Is active travel a stable physical activity behavior? Evidence from the German Mobility Panel

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Background

Active travel and physical activity

- Governments at national, state, and city levels promote walking and cycling – *active travel* – as sustainable and healthy means of daily transport
- Walking and cycling for daily trips can serve as consistent source of **physical activity**, improve cardiovascular health, and help prevent obesity and diabetes
- **Active travel** can help achieve the World Health Organization's (WHO) recommendations on **physical activity** per week for adults

WHO Recommendations

Global Recommendations on Physical Activity for Health

18–64 years old

These guidelines are relevant to all healthy a
specific medical conditions indicate to the cont
ethnicity or income level. They also apply to i
chronic noncommunicable conditions not relate
or diabetes. These recommendations can be ap
However they may need to be adjusted for each
capacity and specific health needs. Pregnant, pos
cardiac events may need to take extra precaution
striving to achieve the recommended levels of p

Strong evidence demonstrates that compared to
individuals who are more active:

- have lower rates of all-cause mortality, coronar
pressure, stroke, type 2 diabetes, metabolic syn
and depression;
- are likely to have less risk of a hip or vertebral f
- exhibit a higher level of cardiorespiratory and r
- are more likely to achieve weight maintenance,
composition.

Recommendations:
In adults aged 18-64, physical activity include
transportation (e.g. walking or cycling), occu
chores, play, games, sports or planned exercis
and community activities.
The recommendations in order to improve
fitness, bone health, reduce the risk of NCDs a

1. Adults aged 18–64 should do at least 150
aerobic physical activity throughout the we
of vigorous-intensity aerobic physical activi
equivalent combination of moderate - and vig

2. Aerobic activity should be performed in bout

3. For additional health benefits, adults sh
intensity aerobic physical activity to 300 m
150 minutes of vigorous-intensity aerobic ph
equivalent combination of moderate - and vig

4. Muscle-strengthening activities should be
groups on 2 or more days a week.

Inactive people should start with small amounts
increase duration, frequency and intensity over ti
disease limitations will have added health benefi

For further information see: http://www.who.int/dietphysic
or contact WHO on dietandhealth@who.int

Global Recommendations on Physical Activity for Health

65 years and above

These guidelines are relevant to all healthy adults aged 65 years and above, unless specific medical conditions indicate to the contrary, irrespective of gender, race, ethnicity or income level. They are also relevant to individuals in this age range with chronic NCD conditions or with disabilities. Individuals with specific health conditions, such as cardiovascular disease and diabetes, may need to take extra precautions and seek medical advice before trying to achieve the recommended levels of physical activity for older adults.

Strong evidence demonstrates that compared to less active men and women, older adults who are physically active have:

- lower rates of coronary heart disease, hypertension, stroke, diabetes, colon and breast cancer, a higher level of cardiorespiratory and muscular fitness,
- healthier body mass and composition and enhanced bone health; and
- higher levels of functional health, a lower risk of falling, and better cognitive function.

Recommendations:
In older adults of the 65 years and above age group, physical activity includes leisure time physical activity, transportation (e.g. walking or cycling), occupational (if the individual is still engaged in work), household chores, play, games, sports or planned exercise, in the context of daily, family, and community activities.
The recommendations in order to improve cardiorespiratory and muscular fitness, bone and functional health, reduce the risk of NCDs, depression and cognitive decline are:

1. Older adults should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity.

2. Aerobic activity should be performed in bouts of at least 10 minutes duration.

3. For additional health benefits, older adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate-and vigorous-intensity activity.

4. Older adults, with poor mobility, should perform physical activity to enhance balance and prevent falls on 3 or more days per week.

5. Muscle-strengthening activities, involving major muscle groups, should be done on 2 or more days a week.

6. When older adults cannot do the recommended amounts of physical activity due to health conditions, they should be as physically active as their abilities and conditions allow.

Inactive people should start with small amounts of physical activity and gradually increase duration, frequency and intensity over time. Inactive adults and those with disease limitations will have added health benefits when they become more active.

