SUSTAINABLE MOBILITY AND WEALTHY CITIES

CIVITAS Summer Course: Sustainable mobility for a better life

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TRANSPORT & MOBILITY LEUVEN

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Introduction: sustainable urban mobility

- Stimulating active mobility
  - Health benefits of physical activity
    - Benefits for transport-related walking and cycling
  - Safety is a key consideration
  - Infrastructure is at core of active travel
  - Five D's to stimulate active mobility: Density, Diversity, Design, Destination and Distance

Moving towards active transportation: How policies can encourage walking and bicycling. Active Living Research, Research Review, 2016.

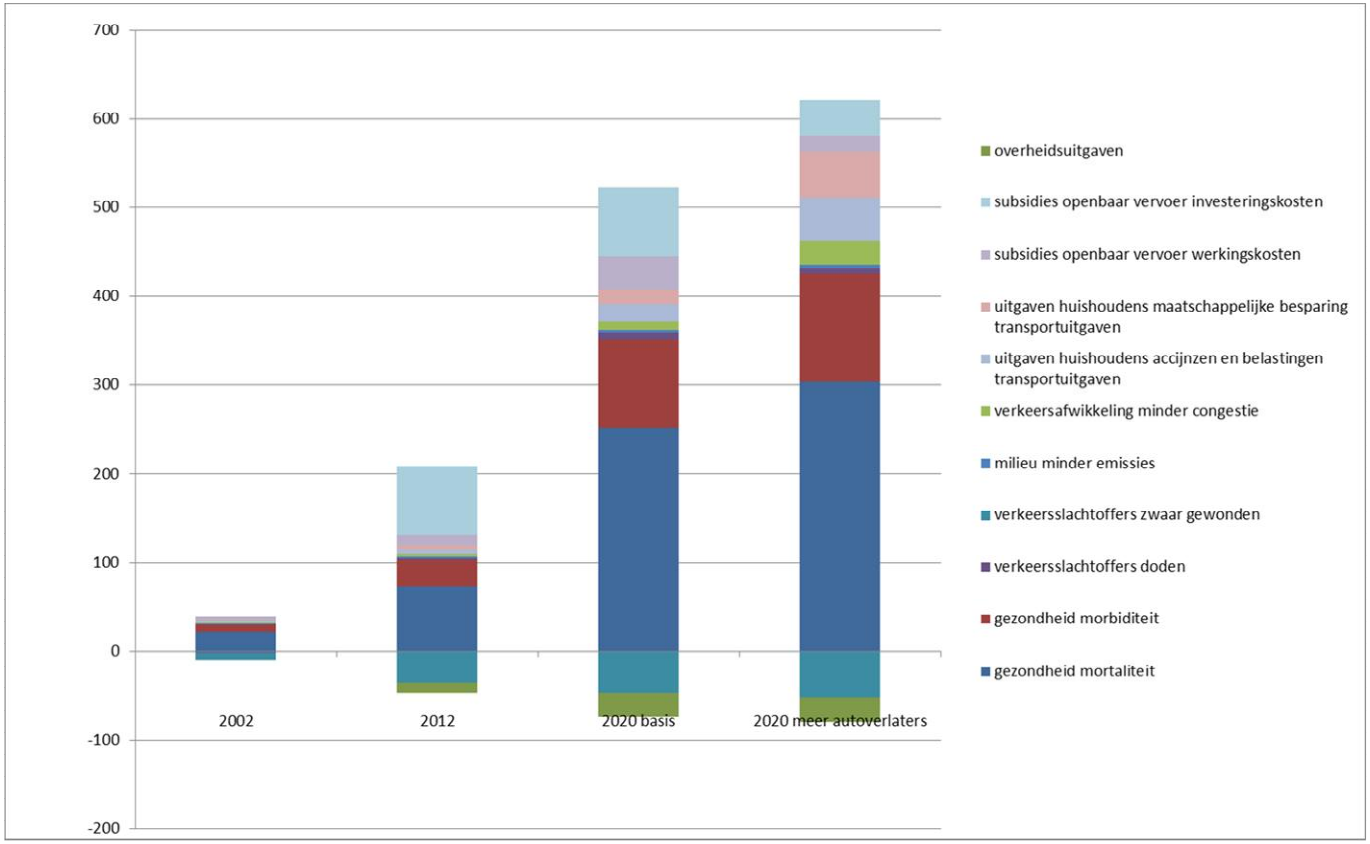
Introduction: sustainable urban mobility ~ stimulating active mobility

- Cycling patterns and trends variations across social and spatial contexts (Netherlands)
  - Rising in urban areas and declining in rural areas
  - Cycling especially increasing among elderly
  - Adults with non-Western migrant background cycle less than adults of dutch origin
  - Need for differentiated approach to promoting cycling and developing policies

Spatial and social variations in cycling patterns in a mature cycling country: exploring differences and trends. Journal of Transport & Health, December 2014.

