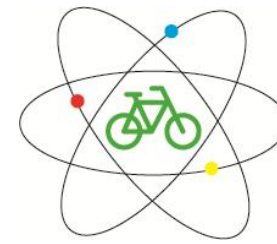




Vrije Universiteit Brussel



Scientists
for cycling

To Make Use of Health Benefits of Active Modes of Mobility

THE SCIENTISTS FOR CYCLING COLLOQUIUM
Nantes – June 2, 2015

Bas de Geus

Dept. Human Physiology
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Review

Health benefits of cycling: a systematic review

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The purpose of this study was to update the evidence on the health benefits of cycling. A systematic review of the literature resulted in 16 cycling-specific studies. Cross-sectional and longitudinal studies showed a clear positive relationship between cycling and cardiorespiratory fitness in youths. Prospective observational studies demonstrated a strong inverse relationship between commuter cycling and all-cause mortality, cancer mortality, and cancer morbidity among middle-aged to elderly subjects. Intervention studies among working-age adults indicated consistent improvements in cardiovascular fitness and some improvements in cardiovascular risk factors due to commuting cycling. Six studies showed a consistent positive dose–response gradient

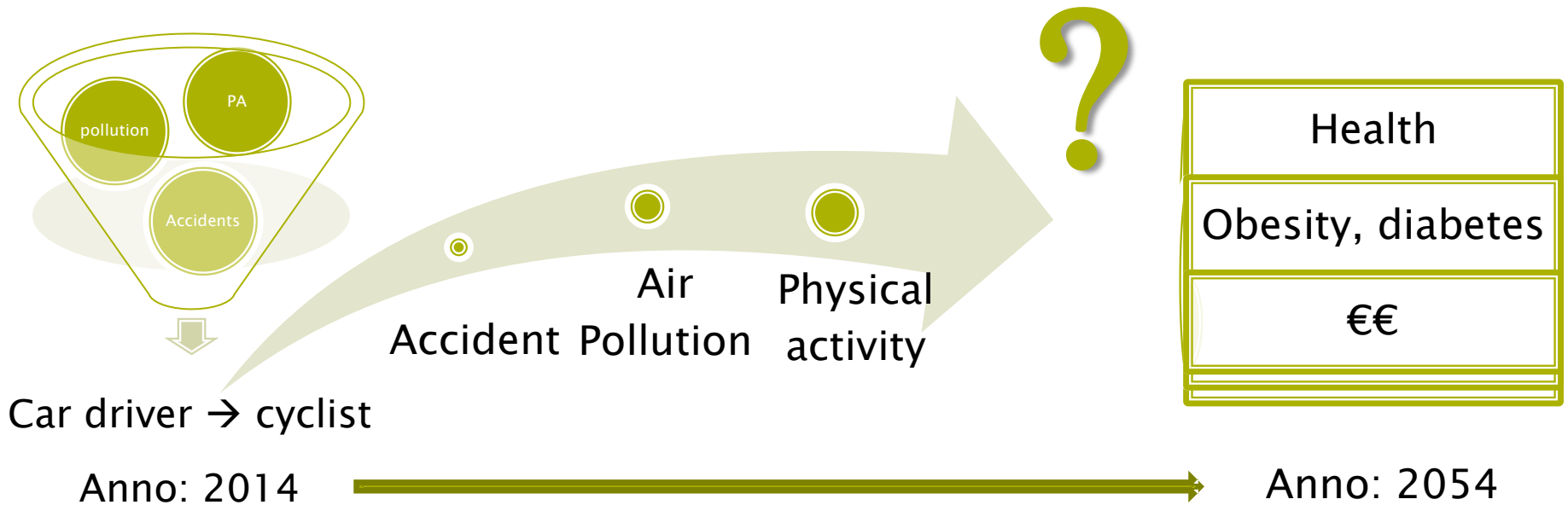
between the amount of cycling and the health benefits. Systematic assessment of the quality of the studies showed most of them to be of moderate to high quality. According to standard criteria used primarily for the assessment of clinical studies, the strength of this evidence was strong for fitness benefits, moderate for benefits in cardiovascular risk factors, and inconclusive for all-cause mortality, coronary heart disease morbidity and mortality, cancer risk, and overweight and obesity. While more intervention research is needed to build a solid knowledge base of the health benefits of cycling, the existing evidence reinforces the current efforts to promote cycling as an important contributor for better population health.



But...

- ▶ Cycling (in urban environment) is more than only **PHYSICAL ACTIVITY**
 - cycling is also related to:
 - *bicycle accidents*: cyclists incur higher crash risks than motorists (in particular car drivers) in terms of accidents per distance
 - *air pollution*:
 - exposure cyclist >> car driver
 - public gain from reduced air pollution
 - *traffic congestion*
 - *infrastructure*
 - ...