For further information see: http://www.who.int/dietphysicalactivity/pa/en/index.html
or contact WHO on dietandhealth@who.int

World Health Organization

Background
WHO Recommendations

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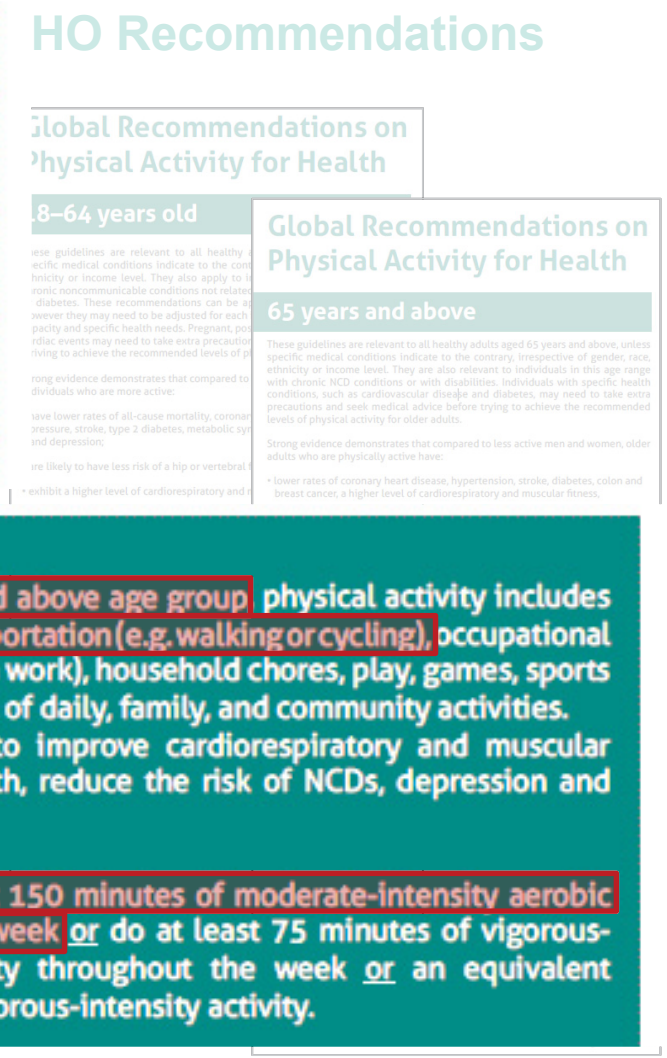

activity (PA), improve cardiovascular
health, and help preve
diabetes.

- AT can help achieve tl
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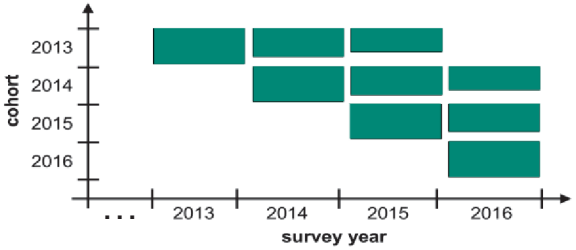
Background
Research objective

- Which share of adult population in Germany achieves 150+ minutes active travel per week? (Q1)
  → One week survey data
- What are the determinants of achieving 150+ minutes active travel in the survey week? (Q2)
  → Demographic and socio-economic information of survey participants
- Which share of adult population achieves 150+ minutes active travel on a regular basis (stability)? (Q3)
  → Panel data
- What are the determinants of achieving stability in 150+ minutes in active travel? (Q4)
  → Demographic and socio-economic information of survey participants

Data
The German Mobility Panel (MOP)

- Annual survey on travel demand in German households since 1994
- Each year:
  2,000-3,000 individuals
  aged 10 years and older
- Trip diary for a whole week
  (multiday) in autumn
- Survey modes: paper,
  web (since 2013)
- Households report for three consecutive
  years (rotating panel)
- Funded by the German Federal Ministry of Transport and Digital Infra-
  structure (Kantar TNS: field work; KIT: design & scientific supervision)