Socio-economic effects: Overview

- Case study – TML study on economic effects of bicycle policy in Brussels capital region



Socio-economic effects: Overview

Effect	Strength
Health	+++
Safety	--
Emissions	+
Congestion	+
Cost savings households	++
Cost savings public transport	++

Socio-economic effects: health

- General overview of findings
  - Socio-economic benefits of increased active mobility
    - Most important are health effects of increased activity
      - Lower prevalence of cardio-vascular diseases
      - Psychological wellbeing
      - Other health benefits
    - Largely outweighs:
      - Increased risks of injury from exposure to motorized traffic
      - Increased exposure to air pollution

Can air pollution negate the health benefits of cycling and walking? Preventive medicine, October 2015.

Does active commuting improve psychological wellbeing? Preventive medicine, August 2014.

Socio-economic effects: health

- Health benefits also largely outweigh
  - Investment cost in (bicycle and walking) infrastructure
    - Investment of 1 € in bicycle highways in Flemish region brings 2 to 14 € in health benefits

Health impact model for modal shift from car use to cycling or walking in Flanders: Application to two bicycle highways. Journal of Transport & Health, December 2015.

- Health benefits also more important than
  - Other benefits of active mobility modes
    - Reduced environmental emissions
    - Reduced congestion

TML Study - Cycling policy in Brussels: Does it pay off?

Socio-economic effects: health

- Positive cost-benefit ratios of active mobility are found and confirmed in various studies
  - Relying on a variety of methodologies using distinctive assumptions
  - In multiple geographical contexts

Health impact assessment of active transportation: A systematic review. Preventive medicine, July 2015.

Socio-economic effects: health

- WHO HEAT: Health Economic Assessment Tool

http://www.heatwalkingcycling.org/
+
Examples of case studies

Socio-economic effects: safety

- Safety by numbers phenomenon
  - The likelihood that a given person walking or bicycling will be struck by a motorist varies inversely with the amount of walking and bicycling

Safety in numbers: more walkers and bicyclists, safer walking and bicycling. Injury prevention, 2003.

  - Causal relationship
  - Underlying rationale:
    - If car drivers do not expect cyclists, they will drive less cautious
    - If there are a lot of cyclists they will be more careful

Socio-economic effects: safety

- Serious accidents involving bicycles:
  - in majority of cases caused by collision with motorized vehicles
  - no proportional increase
  - safety by numbers phenomenon

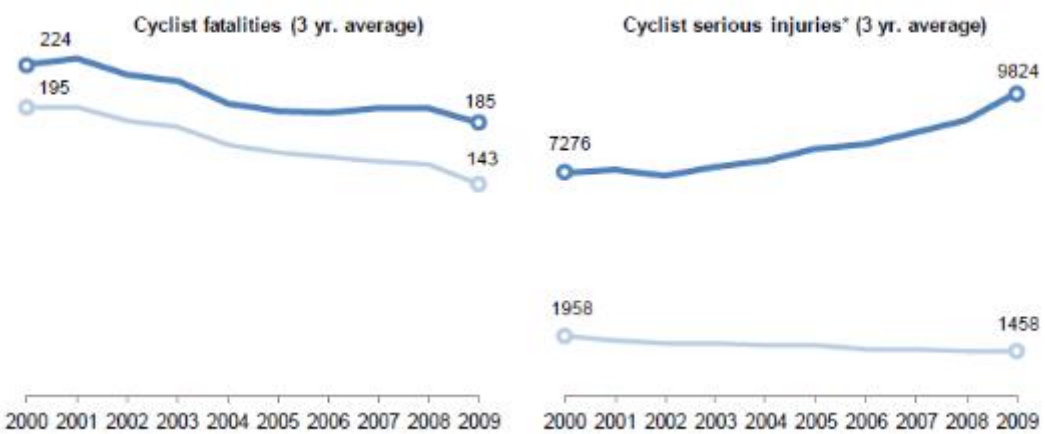
- Small incidents involving bicycles:
  - mostly one-sided accidents caused by technical failure of bicycle/infrastructure, absentmindedness, …
  - proportional increase with increased cycling
  - no effect of "safety by numbers"

Safety by numbers only valid for two-sided accidents: between motorized vehicle and bicycle

Socio-economic effects: safety

- But evidence of significant underreporting of mostly small and even serious injuries
  - Correction factors on official injury statistics proposed:
    - Serious injuries: x2 – x5.5
    - Light injuries: x8 – x16

Trends in cycling injury reports in the Netherlands - official police statistics (light blue) and hospital statistics (dark blue)



