

Health and Transport: Bridging the Gap

Audrey de Nazelle

“Moving Active Transportation to Higher Ground: Opportunities for Accelerating the Assessment of Health Impacts”

Washington DC, April 13 2015



Photo: Gil Garcetti

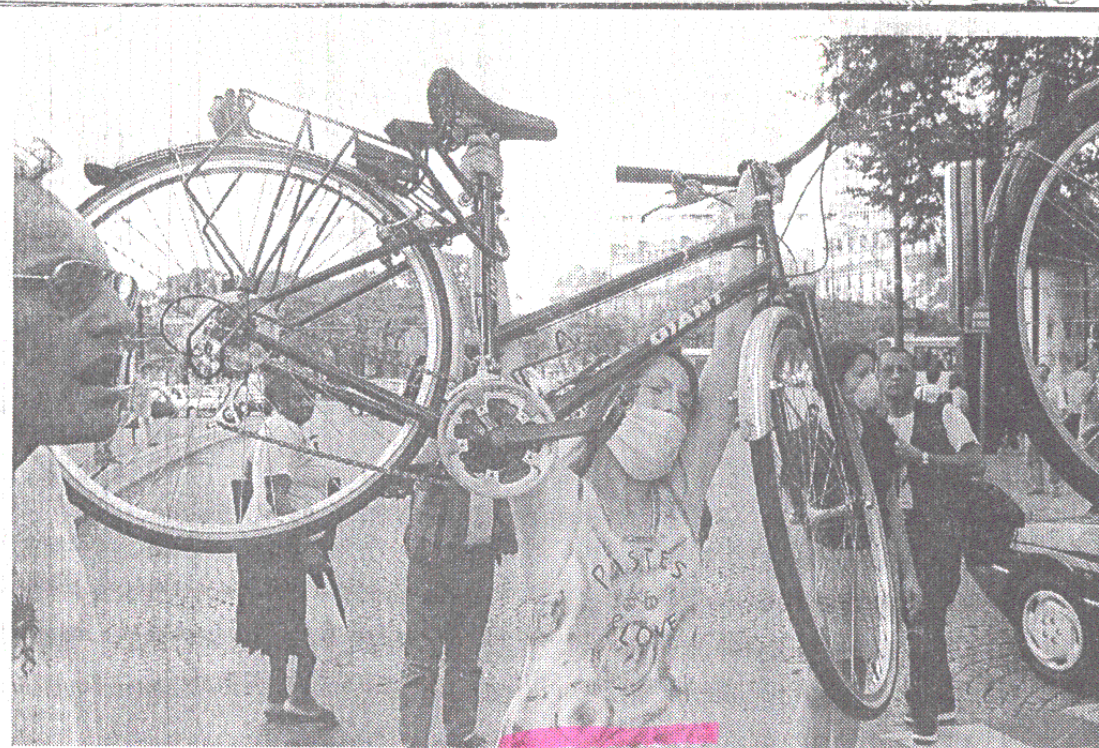




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INTERNATIONAL HERALD TRIBUNE, FRIDAY, JULY 14, 1995

INTERNATIONAL



Pascal Rossignol/Reuters

UP IN THE AIR — A protester holding her bicycle aloft to stop traffic in Paris during an anti-pollution demonstration. As air conditions worsen, authorities have asked motorists not to drive in the city on the weekend.

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Bridging the gap between health and transport

- **Why? Opportunities for planning cities for health, but what is the evidence base?**
- **Purpose: help decision-makers design urban policies that promote health**
- **Methods:**
 - **Conceptual and quantitative integrated frameworks**
 - **Research gaps**

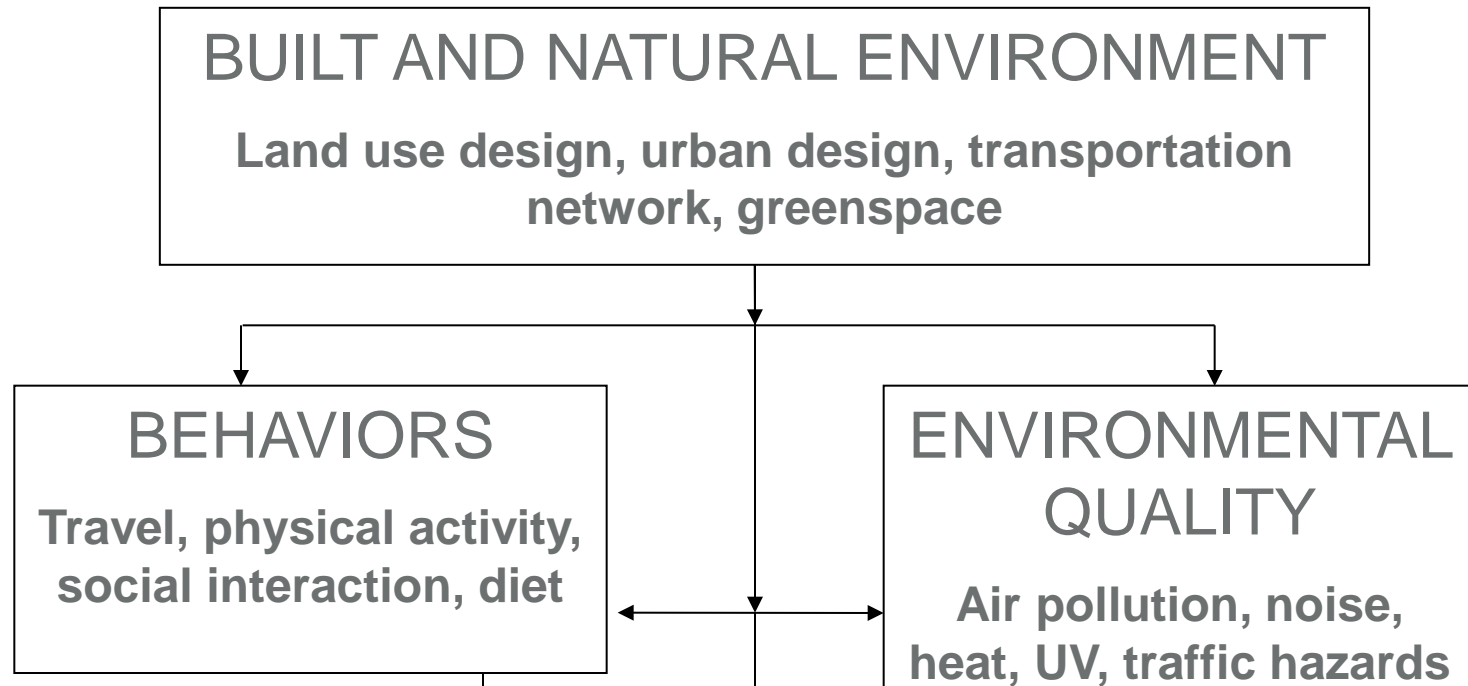


Holistic approach to considering urban and travel policies

**TRANSPORTATION, AIR
POLLUTION AND
PHYSICAL ACTIVITIES**
an integrated health risk
assessment programme of
climate change and urban
policies