Predictive models – population level



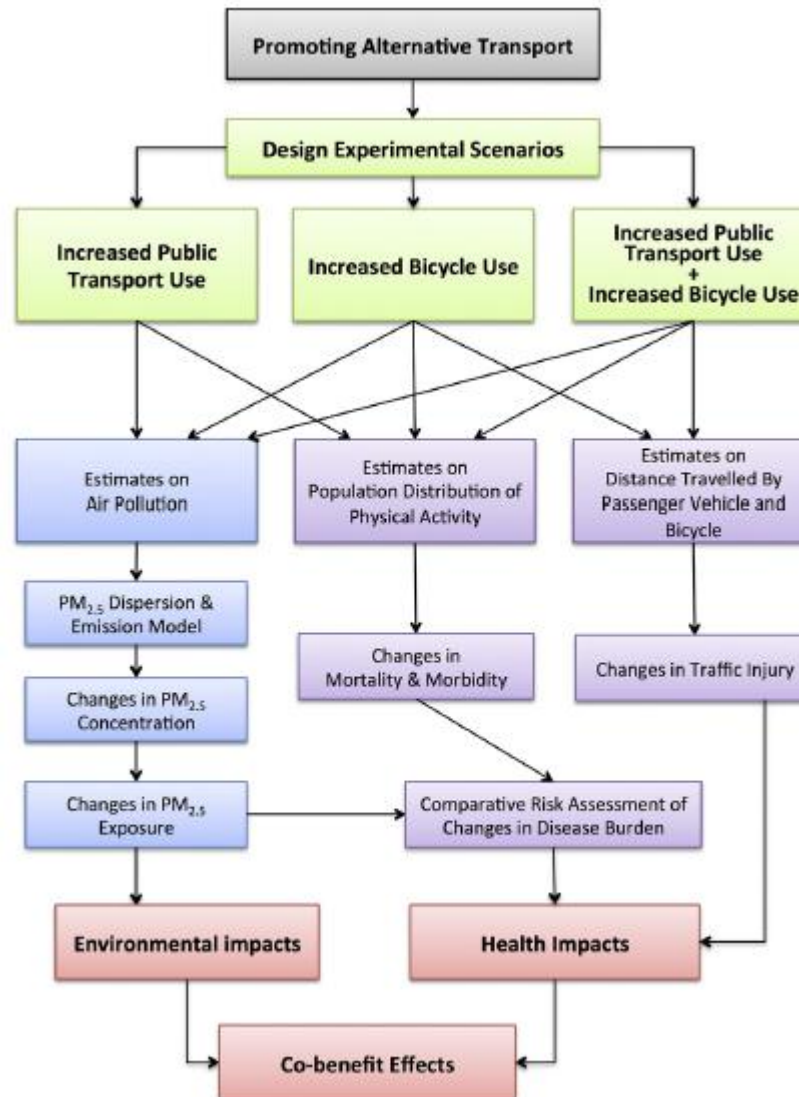
CBA & HIA

Available scientific studies: e.g.

- de Hartog et al., 2010: health
- Rojas-Rueda et al., 2011: health
- Holm et al., 2012: DALY
- Woodcock et al., 2014: DALY
- Rabl & de Nazelle, 2012: Economic cost: health
- Cavill et al., 2008 (Review): Economic cost: infrastructure
- Gotschi, 2011: Economic cost: infrastructure
- Aertsens & de Geus, 2010: Economic cost: accidents
- Xia et al., 2015: deaths & DALY
- Muller et al., 2015 (Review): HIA of active transportation
- ...



CBA & HIA



Xia (2015)

Net health benefit: 7 months

→ 500,000 people make a transition from car to bicycle for short trips on a daily basis in the Netherlands