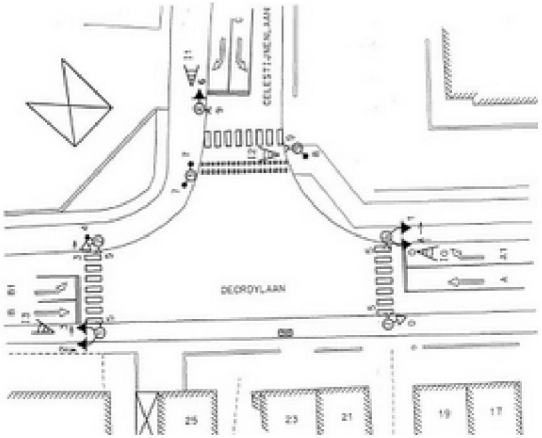
Socio-economic effects: safety

- Good bicycle infrastructure is important
  - For avoiding collisions
  - For avoiding one-sided accidents
- Some examples
  - Avoid conflicts between cars and cyclists

Socio-economic effects: safety

- Avoiding conflicts between cars and cyclists
  - Bicycle lanes & “bicycle street”

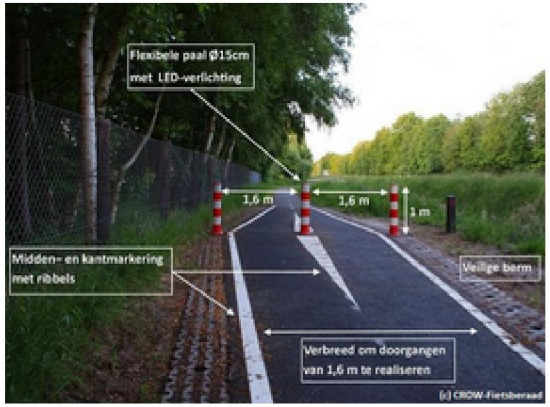
  - Modified traffic light phasing
    - All green at same time
    - Extra priority for cyclists and walkers



Socio-economic effects: safety

- Examples to avoid “small incidents”
  - Avoiding slippery roads

  - Limiting obstructions to cyclists from obstacles which are meant for guidance of car traffic



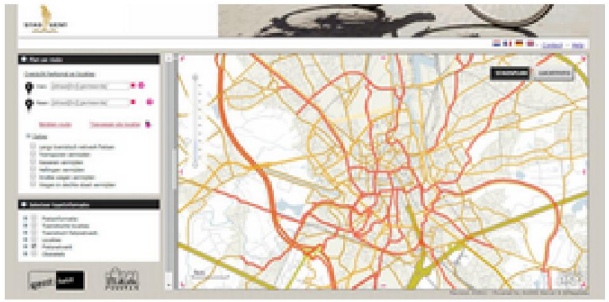
Socio-economic effects: safety

- Bicycle and walk in city center
  - Shared space - Leeuwarden

  - Cyclists are “guests” in walking streets - Groningen

Socio-economic effects: safety

- But also “soft measures” such as information (campaigns), guidance to new cyclists, etc.



Direct economic effects: active mobility and retail income

- Relation between mode choice and spending behaviors
  - Non-driving customers (pedestrian, cyclists, transit) are more valuable to local retail shops than car driving customers
    - More frequent trips
    - Similar expenditure per visit (except for supermarkets)
    - Higher average spending per month
    - Based on surveys at local business in Portland metropolitan area
  - "Green dividend phenomenon"

Consumer behavior and travel choices: A focus on cyclists and pedestrians. Presented at Transportation Research Board, January 2013.

Direct economic effects: active mobility and retail income

- In addition, ECF study arguments that:
  - Retailers typically under-estimate the share of clients that shop by bike, and over-estimate the importance of car use
  - If a street is transformed in a way that gives more space to cyclists and pedestrians, and less to cars, absence of clients coming by car is more than compensated by clients coming on foot or by bike

Shopping by bike: Best friend of your city centre. Cycling and local economies. ECF study, 2016.

Direct economic effects: jobs

- Cycling economy (TML study for ECF)

Subsector	Employment (FTE) today	Reliability of estimate
Bicycle retail (mainly sales and repair)	80 587	High
Bicycle industry (manufacturing and wholesale)	22 629	High
Bicycle infrastructure	23 417	Intermediate
Bicycle tourism	524 063	Intermediate
Bicycle services	4224	Low
Total	654 920	

Direct economic effects: jobs

- Job intensity in cycling economy

	Bicycle	Other transport mode
Sales (bikes and accessories)	5.42 – 8.13	Motor vehicles: 1.92
Manufacturing	4.89	Car: 1.63 Ships and boats: 4.07 Air and spacecraft: 3.9
Repair	5.23	Motor vehicles: 7.59
Infrastructure	Cycle-specific: 7.33	General: 5.73

- Job quality: opportunities for relatively low-skilled workforce

Direct economic effects: jobs

- A few references

Job creation potential of cycling. TML study for ECF, 2014. (Ref1 – Ref2)

The British cycling economy – 'Gross cycling product' report. London School of Economics, 2011.