Conceptual Framework



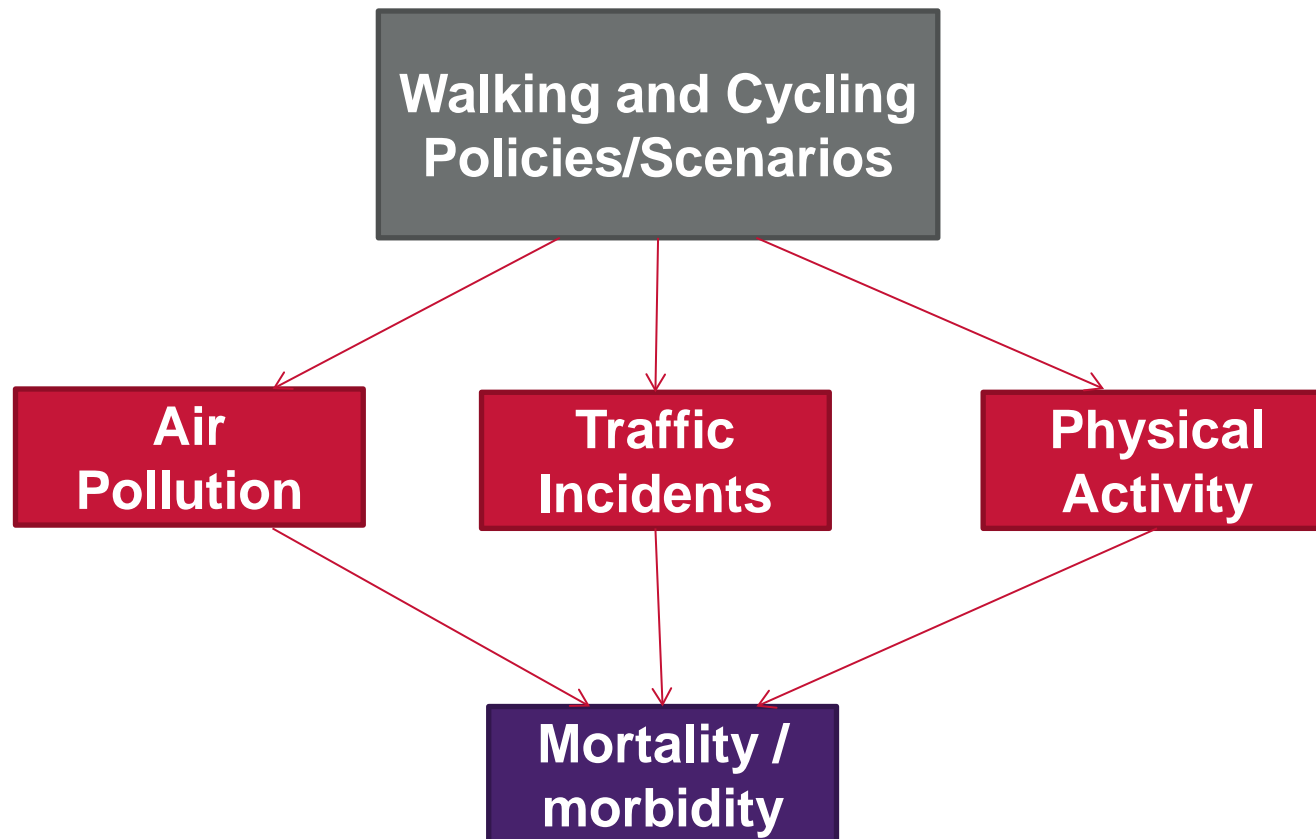
Review

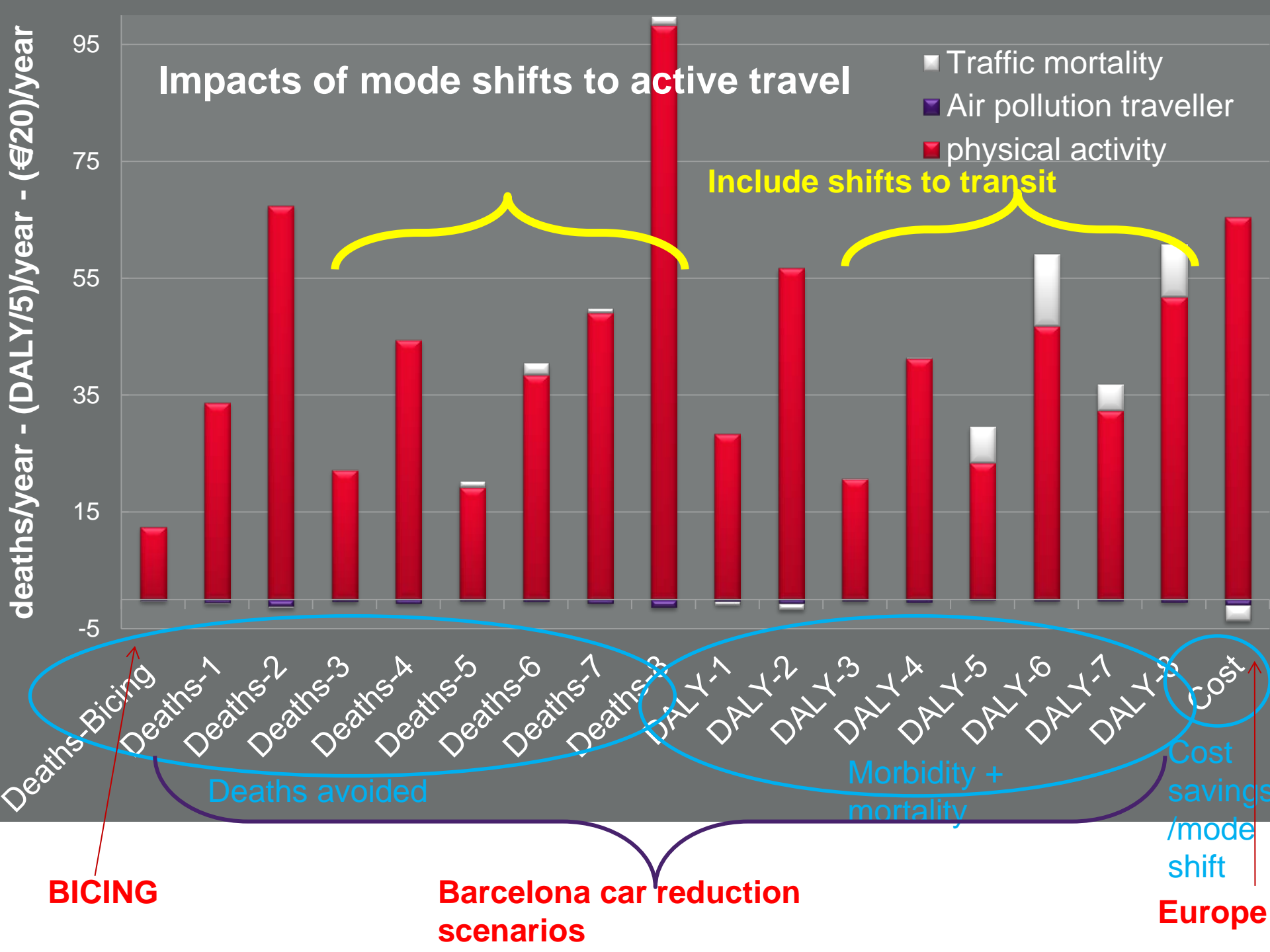
Environment International 37 (2011) 766-777

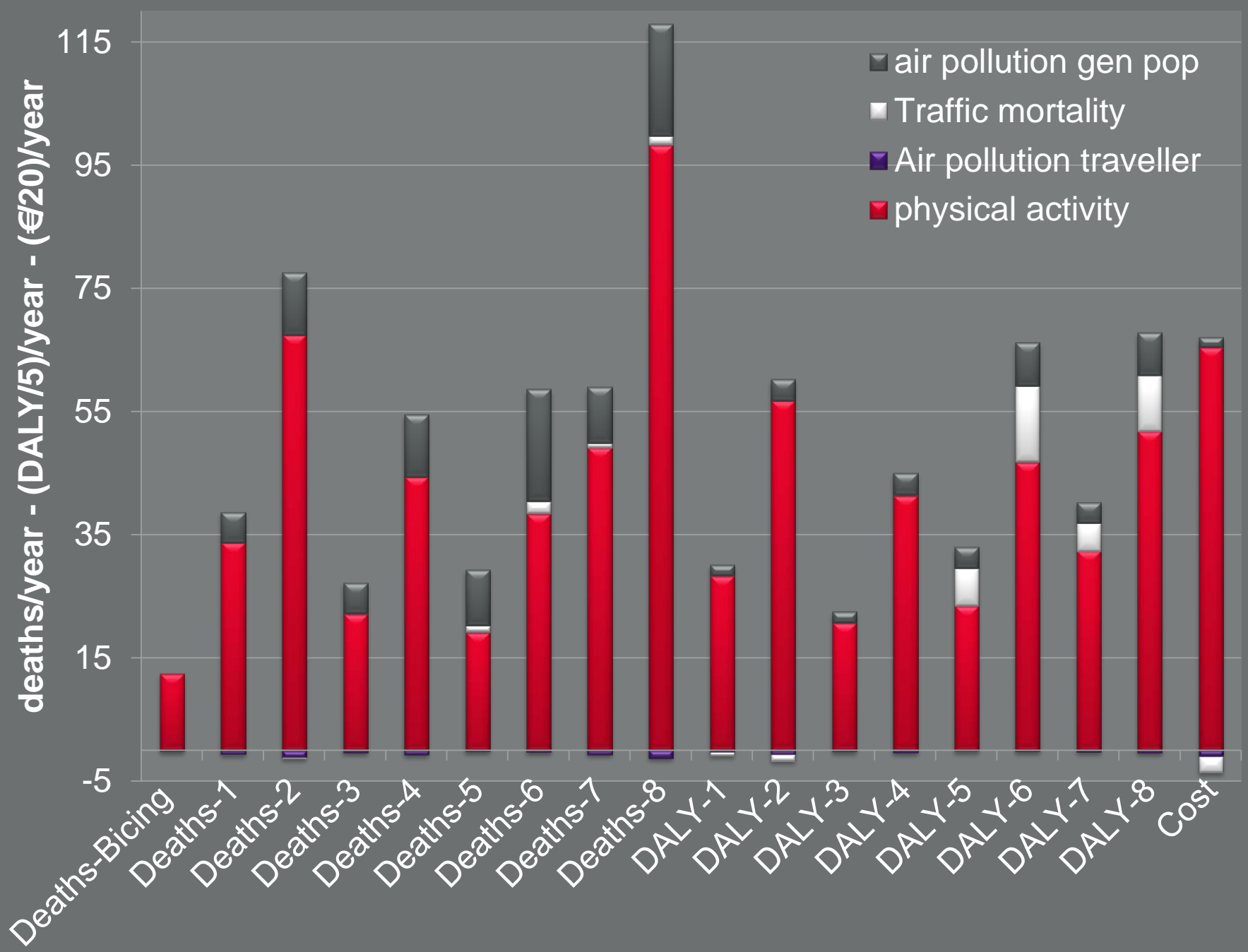
Improving health through policies that promote active travel: A review of evidence to support integrated health impact assessment

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TAPAS quantitative models: health impacts for travellers themselves