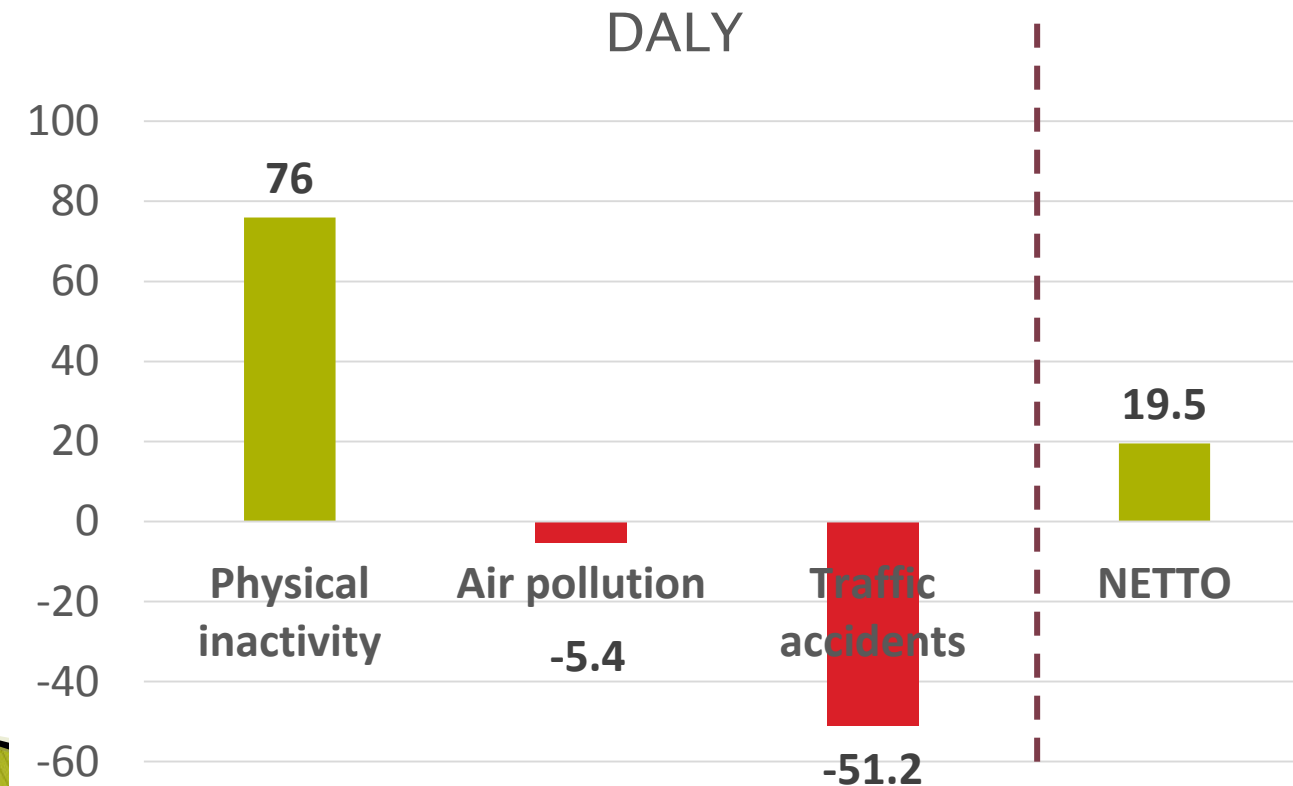
Stressor	Relative risk	Gain in life years ^a	Gain in life days/ months per person ^a
Air pollution	1.001 to 1.053	-1,106 to -55,163 (-28,135)	-0.8 to -40 days (-21 days)
Traffic accidents	0.996 to 1.010 ^b 0.993 to 1.020 ^b	-6,422 to -12,856 (-9,639)	-5 to -9 days (-7 days)
Physical activity	0.500 to 0.900	564,764 to 111,027 (337,896)	14 to 3 months (8 months)

CONCLUSIONS: On average, the estimated health benefits of cycling were substantially larger than the risks relative to car driving for individuals shifting their mode of transport.

Net DALY: 19,5 annually

33% trips in Copenhagen by bicycle

→ 50% car trips 2–10 km & 33% car trips 10–15 km to cycling → cyclists to 42%



Holm (2012)

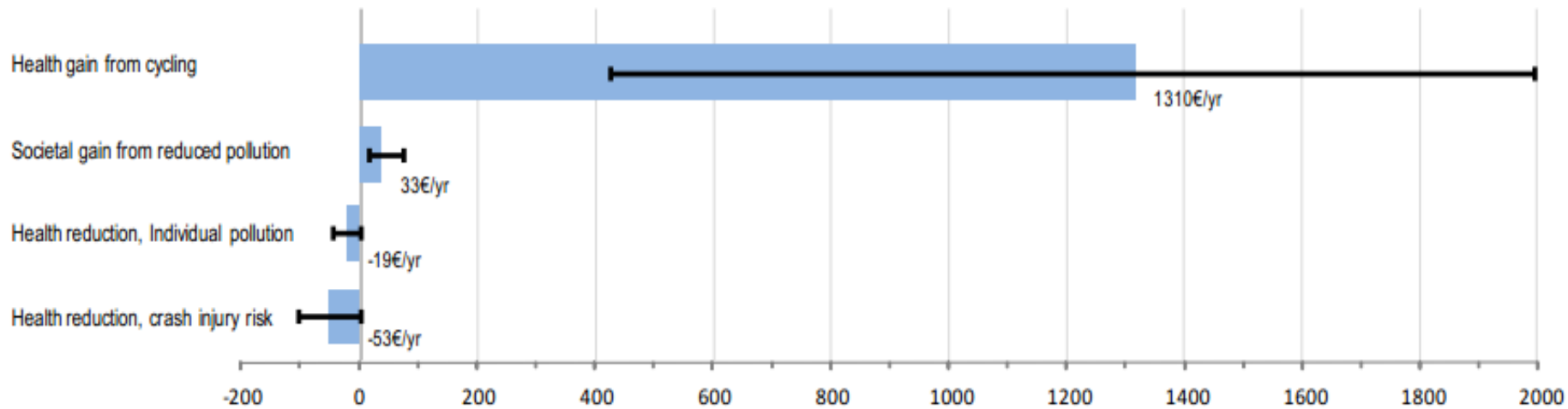
Economic cost: health

- ▶ Shift car → bicycling, by evaluating 4 effects:
 - health benefit by PA
 - public health benefit due to reduced pollution
 - individual exposure to ambient air pollution
 - individual risk of accidents