Direct economic effect: bike sharing

- Economic impacts
  - Predominantly commuting function
  - Benefits
    - Health
    - Increased transport choice and convenience
    - Reduced travel times and costs
    - No evidence of effects on congestion, reduced emissions or reduced pollution
  - Benefits unequally distributed, mainly to males, younger, more advantaged socio-economic positions
  - Challenges:
    - Network balancing
    - Maintenance costs
    - Financial profitability of model

Direct economic effect: bike sharing

- Conclusion
  - Bike sharing can be beneficial but there is a need to develop complementary pro-cycling policy and support to sustainable urban mobility
  - Limited effects if motivation is political visibility without complementary policy approach

Bike sharing: A review of evidence on impacts and processes of implementation and operation, by Miriam Ricci

Current topics: e-bike sharing

- Case-study Madrid
  - System is developed such that bikes are automatically recharged at stations
    - No need to carry battery
  - Successful in number of active users and in number of uses

Number of active users (end 2015)	Number of uses (all 2015)	Average number of bicycle uses/day (all 2015)
40 000	+ 3 million	4.15 Peak > 10 in summer period

Current topics: e-bike sharing

- Case-study Madrid
  - But other operational problems
    - Uneven distribution of bicycles over stations
      - Mainly reflecting daily travel patterns of commuters
      - Insufficient redistribution of bicycles or inaccurate redistribution strategies
    - Inaccurate real-time information, failures of electronic devices at charging stations, complex registration process, etc.
      - Have led to financial penalties for (private) operator of bike sharing system
  - Operational and maintenance cost underestimated
    - Leading to financial difficulties for bike system operator

Current topics: e-bike sharing

- Potential in Brussels
  - Survey shows that e-bike would also be well-received by (potential) users of bike sharing system in Brussels
    - 60% of potential users would likely use them
    - At cost of 50€ per year
      - Compared to current cost of 30€ per year
  - Study report for Brussels region will (maybe) be available soon at following website

http://www.tmleuven.be/project/fietsdeelsysteem/home.htm

Current topics: Bicycle commuting

- Belgian study demonstrates that bike commuting potential doubles thanks to e-bike
  - Based on survey among 1700 respondents
  - Average distance for bicycle commuting doubles from 5km to 10km
- Other Belgian study shows that share of bicycle commuters is effectively increasing
  - From 12% in 2011 to 18% in 2016
  - People also live closer to work, due to heavy congestion and related time losses

Commuting bicyclists: A growing transportation trend.

Global bike to work day: May 10

Current topics: bicycle commuting

- Many studies show that bike commuting is one of the best ways to stay healthy
  - Accumulate recommended level of physical activity through active transportation, rather than during leisure time (in fitness or related)
  - To curb weight gain, improve psychological wellbeing, improve worker productivity, etc.
- Companies more and more interested in measurement of worker wellbeing and link to productivity

Current topics: Bike data

- Increasing availability of bicycle tracks and bike data
  - Enabled by increasing use of GPS devices for cycling
    - http://insights.strava.com - http://metro.strava.com/
      - http://www.bicycling.com/rides/commuting/strava-insights-reveals-which-cities-have-most-hardcore-commuters
    - http://www.bikeprint.nl/
    - http://bikedataproject.com/
  - Alternative is collection using automatic bicycle counters at specific places
    - For instance: http://eco-public.com/ParcPublic/?id=4586
  - Or via classic method of surveys

Current topics: Bike data

- Can lead to new insights and more targeted policies
  - Cycle data show routes of where cyclists actually drive in the city
  - Valuable to city planners and bike advocates to determine where to primarily focus infrastructure efforts
  - Valuable to new cyclists on identifying safer routes

Use of strava data for city planners and bike commuters

Current topics: cycle tourism

- Cycle tourism is responsible for 3% – 6% of overall tourism activity in EU countries
  - Important economic activity and important (potential) source of income for cities and regions
  - Depending on breath of definition of 'cycle tourism'
  - Depending on country attractiveness
    - Main outbound markets are Germany and UK
    - Main receiving countries are Austria, Denmark, Switzerland and France
  - But market is predominantly domestic and primarily about independent travel
- Increasing trend over time
  - Still growing in countries as Austria or France
  - Close to saturation in countries like Denmark, Netherlands, Switzerland or Germany

Current topics: cycle tourism

- User profile
  - 45 – 55 years on average
  - Gender: 60% male, 40% female
  - Group composition: 20% alone, 50% in pairs, 20% in small groups, 10% in large groups
  - Rather high income group

The European cycle route network: Eurovelo. Challenges and opportunities for sustainable tourism. 2012.

THANK YOU!

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