IS ACTIVE TRAVEL A STABLE PHYSICAL ACTIVITY BEHAVIOR? EVIDENCE FROM THE GERMAN MOBILITY PANEL

Active travel as stable source of physical activity for one third of German adults: Evidence from longitudinal data

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World Health Organization recommends 150+ min of moderate-intensity aerobic physical activity (PA) per week for adults;

- Active travel (AT) can contribute to achieving recommended PA;

**Is AT a stable source of PA over time?**

**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 PA from AT of individuals in two consecutive years.*
Objectives

- Identify correlates of achieving 150+ min of AT during a week in year 1 of panel participation;

- Distinguish four groups of respondents based on trends in achieving 150+ min of AT in year 1 and year 2 of panel participation:
  - **high maintainers** (achieved 150+ min in year 1 & 2);
  - **low maintainers** (do not achieve 150+ min in year 1 & 2);
  - **adopters** (do not achieve 150+ min in year 1, but do in year 2);
  - **relapsers** (achieve 150+ min in year 1, but not in year 2);

- Compare characteristics of high maintainers to individuals in each of the other three groups with the goal to identify target groups for policy interventions to promote maintenance of AT over time.
Background: Germany

- ~82 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
- Trip-share for AT: foot (22%); bicycling (12%)
Few longitudinal studies tracking changes and stability of AT in the same people for all trip purposes
- Baseline AT strong predictor of future AT

Studies about AT before and after the implementation of specific infrastructure measures
- Mixed results

Cross-sectional population-level studies in transport
- Stability of time spent traveling

Independent variables from cross-sectional studies on AT
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 ~750 households, 1,800 persons, and 45,000 trips

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;
- Duration of access to/egress from public transport to home.
Data Preparation

- Pooled the panel data from 1999 to 2014;
- Aggregate minutes of active travel per person per week from trip file;
  - 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 7,758 individuals who participated in MOP for two consecutive years.
Similar distributions of minutes of active travel per week in year 1 & 2

YEAR 1
median 135 min
IQ range 38–275 min

YEAR 2
median 138 min
IQ range 32–274 min
Comparison of shares of individuals achieving 150+ min AT in year 1 & 2

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td>&lt;150 min</td>
<td>&lt;150 min</td>
</tr>
<tr>
<td>(low maintainers)</td>
<td>(adopters)</td>
</tr>
<tr>
<td>150+ min</td>
<td>(relapsers)</td>
</tr>
<tr>
<td>(n=4,123)</td>
<td>(n=3,635)</td>
</tr>
<tr>
<td>(n=3,703)</td>
<td>(n=7,758)</td>
</tr>
</tbody>
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Significant AORs for achieving 150+ min of AT per week in year 1

- Female (+);
- Middle age (+);
- Car ownership (-);
- Population size (+);
- Employment (-);
- Being in school (+);
- Monthly PT pass (+);
- Shopping <2km (+);
- Leisure <2km (+);
- Rain 5 of 7 days (-).
Share of High Maintainers (150+ min in both years) by Population Subgroup

Population share = 35%
Adjusted Odds Ratios: High vs Low Maintainers

Sex: Male, Female
Age Group: 18-29, 30-69, 70+
Cars per HH: 0, 1, 2+
Population Size: <5k, 5k<50k, 50k<500k, 500k+
Employment Status: No employed, Employed
Education Status: <High School, High School, In Education, High School, >High School
Monthly PT Pass: No, Yes
Shopping <2km: No, Yes
Leisure <2km: No, Yes
Rained 5 of 7 Days (trend): No, Yes, No-Yes, Yes-No, Yes-Yes
AT year 1 Commute: No, Yes
AT year 1 Leisure: No, Yes
Green Multimodal year 1: No, Yes
Adjusted Odds Ratios:
High Maintainers vs Relapsers

Sex Age Group Cars per HH Population Size Municipality Employment Status Education Status Monthly PT Pass Shopping <2km Leisure <2km Rained 5 of 7 Days (trend) AT year 1 Commute AT year 1 Leisure Green Multimodal year 1
Discussion (1)

- AT alone helps almost half (47-48%) of German adults achieve the WHO recommended PA guidelines;
- About 75% of those who achieved 150+ min of AT in year 1 of panel participation also walked and cycled for 150+ min in year 2;
- Results for achieving 150+ min in year 1 resemble results from previous studies;
- Fewer statistically significant determinants of stability of AT (compared to achieving 150+ in year 1);
- Magnitude of coefficients in models comparing high to low maintainers indicate stronger differences between those two groups than between high maintainers and relapsers and adopters;
Discussion (2)

- Statistically Significant Adjusted Odds Ratios for High Maintainers (vs. all groups)
  - Age (18-29 years) (-);
  - Car ownership (-);
  - Employed (-);
  - Shopping destinations <2km (+);
  - AT in year 1 from commute (+);
  - AT in year 1 from leisure (+);
  - Green multimodal year 1 (+).

- High vs. Low Maintainers
  - Municipality size (+);
  - In education (+);
  - Monthly PT pass (+);
  - Rain (-).
Some Limitations

- Missing variables (policy, land-use);
- Panel selectivity;
- Only 2 years of data per person;
- Only data for one week in the fall each year;
- Self-selection;
- No control for PA from other activities;
- Cannot establish causality.
How to increase stability of AT?

- Mixed-use neighborhoods with shopping destinations in proximity to where people live;
- Monthly public transport passes;
- Policies that help make car-ownership less attractive and unnecessary;
  - E.g. integrated & safe networks of ped/bike infrastructure; high quality and frequent public transport;
- Policies to allow young adults and employed individuals to become high maintainers.
Buehler, R., Kuhnimhof, T., Bauman, A., Eisenmann, Ch. (accepted for publication). Active Travel as Stable Source of Physical Activity for One Third of German Adults: Evidence from Longitudinal Data. Transportation Research Part A: Policy and Practice.