Health impact assessments

- TAPAS model across 6 European cities: See David Rojas' presentation 3:45pm today
- Main message so far (**from all of 20 studies**): Benefits of active travel in terms of physical activity outweigh adverse effects associated with air pollution and/or traffic injuries
- Review of HIAs: See Natalie Mueller's presentation 10:30 tomorrow

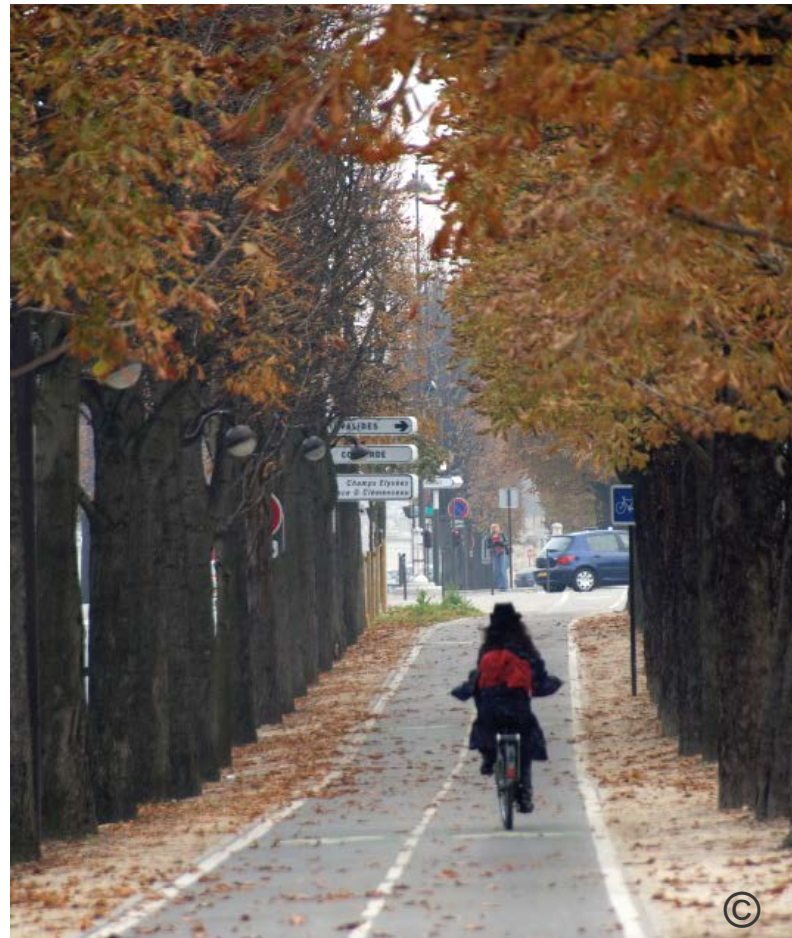


BUT, lots of uncertainty still exists

- Knowledge gaps
- Lack of data
- Choice of metrics/outcomes



Effectiveness of policies



Effectiveness of policies



Some methodological issues

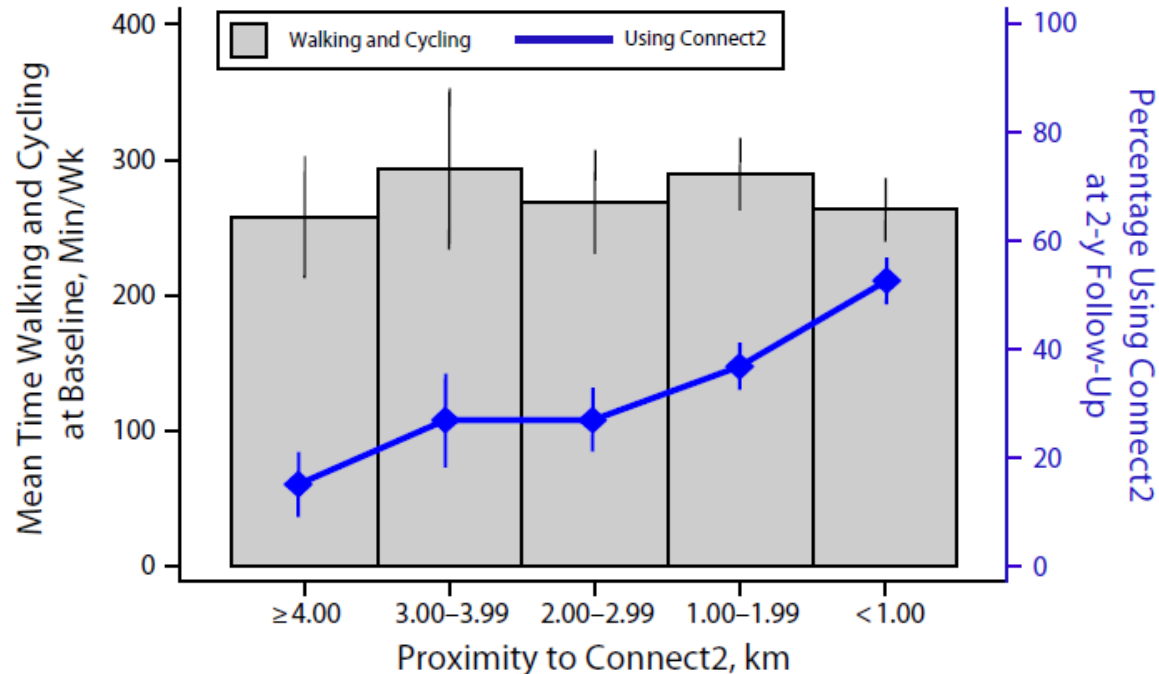
- Residential choice / mode choice
- Behavioural theories
 - Environmental or social context, personal norms, etc
- Seasonal effects
- Physical activity substitution

Effectiveness of policies

- Intervention study design
- Natural Experiments
- Longitudinal analysis

Centre for Diet and Activity Research (CEDAR, Cambridge)

E.g. I-Connect: Goodman et al. 2014 Am J Public Health; Sahlqvist et al. 2013 Int J Behav Nutr Phys Act



Note. Whiskers indicate 95% confidence intervals. The findings were very similar when we repeated the analysis for the 1-year sample and for Connect2 use at 1-year follow-up.

FIGURE 1—Association between proximity to Connect2 and (1) past-week walking and cycling at baseline and (2) Connect2 use at 2-year follow-up: Cardiff, Kenilworth, and Southampton, United Kingdom; April 2010–April 2012.