→ Health → €€

Economic cost: health

- ▶ Estimated mortality costs and benefits per individual switching from car to bicycle for work trips* in large European cities



* 2x5km daily roundtrip, 5 days per week, 46 weeks per year

Error bars represent upper and lower (95% confidence intervals).

Economic cost: 'other' impacts

Typical benefits per individual who switches from driving to bicycling, €/yr

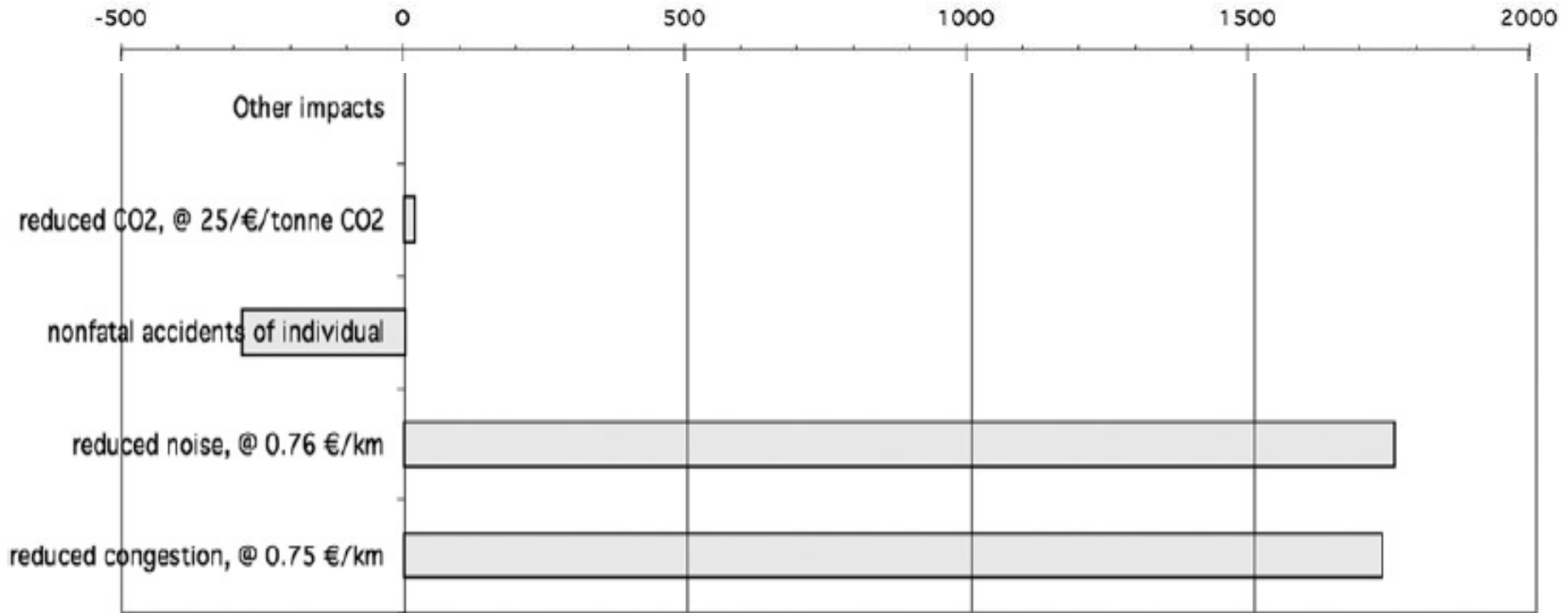


Fig. 3. Comparison of mortality costs and benefits with other impacts, for our bicycling scenario.

Total Economic benefit: 177 M€/yr

► Vélib Program in Paris:

- total cost of the program is 64 M€/yr (2011)



Upper bound of benefits of Vélib bike sharing program in Paris.