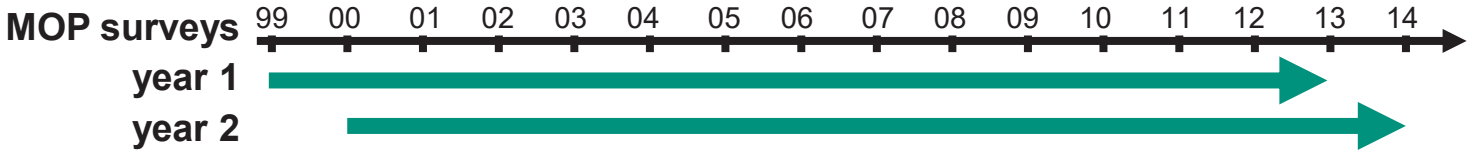
Data
Data preparation

- Travel behavior of MOP participants in their first and second year of MOP participation

year 1 

year 2 

- Trip diaries of individuals (n= 7,758) with first year MOP part. 1999-2013



- Calculation of weekly active travel time from….

…walking

…cycling

…access/egress of public transport

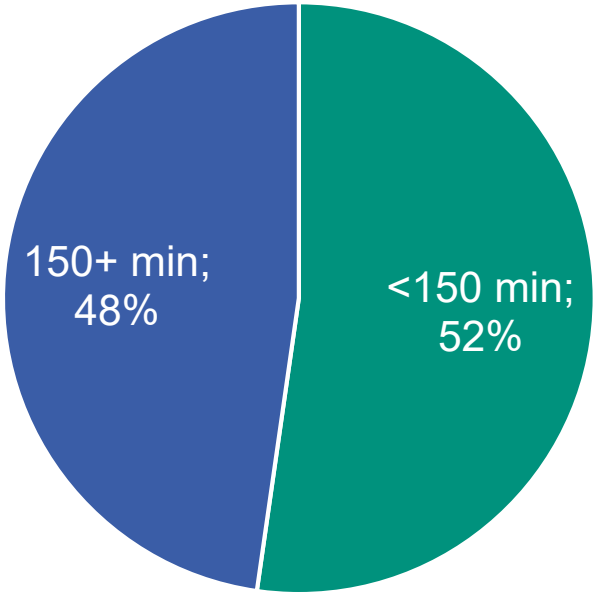
(derived from self-reported walking times from home to public transport)

… in year 1 and year 2 of MOP participation.

Active travel in one year

Share of adults with 150+ min active travel

Q1: Which share of adult population in Germany achieves 150+ minutes active travel per week?



Active travel in one year
Determinants of active travel

Q2: What are the determinants of achieving 150+ minutes active travel in the survey week?

- Binary logistic regression
- greater likelihood for achieving 150+ minutes of active travel for individuals
  - aged between 30 and 69
  - not in the workforce
  - in households without cars
  - in jurisdictions with larger population sizes
  - in households with access to shopping / leisure destinations
  - with public transport pass

Model 1: 150+ min in Year 1

Parameter	Parameter Bin	Odds Ratio
Gender	Female	1.00
	Male	0.87**
Age Group	18-29	0.59***
	30-69	1.00
	70+	0.86**
Cars in Household	0	1.00
	1	0.30***
	2+	0.16***
Population Size of Jurisdiction	<5k	1.00
	5k<50k	1.34***
	50k<500k	1.46***
	500k+	1.55***
Employment Status	No employed	1.00
	Employed	0.59***
Education Status	<High School	1.00
	>High School	1.42
	In Education	1.36***
Monthly Public Transport Pass	No	1.00
	Yes	1.49***
Shopping Destination Within 2km	No	1.00
	Yes	1.42***
Leisure Destination Within 2km	No	1.00
	Yes	1.45***
Rained 5 Out of 7 Reporting Days	No	1.00
	Yes	0.88**
Intercept		1.55***

*Levels of significance: *** <1%, ** <5%, *<10%;*
Mc Fadden R-Squarred: 0.11

Institute for Transport Studies.
Karlsruhe Institute of Technology (KIT)

Stability of active travel

Share of adults with 150+ min active travel

Q3: Which share of adult population achieves 150+ minutes active travel on a regular basis (stability)?