Air pollution and physical activity

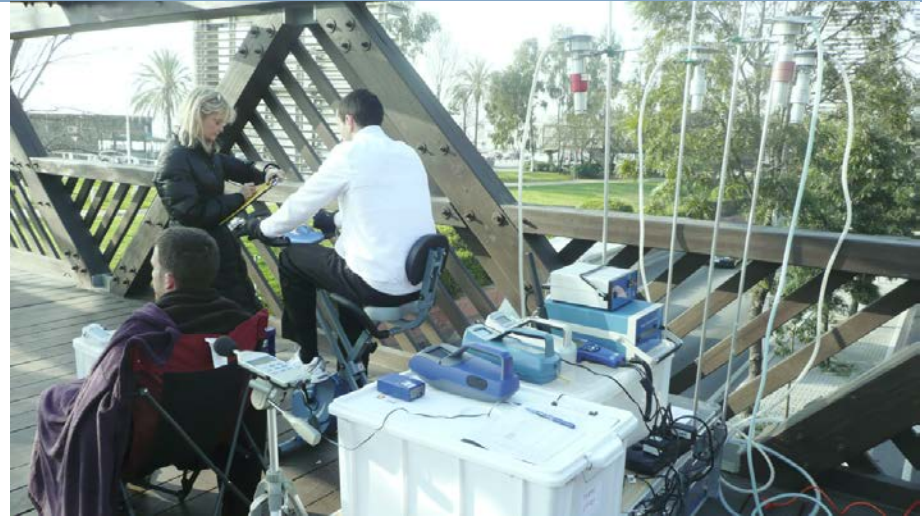
- TAPAS epidemiologic analysis
(Andersen et al. 2015 Environmental Health Perspectives):
 - Danish Diet Cancer and Health Cohort (52 061 members, NO₂ concentration at home address)
 - **Benefits of outdoor physical activity outweigh risks associated with air pollution exposure**
 - **Some benefits may be slightly attenuated when exposed to high levels of NO₂ (respiratory mortality)**



Air pollution and physical activity: Experimental studies

TAPAS experimental study (Kubesch et al. 2014 European Journal of Preventive Cardiology, & Occupational Environmental Medicine):

- Case crossover, 28 volunteers
- Benefits of cycling on respiratory and cardiovascular outcomes even at high air pollution levels, may protect against acute adverse effects
- Difficulty of disentangling effects



Exercise improves the same physiological mechanisms that air pollution deteriorates



- Emergence of novel methods of exposome and biomarkers and sensors (Nieuwenhuijsen et al. 2014 Int. J. Environ. Res. Public Health)

Active travel and safety



Deterrent to active travel

Under-reporting of bike incidents:
SHAPES longitudinal analysis
(Aertsens et al. 2010 Accident Analysis and
Prevention)

Safe conditions?

Population characteristics



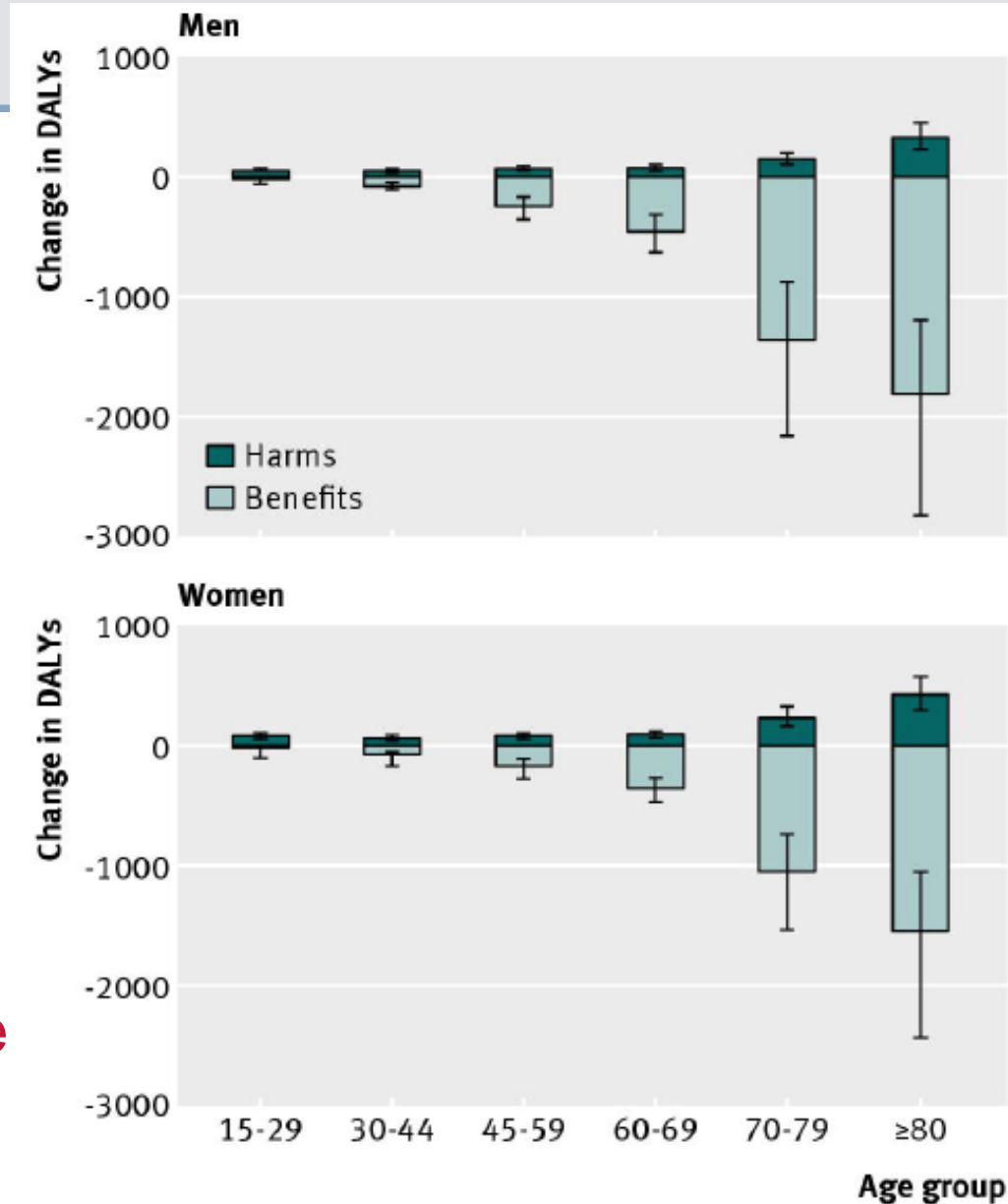
Exposure to policies & risks
Uptake of active travel
Health effects