Item	Amount, M€/yr
Health gain from bicycling	52.4
Public gain from reduced pollution	1.3
Pollution exposure of individual	-0.7
Fatal accidents	-4.2
Nonfatal accidents	-11.5
Reduced CO ₂ emissions	0.6
Congestion	69.0
Noise	69.9
Total benefit	176.9

Economic cost: infrastructure

- ▶ transport infrastructure or policy + walking and/or cycling and health effects
- ▶ variation in values attributed to 1 new active walker/cyclist: €127 – €1290/year



Cavill (2008)

Economic cost: infrastructure

- ▶ By 2040, investments M\$138 – M\$605 result:
 - health care cost savings: M\$388 – M\$594
 - fuel savings: M\$143 – M\$218
 - savings in value of statistical lives: \$7 – \$12 billion
- BCR for health care and fuel savings: 3.8:1 – 1.2:1
- order of magnitude larger when value of statistical lives is used



Gotchi (2011)

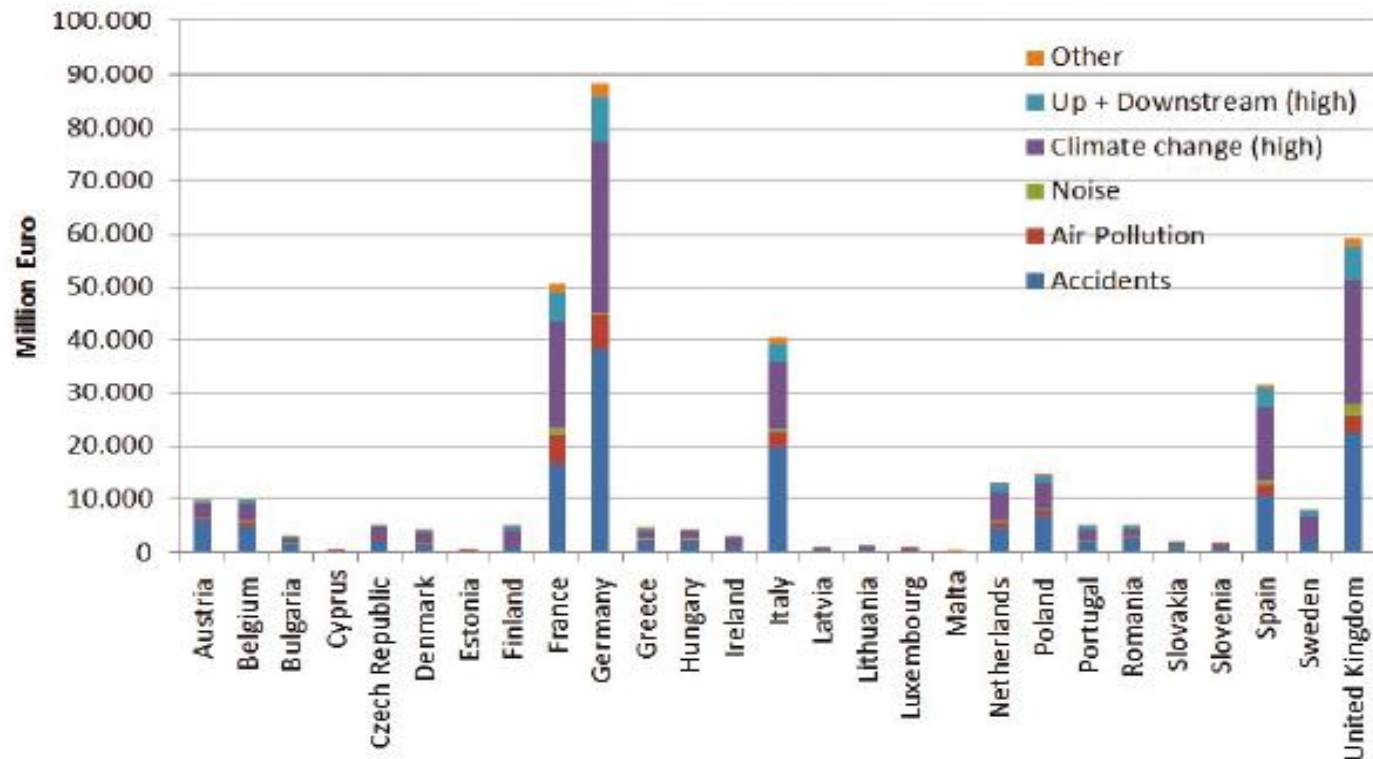


The health impact of bicycle paths and lanes



Total external costs for of cars from all EU countries add up to €373 billion for 2008

