female (+), employed (-), car ownership (-), transit pass (+), driver's license (-), population size (+), age (<16 and then +);

- Unadjusted correlates of stability (i.e. achieving 150+ minutes in 2 or 3 consecutive years):
 - Female (+), employed (-), car ownership (-), transit pass (+), driver's license (-), population size (+), age (<16 and then +);

Results 3

- Adjusted Odds Ratios for achieving health enhancing PA (150+ min per week) in **more years:**
 - Age (<16 and then +);
 - Education: high school and higher (+);
 - Employed (-);
 - Car ownership (-);
 - Monthly transit pass (+);
 - Population size (+).

Results 4

- Differences in AOR between population groups:
 - ▣ Few significant AORs between 0 and 1 year;
 - ▣ Greater and significant AORs comparing 2 or 3 year vs. 0 year;
 - ▣ Age (<16, then +)
 - ▣ Education level (+)
 - ▣ Employment (-)
 - ▣ Transit pass (+)
 - ▣ Population size(+).

Some Limitations

- Missing variables (policy, land-use)
 - ▣ Some captured by population size categories;
 - ▣ Transit access/egress if not at home;
- Panel selectivity
 - ▣ about 75% to 80% of first time respondents repeat their participation in the survey (middle class bias)
 - ▣ Low participation of those 'in education' and '18-35 year old';
- Only 3 years of data per person;
- Self selection (e.g. transit pass, drivers license, car ownership);
- Cannot establish causality.

Discussion and Conclusion

- About 50% of the population achieve 150+ minutes of PA from AT per week;
- 35% achieve 150+ minutes in year 1 and 2;
- More than ¼ (27%) achieve 150+ minutes in years 1, 2, and 3;
- Demographics:
 - Besides the very young, PA from AT increases with age;
 - Small gender differences (females more likely to achieve 150+);
 - Some gentrification: higher education correlated with more AT;
 - Employed individuals achieve less AT.
- Settlement size correlated with more active travel and greater stability;
- Greater car ownership is correlated with less active travel and less stability;
- Having a transit pass is correlated with more active travel and more stability.

Questions

The background image shows a city street scene. On the right, there is a large, classical building with columns and a pediment. In the center, a modern, sleek, silver car is parked. In the foreground, several people are riding bicycles. On the right side, there are two beer delivery vehicles: a blue one with 'ORIGINAL Berliner Kindl WEISSE' and a green one with 'BERLINER Pilsener'. The scene is bright and sunny.

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