Population characteristics



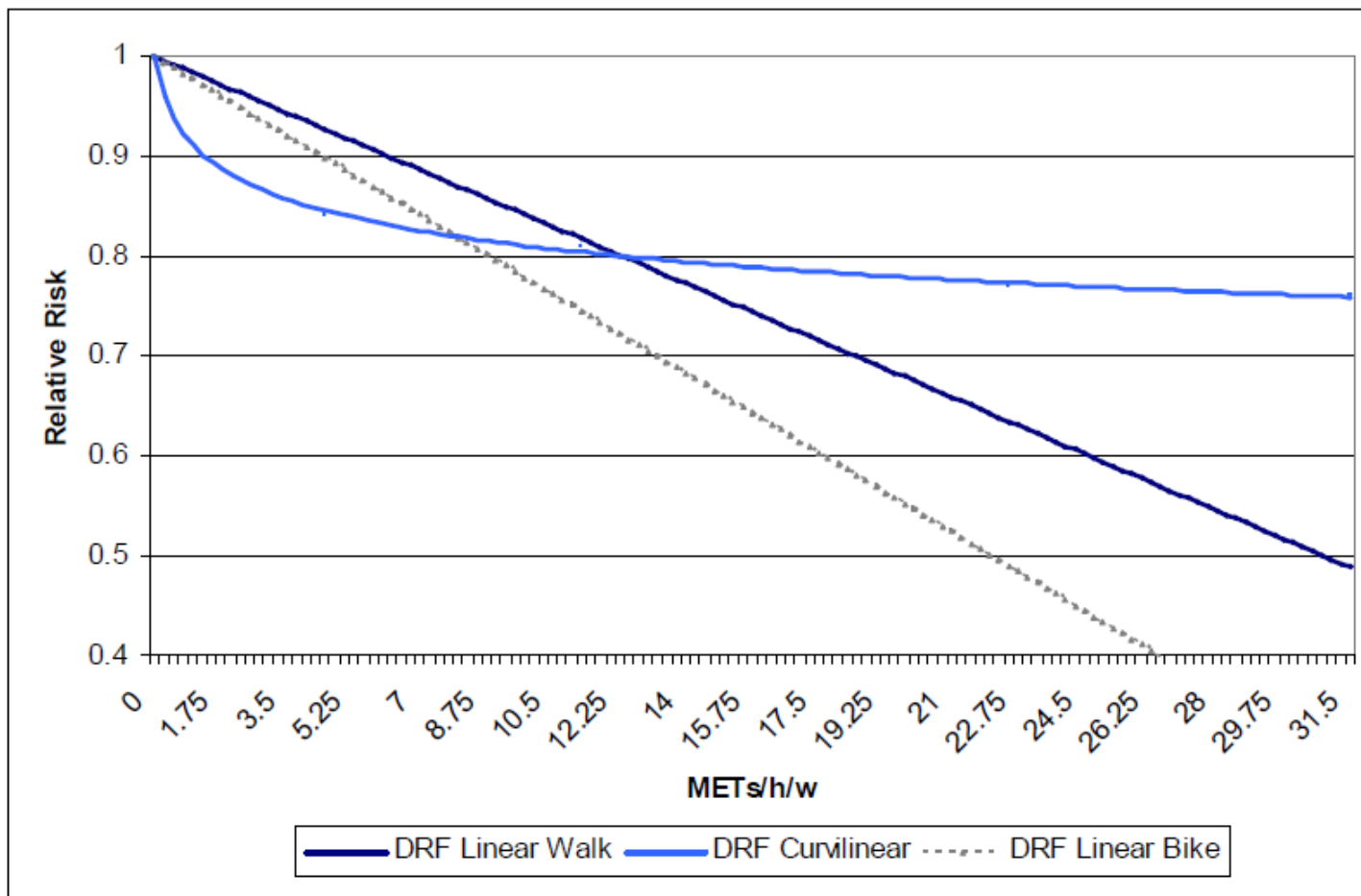
Woodcock et al. (2014 BMJ)
on the London cycle hire
scheme: **for young women
benefits did not outweigh the
harms**

Photo: Gil Garcetti



Population characteristics: baseline levels of physical activity

Figure 8. Dose response functions (DRF) for physical activity and all cause mortality.



Rojas-Rueda *et al.*
Environment International
2012

* METs/h/w: Metabolic Equivalent of Task per hour per week; DRF: Dose Response Function; Curvilinear DRF from a meta-analysis for physical activity and all-cause mortality (Woodcock J. 2010); Linear Walk DRF from a meta-analysis reported in HEAT for walking (WHO, 2010); Linear Cycling DRF from HEAT for cycling (Andersen L, 2000).

Range of conditions for environmental, population and personal risk tradeoffs



Effects of other exposures/behaviours



Exposure to outdoor natural environments



Adjusted associations between natural outdoor environments within 300 m and health and mediators.

