Physical Activity through Sustainable Transport Approaches (PASTA)

A longitudinal study on active travel and physical activity in seven European Cities

This project has received funding from the European Union’s Seventh Framework Programme for research; technological development and demonstration under grant agreement no 602624-2.
Active travel and Health

General Background
Health endpoints associated with active travel over the course of life

- Compared to driving, wellbeing was higher when using active travel or public transport.

Active commuting and cardiovascular risk in men and women. The referent group refers to non-active commuting and non-active travel.

Relative risk for all-cause mortality for 11.25 MET hours/week of walking:

\[ \text{Relative risk} = 0.89 (0.83, 0.96) \]
Two ways to look at health

**Individual perspective**
How healthy or unhealthy (risky) is AT?

**Public health perspective**
What is the magnitude of net (health) impacts to society?
The Role of Public Health in the Promotion of Active Travel

1. Policies, measures (infrastructure investments, campaigns)
2. Active travel (surveys, diary, app)
3. Health impacts (benefits and risks)

- Fixed Factors (e.g., topography, weather, demographics)
- Modifiable Factors (e.g., land use, road design, socioeconomics, attitudes)

Adapted from „Moving Active Transportation to Higher Grounds“ Conference, Washington DC, April 2015
The Role of Individual Health in Active Travel Behavior

Active Travel (surveys, diary, app) → Health Effects (benefits and risks)

Individual Motivation

Short term

1. Determinants
2. Behaviour
3. Impacts

Adapted from „Moving Active Transportation to Higher Grounds“ Conference, Washington DC, April 2015
Project Framework and Objectives
A broadband project on active travel and health

**HEALTH.2013.3.3-1: Social innovation for health promotion.**

FP7-HEALTH-2013-INNOVATION-1. EU research should aim to identify, develop and better understand innovative approaches to reduce sedentary behaviour and enhance the level of physical activity in the population. Research should include the evaluation of innovative on-going initiatives that reduce sedentary behaviour, enhance the level of physical activity combined with dietary or other interventions. In this context, research should include the identification of “good practices”, as well as the analysis of their economic and social benefits and impact. Correlates will have to be detected (such as cultural, environmental, economic, psychological and others) that inhibit or promote the individuals capacity to increase physical activity, reduce sedentary behaviour and self-regulate their dietary or other relevant behaviour. Research may cover various areas affecting lifestyle (e.g. sports, health, education, transport, urban planning, working environment, leisure) as well as different intervention levels (local, national, European). As a social innovation it should address the role of diverse public and private entities, such as business, including social enterprises, civil society organisations and public authorities, as well as their interaction. The views of potential end-users should be integrated in the design of the project as well as the methodology for assessing impact and outcomes throughout the project. The project should have a strong communication strategy.
FP7 call title:  
Social innovation for health promotion

What could possibly be innovative about walking and biking?

Judging from footprints discovered on a former shore in Kenya, it is thought possible that ancestors of modern humans were walking in ways very similar to the present activity as many as 1.5 million years ago.

Bicycles were introduced in the 19th century in Europe.
15 Partners across seven PASTA cities

1. Vienna
2. Zurich
3. Antwerp
4. Barcelona
5. Örebro
6. Rome
7. London Borough of Newham
What are the determinants of active travel?
What are effective measures to promote active travel?
What is the interrelation between active travel and physical activity?
What are the health impacts of active travel?

PASTA objectives

Context
- Physical environment
  - Transport options
  - Built environment
  - Natural environment
- Social Environment
- Planning practice

Individual
- Individual characteristics
  - Socio-demographics
  - Home and work location
- Socio-geographical factors
  - Neighborhood perceptions
  - Perception of travel choices
- Socio-psychological factors
  - Extended theory of planned behaviour

Trips
- Travel choices

Physical activity

Travel behaviour

Safety incidents

Impacts
- Health benefits from PA
- Environmental impacts
- Health risks from AP
- Injury risks from travel
- Net health impacts
What is known about determinants of cycling?

- **Rationalist factors (mode choice)**
  - Distance, duration, purpose
- **Socio-psychological factors**
  - Attitudes, TPB, etc.
- **Socio-geographical factors**
  - Topography, neighborhood, routes
- **Temporal factors**
  - Weather, time of day, day of week
- **Safety**
  - Perceived and objective
How to promote walking and cycling?

Moving Toward Active Transportation: How Policies Can Encourage Walking and Bicycling

INTRODUCTION
Walking and cycling for daily trips can provide valuable regular physical activity, but

<table>
<thead>
<tr>
<th>Factor</th>
<th>Perceived safety</th>
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<tbody>
<tr>
<td>Safety</td>
<td>No access to car</td>
</tr>
<tr>
<td>(Motorised) traffic speeds</td>
<td>Car ownership</td>
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<tr>
<td>Higher volume vehicles</td>
<td>Physical ability</td>
</tr>
<tr>
<td>Traffic calming</td>
<td>Ethnic groups</td>
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<tr>
<td>Cycle tracks</td>
<td>Lower income</td>
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<td>Large vehicles</td>
<td>Higher income</td>
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<td>Compulsory bicycle helmets</td>
<td>Higher socioeconomic position and not owning a motor vehicle</td>
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<td>Safety in numbers</td>
<td>Low socioeconomic status areas</td>
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<td>Social norm</td>
<td>Educational level</td>
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<tr>
<td>Normalisation of active mobility</td>
<td>Area- and individual-level income</td>
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<tr>
<td>Social support</td>
<td>Dog ownership</td>
</tr>
<tr>
<td>Socio-economic factors generally</td>
<td>Costs of other modes</td>
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<tr>
<td>Age, seniors</td>
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<td>Age, children</td>
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Conceptual Frameworks (Literature Review)