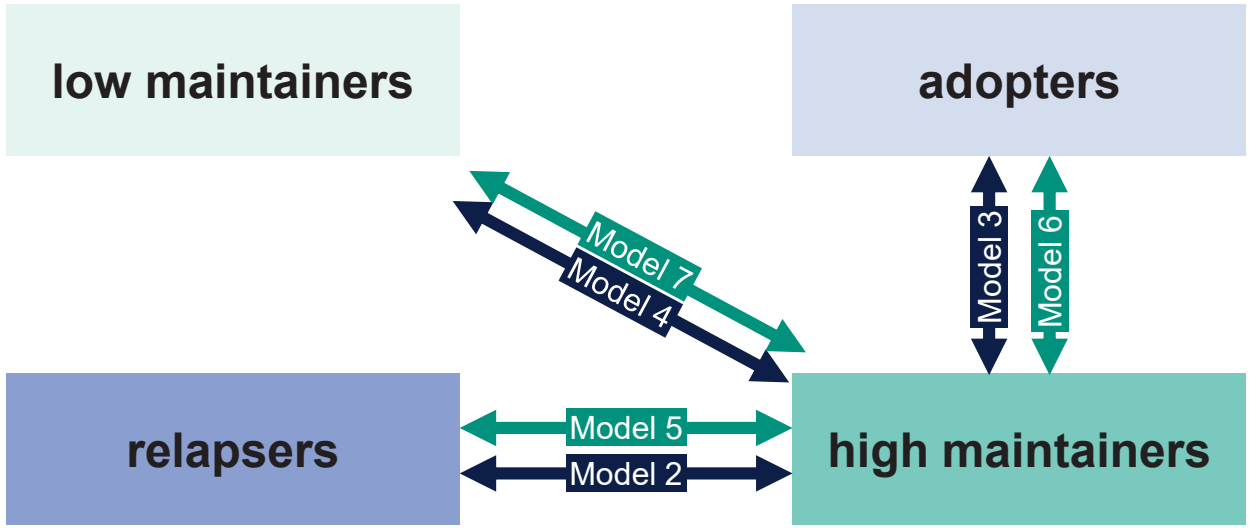
		Year 2		∑
		< 150 min	**150 + min**	
Year 1	**< 150 min**	40% **low maintainers**	12% **adopters**	52%
	150 + min	13% **relapsers**	35% **high maintainers**	48%
∑		53%	47%	100% (n=7,758)

73% of those who achieved 150+ minutes in year 1 have also achieved 150+ minutes in year 2

Stability of active travel
Detecting determinants for stability

Q4: What are the determinants of achieving stability in 150+ minutes in active travel?

- Run binary logistic regression models to compare active travel groups

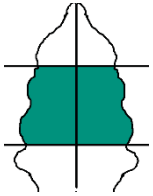


WITHOUT dummy variables on the source of active travel in year 1

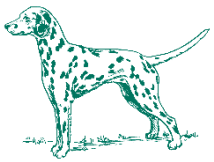
WITH dummy variables on the source of active travel in year 1

Stability of active travel
Binary regression results I

- Individuals with greater likelihood for maintaining 150+ minutes of active travel in year 2 are
  - aged between 30 and 69
  - not in the workforce
  - in households without cars
  - in households with access to shopping destinations within 2 km of the home

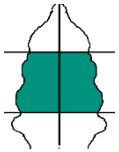
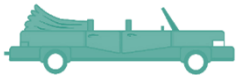


- Individuals were more likely **high maintainers**, if in year 1 they
  - used active modes for work or school commuting
  - used active travel for round trips (i.e. going for a walk or bike ride)
  - used all three non-automobile modes (walking, cycling, and public transport)



Stability of active travel
Binary regression results II

- Stronger differences between **high maintainers** and **low maintainers** than between **high maintainers** and **relapsers / adopters**
  - Policy interventions may target primary **adopters** and **relapsers**
- Differences between **high maintainers** and **relapsers / adopters**
  - employment status
  - age group
  - car ownership
  - access to shopping destinations within 2 km of the home


- Correlates, which do not differ significantly:
  - gender
  - population size of home jurisdiction
  - access to leisure destinations within 2 km of the home
- High maintainers are most likely older than 29 years → life cycle events

Conclusions

- The German Mobility Panel is a reliable source for physical activity and active travel studies
- Active travel alone contributes to almost half of German adults meeting the WHO recommended levels of physical activity in one year
- About one third of German adults achieve health-enhancing levels of physical activity on a regular basis
- Limitations:
  - Travel times were self-reported / derived (public transport)
  - MOP only identified stability of weekly active travel in the fall of two consecutive years
  - It is not possible to determine if stability of active travel between years is different from stability of active travel in consecutive weeks of the same year
  - Our study cannot establish causality, but can only show correlation

Karlsruher Institut für Technologie

Thank you!
Questions?