Figure 11: Total external costs from cars per year (2008) by country

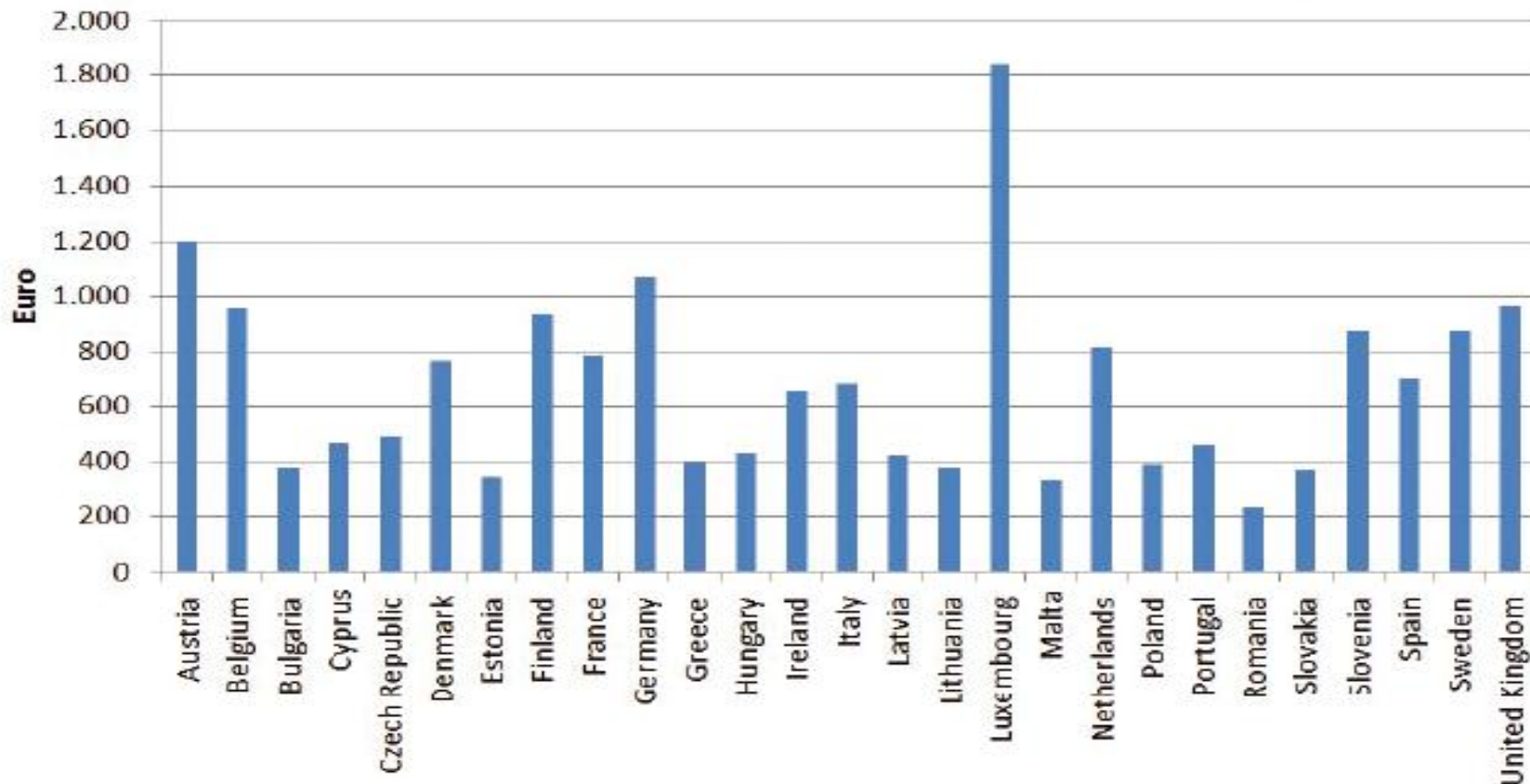


Becker (2012)