- Found 26 «new and conceptual» frameworks.
  - Identify common and unique features. Integrate in one diagram.
PASTA Conceptual Framework of Active Travel Behavior

Study design, methods and tools
City-level indicators on policy, built environment, etc.
Stakeholder interviews

NUMBERS OF STAKEHOLDERS INTERVIEWED FROM EACH SECTOR

- Transport planning: 28
- Environment: 7
- Health: 8
- Urban planning: 6
- Advocacy: 7
- Sport: 1
- Tourism: 1
- Bicycle manufacturing: 1

www.pastaproject.eu
Longitudinal Online Survey

• Before/after, trend evaluation
• Active travel and physical activity vary in time
• Lots of contents to cover
Rolling recruitment, hibernation for participants affected by „top measures“

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>t = 0</td>
<td>Campaign start</td>
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<tr>
<td></td>
<td>Start hibernation</td>
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<tr>
<td></td>
<td>Stop hibernation</td>
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<td></td>
<td>TM implementation</td>
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<td>buffer period</td>
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**Diagram:**
- **TM Affected**
  - Polygon
  - BQ answer
    - Yes
      - New user
        - TM group?
          - Yes
            - Hibernation
          - No
            - General sample
    - No
      - New user
        - TM group?
          - Yes
            - Hibernation
          - No
            - General sample

**Legend:**
- Baseline Q
- Follow-up Short
- Follow-up Long
- Re-entry Q
- Unanswered

**Hibernation:**
- Start hibernation
- Stop hibernation
- TM implementation buffer period
10’000+ Europeans surveyed
Health and air pollution add-on

- Real-life study design
- 40 healthy adults / city (Antwerp, London, Barcelona)
- 1 week, 3 seasons

Personal exposure to black carbon, GPS, Sensewear, ExpoApp, Zephyr bioharness
Health parameters: HRV, blood pressure, fundus photography, eNO, spirometry
‘Tracking add-on: “PASTA on the Move”

• 546 participants were followed for up to 6 months
• using the commercial smartphone application called Moves (https://www.moves-app.com/)
• track journeys and automatically detect active travel modes
• 29 April 2016 – 9 January 2017

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<thead>
<tr>
<th>City</th>
<th>n</th>
<th>%</th>
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<tr>
<td>Antwerp</td>
<td>71</td>
<td>13.00</td>
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<tr>
<td>Barcelona</td>
<td>107</td>
<td>19.60</td>
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<tr>
<td>London</td>
<td>66</td>
<td>12.09</td>
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<td>Oerebro</td>
<td>31</td>
<td>5.68</td>
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<tr>
<td>Rome</td>
<td>131</td>
<td>23.99</td>
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<tr>
<td>Vienna</td>
<td>54</td>
<td>9.89</td>
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<tr>
<td>Zurich</td>
<td>86</td>
<td>15.75</td>
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<tr>
<td>TOTAL</td>
<td>546</td>
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Some Preliminary Findings

Analyses ongoing
Cycling as a mode of transport

- 77% think that it saves time
- 57% find it comfortable
- only 23% consider it safe with regards to the risk of traffic crashes.
- 92% agree that cycling for travel offers personal health benefits
- those for whom health is an important criterion when choosing their mode of transport bike approx. 10% more
Electric assist bikes

- E-bike users achieve similar levels of physical activity as conventional cyclists refuting the concern that e-biking may not be as good for health as conventional cycling.
- More importantly, e-biking helps older people to stay active, and they benefit even more from physical activity.

Distance covered by e-bikes vs. non-electric bikes

- Distance per day (km): 20.4 (E-bike) vs. 12.2 (Non-electric bike)
- Distance per trip (km): 9.3 (E-bike) vs. 5.1 (Non-electric bike)
Denser Cycling Networks are associated with higher mode shares of cycling
Exposure Adjusted Bicycle Crash Rates

Per «hours cycled»

Travel Diary Sub-Sample (participants = 2,101 ; crashes = 496 )
Health Impact Assessment
Main Pathways and Outcomes for Health Impacts of Active Travel

- Bike
- Walk

- Physical Activity
  - Air Pollution
    - General population
      - Mortality
      - Injuries
    - Active Traveler
      - DALYs
      - Work absence
      - Medical costs
      - Productivity loss
      - Monetization
      - Life expectancy

- Crashes
  - Noise
    - General population
Health benefits of active travel outweigh its risks
New HEAT4.0

<table>
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<tr>
<th>HEAT 4.0</th>
<th>HEAT Health economic assessment tool</th>
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<td><strong>USE CASE DEFINITION</strong></td>
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<td><strong>COMPARISON SETUP</strong></td>
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<td><strong>IMPACT PATHWAYS</strong></td>
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<td><strong>DATA ADJUSTMENT</strong></td>
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<td><strong>RESULTS</strong></td>
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**Impact pathways:**

- Physical activity
- Air pollution
- Crash risk
- Carbon emissions

Health economic assessment tools (HEAT) for walking and for cycling

www.heatwalkingcycling.org
Preliminary conclusions

Ample gaps in (quantitative) understanding of active travel remain!

PASTA research progress timeline:
2014: can we measure it?
2015: will participants play along?
2016: can we possibly clean so much data?
2017: can we actually analyze all this?
2018: can we find funds to continue analyzing?

(Research) progress is a slow vehicle! - keep pushing!
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