INSTITUT FOR TRANSPORT STUDIES

KIT – Universität des Landes Baden-Württemberg und
nationales Forschungszentrum in der Helmholtz-Gemeinschaft

www.ifv.kit.edu

Stability of active travel

Binary regression results

		Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
		High Maintainers vs Relapsers	High Maintainers vs Adopters	High Maintainers vs Low Maintainers	High Maintainers vs Relapsers	High Maintainers vs Adopters	High Maintainers vs Low Maintainers
Parameter	**Parameter Bin**	**Odds Ratio**	**Odds Ratio**	**Odds Ratio**	**Odds Ratio**	**Odds Ratio**	**Odds Ratio**
Intercept		6.59***	5.80***	1.88***	5.18***	2.41***	0.67***
Sex	Female	1.00	1.00	1.00	1.00	1.00	1.00
	Male	0.9	0.89	0.88**	0.97	0.88	0.89
Age Group	18-29	0.69**	0.58**	0.50*	0.63***	0.51***	0.40***
	30-69	1.00	1.00	1.00	1.00	1.00	1.00
	70+	0.91	0.95	0.79**	0.92	1.00	0.87
Cars in Household	0	1.00	1.00	1.00	1.00	1.00	1.00
	1	0.40***	0.34***	0.21***	0.40***	0.35***	0.21***
	2+	0.24 ***	0.21***	0.09***	0.24***	0.22***	0.09***
Population Size of Jurisdiction	<5k	1.00	1.00	1.00	1.00	1.00	1.00
	5k<50k	0.97	1.25*	1.36***	0.96	1.18	1.32
	50k<500k	1.14	1.24	1.63***	1.13	1.30*	1.75***
	500k+	0.92	1.26	1.55**	0.92	1.32	1.63***
Employment Status	No employed	1.00	1.00	1.00	1.00	1.00	1.00
	Employed	0.71***	0.62***	0.50***	0.62***	0.40***	0.33***
Education Status	<High School	1.00	1.00	1.00	1.00	1.00	1.00
	>High School	0.89	2.49*	1.07	0.82	1.68	0.73
	In Education	1.04	1.26***	1.39***	1.00	1.16	1.25**
Monthly Public Transport Pass	No	1.00	1.00	1.00	1.00	1.00	1.00
	Yes	1.24*	1.23*	1.82***	1.15	0.98	1.22*
Shopping Destination Within 2km	No	1.00	1.00	1.00	1.00	1.00	1.00
	Yes	1.28*	1.26	1.62***	1.30*	1.36*	1.81***
Leisure Destination Within 2km	No	1.00	1.00	1.00	1.00	1.00	1.00
	Yes	0.91	1.05	1.50***	0.90	1.09	1.52***
Rained 5 Out of 7 Reporting Days	No	1.00	1.00	1.00	1.00	1.00	1.00
	Yes	0.89	1.08	0.92	0.89	1.09	0.92
Active Travel from Commuting in Year 1	No				1.00	1.00	1.00
	Yes				1.37***	3.08***	4.38***
Active Travel from Round Trips (e.g., strolls) in year 1	No				1.00	1.00	1.00
	Yes				1.43***	5.45***	11.81***
Walked, Cycled, and Rode Public Transport in Year 1	No				1.00	1.00	1.00
	Yes				1.46***	3.63***	6.22***
McFadden R-Squared		0.05	0.07	0.17	0.06	0.19	0.36
Sample Size		3,523	3,482	5,819	3,523	3,482	5,819
Levels of significance: *** <1%, ** <5%, *<10%							