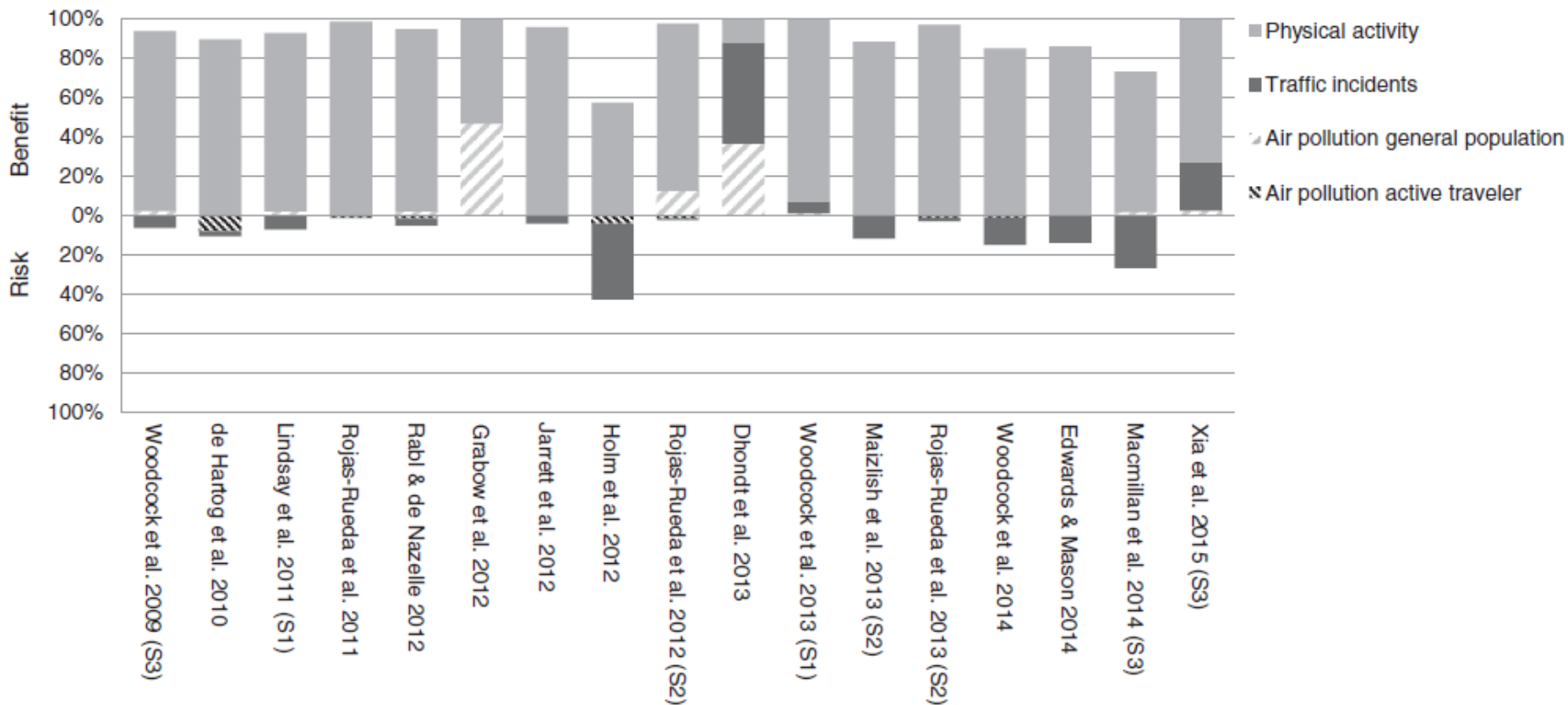
An average European citizen causes a cost of about €750/yr

Figure 12: External costs from cars per inhabitant and year (2008) by country



Becker (2012)

HIA of active transportation: A systematic REVIEW



HIA of active transportation: A systematic REVIEW

- ▶ Strengths of this REVIEW:
 - Walking & Cycling
 - Mortality & Mobility
 - Europe, India, US & NZ, Australia
 - ...

Conclusions: CBA & HIA

Positive or negative health or €€ balance?

Although the costs related to cycling accidents, road infrastructure, air pollution are high

Cost–benefits (ratio) of being **physically active** on a daily basis outweigh the ‘negative’ costs (economically and health)

Convincing ??

Political agenda

Cycling & Health political agenda

- ▶ There is a ‘gap’ between researchers – and policymakers or practitioners: “scientists are skeptical about the extent to which research is used” to inform policies; and “policymakers are sceptical about the usefulness and accuracy of research”.
- ▶ At times, research findings do not support policymakers’ agendas → conducting more policy–relevant research