Health indicators

Less than good self-perceived general health

Surrounding greenness OR§ (95% CI)

0.90 (0.83, 0.98)*

Perceived risk of poor mental health

0.79 (0.71, 0.88)*

Perceived depression and/or anxiety

0.81 (0.75, 0.88)*

Visits to mental health specialists

0.80 (0.69, 0.92)*

Intake of tranquilizers or sedatives

0.88 (0.79, 0.99)*

Intake of antidepressants

0.80 (0.71, 0.91)*

Intake of sleeping medication

0.89 (0.79, 0.99)*

Mediators

Social support

0.98 (0.93, 1.04)

Physical activity

1.01 (0.93, 1.09)

Other health and wellbeing outcomes

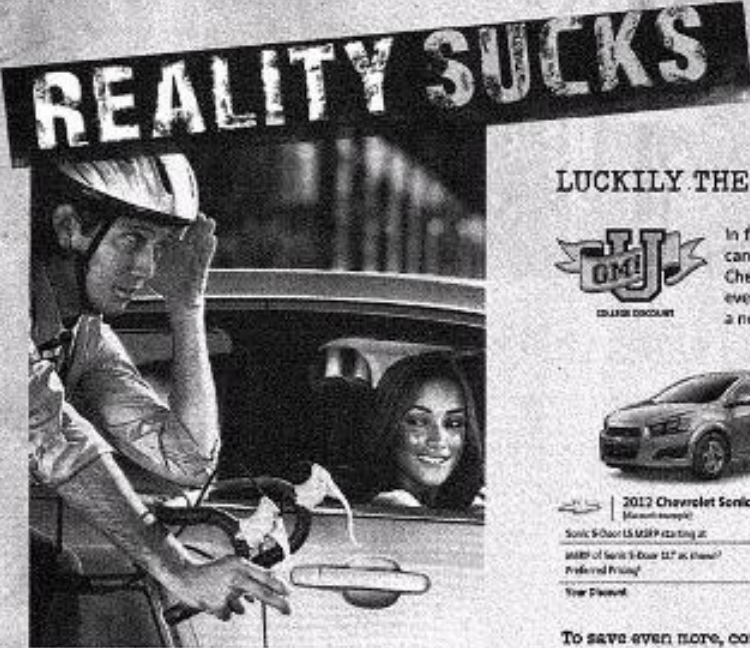
Exposome: novel sensors, smart phones and ecological momentary assessments?
(Nieuwenhuijsen et al. 2014 Int. J. Environ. Res. Public Health)



What will convince policy-makers? (And individuals?)


- Mortality, morbidity, burden of disease
- Metrics used by government agencies: congestion, air pollution compliance, medical expenditures, etc
- Climate change (ITHIM)
- Economic evaluations (HEAT)
- Fuel savings
- Stakeholder and public attitudes
- ...


Benefits of car use?



REALITY SUCKS


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 In fact, it's the best college discount from any car company,¹ and can save you hundreds — even thousands — on an eligible, new Chevrolet², Buick³ or GMC.⁴ If you're in college, a grad program or even a recent grad...take advantage today and get a great deal on a new ride to call your own!



2012 Chevrolet Sonic
(shown as example)




Sonic S-Connect LS MSRP starting at:	\$ 21,365.00
MSRP of Sonic S-Connect LT* at check ⁵ :	\$ 24,865.00
Preferred Pricing ⁶	\$ 26,222.02
Year Discount	\$ 282.89





2012 GMC Sierra 1500
(shown as example)

Sierra 1500 Reg. Cab 48" 2WD MSRP starting at:	\$ 22,340.00
MSRP of Sierra 1500 Extended Cab SLE 2WD with optional equipment as shown ⁷	\$ 32,840.00
Preferred Pricing ⁶	\$ 31,532.28
Year Discount	\$ 3,823.74

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GM add: "Stop pedaling, start driving"

Conclusion

Bridging the gap between transport and health:

- Current evidence shows benefits of active travel > risks
- Future work needed to further explore (Combining methods from various fields)
 - Effectiveness of policies (longitudinal analyses, behavioural theories)
 - PA and AP (real world , normal life conditions, subpopulations)
 - Traffic injuries (conditions and underreporting)
 - Variety of population and environmental characteristics
 - Other impacts
 - Exposome - novel technology
 - Stakeholder and decision makers



See Thomas Goetschi's poster

PHYSICAL ACTIVITY THROUGH
SUSTAINABLE TRANSPORT APPROACHES

THANK YOU

Thanks in particular to:

Mark Nieuwenhuijsen

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Katarzyna Iwinska

Nadine kubesch

Martina Ragetti

Marko Tainio

Ari Rabl

Helene Desqueyroux

Jean-Francois Toussaint

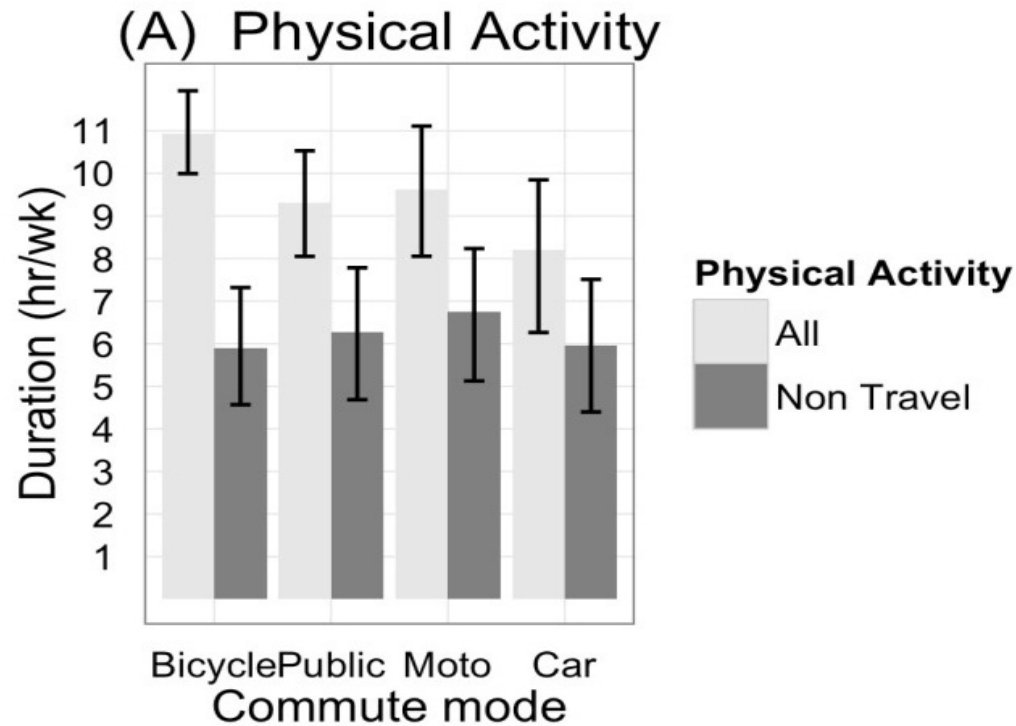
Charlotte Braun-Fahrländer

...