Cycling & Health political agenda

NON-POLICY-RELEVANT Research



POLICY-RELEVANT Research

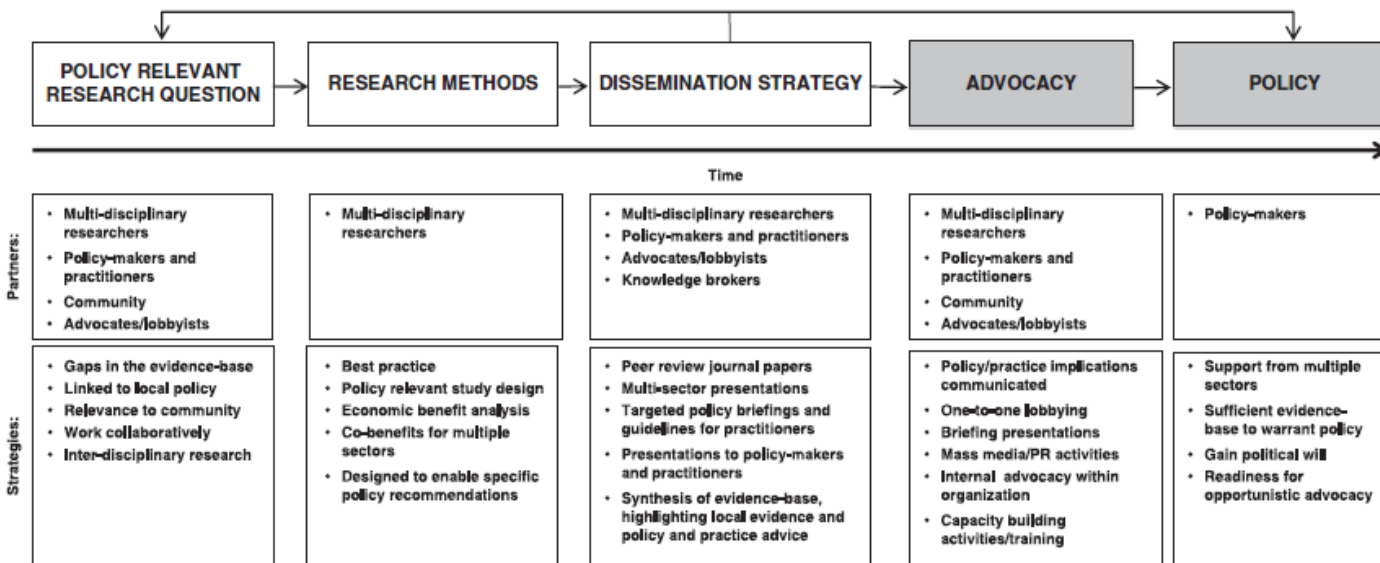


Figure 1: Processes, partners, and strategies that differentiate non-policy-relevant and policy-relevant research.

Strategies to Close the 'Research Translation Gap'

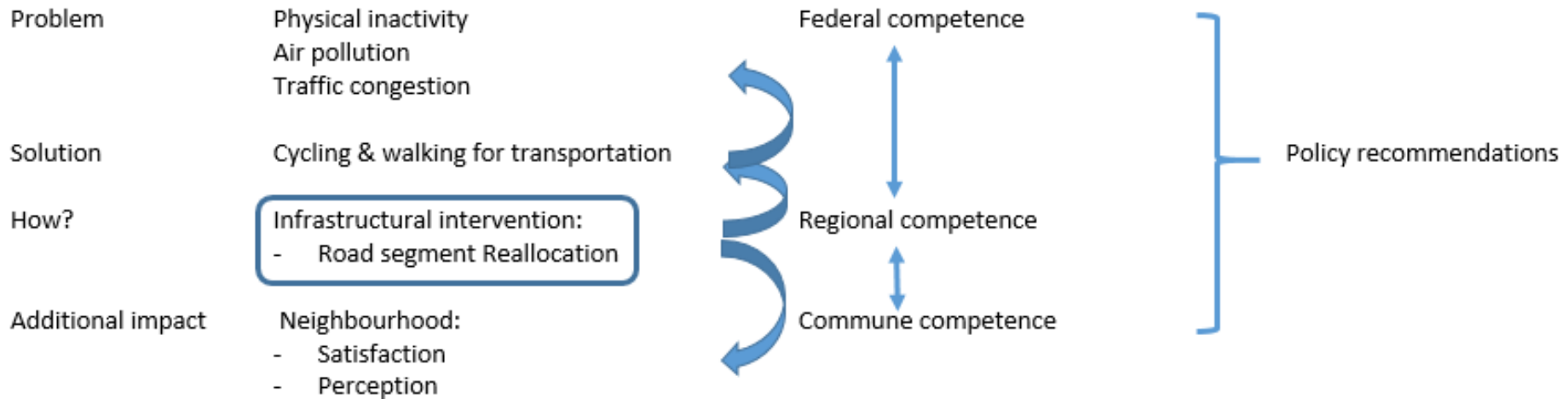
- ▶ Giles–Corti propose 10 strategies to help bridge the gap between active living researchers and those responsible for planning and implementing transport and land–use policies (1):
 - Understand the 'policy world' we are attempting to shift
 - Establish links with policymakers and practitioners
 - Work with knowledge brokers, advocates, and lobbyists
 - Establish research agendas jointly with policymakers and practitioners
 - Undertake interdisciplinary collaborative research

Strategies to Close the 'Research Translation Gap'

- ▶ (2):
 - Study the health–economic impacts of active living infrastructure;
 - Evaluate policy reform through natural experiments;
 - Conduct research focusing on community needs and preferences;
 - Highlight specific policy implications;
 - Create interdisciplinary built environment and health training programmes.

Belgian case study

► Different competence levels:

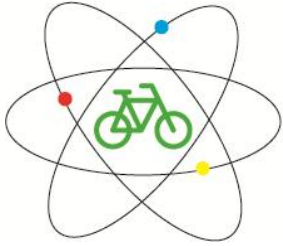


French case study

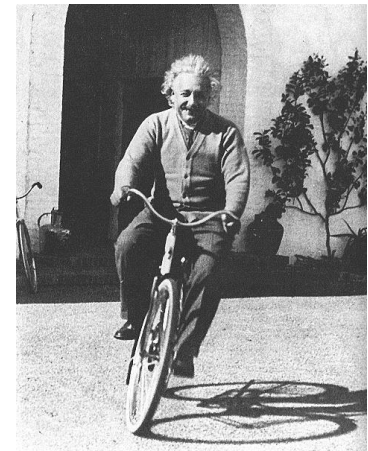
- ▶ Damart S, Roy B; The uses of cost-benefit analysis in public transportation decision-making in France; Transport Policy 16 (2009) 200-212



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Thanks for your attention