Effectiveness of policies

Physical Activity substitution?



Active travel and safety



Photo: Gil Garcetti

Deterrent to active travel

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Safe conditions?

Safety in numbers? (Jacobsen Inj Prev 2003)

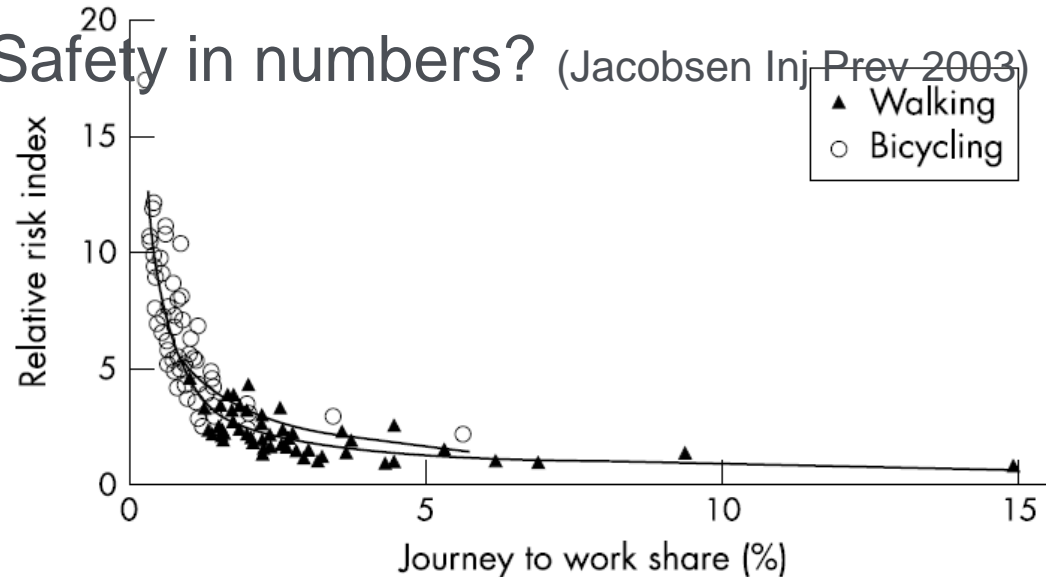
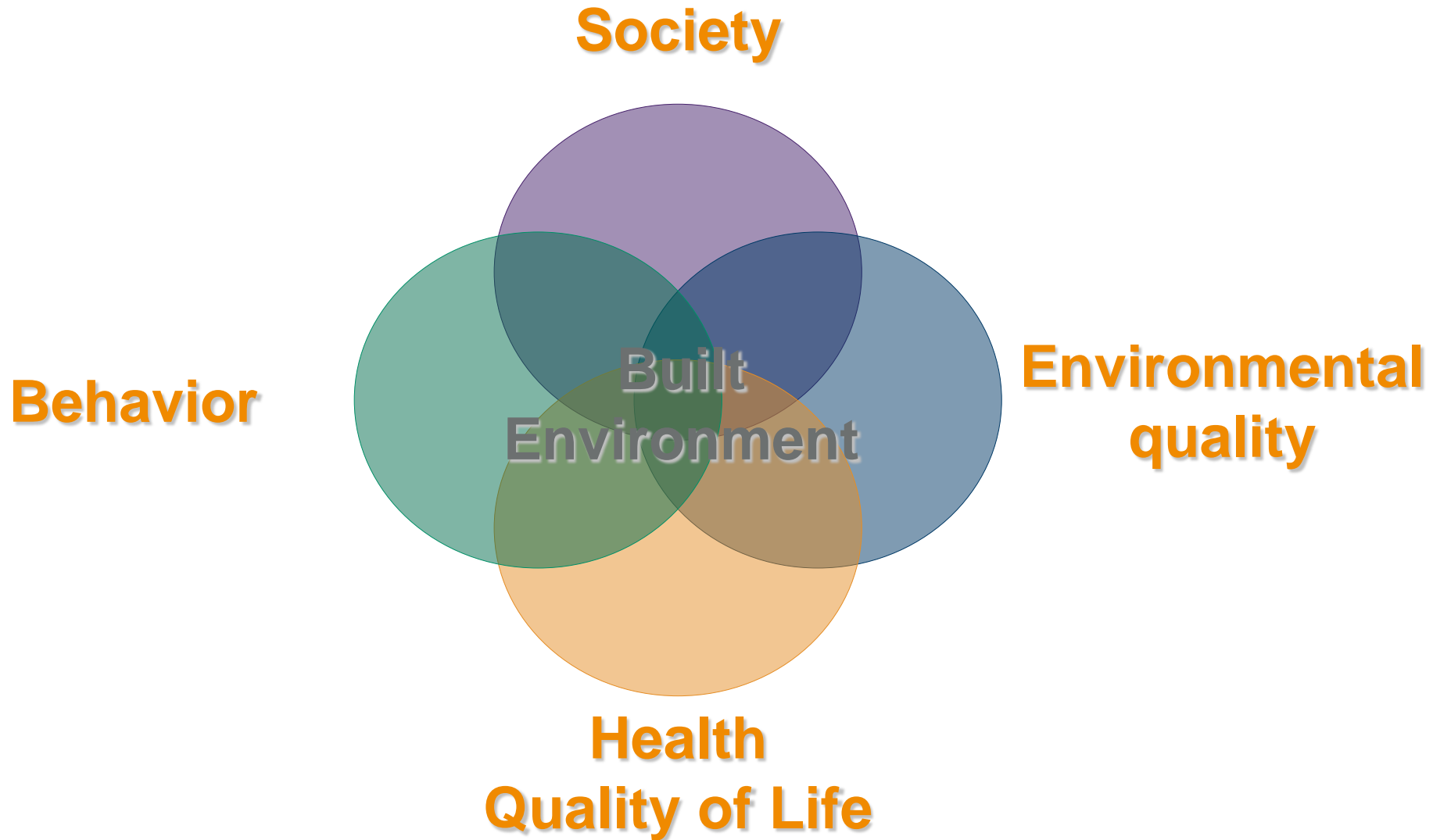


Figure 1 Walking and bicycling in 68 California cities in 2000.



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