

Cycling for Everyone:

Lessons from the Netherlands, Denmark, and Germany

John Pucher and Ralph Buehler

Rutgers University

(<http://policy.rutgers.edu/faculty/pucher.html>)



Pucher and Buehler: Cycling for Everyone

Reasons for *everyone* to support cycling:

- **More daily physical activity and better personal health**
- **Reduced medical costs for everyone, directly and indirectly**
- **Improved traffic safety and more livable neighborhoods**
- **Better Environment: Reduced air, water, and ground pollution; less noise; less disruption of natural ecosystems**
- **Reduced Greenhouse Gases and global warming**
- **Improved accessibility and increased social and economic integration of all groups**
- **Reduced traffic congestion, parking needs, energy use**

Walking and Cycling: the *MOST* sustainable transport modes

- **MOST environmentally friendly:**
 - >Virtually no pollution at all
 - >Almost no nonrenewable resources used
- **MOST equitable:**
 - >Financially affordable by virtually everyone
 - >Physically possible by all but the severely disabled
- **MOST economical:**
 - >Minimal private and public costs
 - >Although they take more time, they provide exercise that reduces medical costs and greatly extends our healthy life expectancy

CYCLING IS DIVINE!!



How Catholic nuns get around in Muenster, Germany

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Lots of Potential for Increased Cycling in the USA: Short trips

Many daily trips in American urban areas are short enough to make by bike!

- 25% of all trips in U.S. metro areas were a mile or shorter in 2001**
- 40% of all trips were shorter than two miles**

Lots of Potential for Increased Cycling in the USA:

Almost EVERYONE *could* bike!

- **Cycling is possible at any age, except for very young and very old**
- **Women can cycle as well as men**
- **Cycling possible for wide range of skills and physical fitness**
- **Cycling affordable by everyone**

Cycling and walking can provide valuable physical activity for almost everyone

- **Both for daily, practical travel and for recreation**
- **Cheaper, easier, and more dependable than formal exercise routines that require trips to gym, home exercise equipment, organized sports events**
- **Can be integrated into daily lifestyle since cycling and walking can be used for purposeful travel and thus achieve practical objectives**
- **Urgent need to increase physical activity levels of Americans**

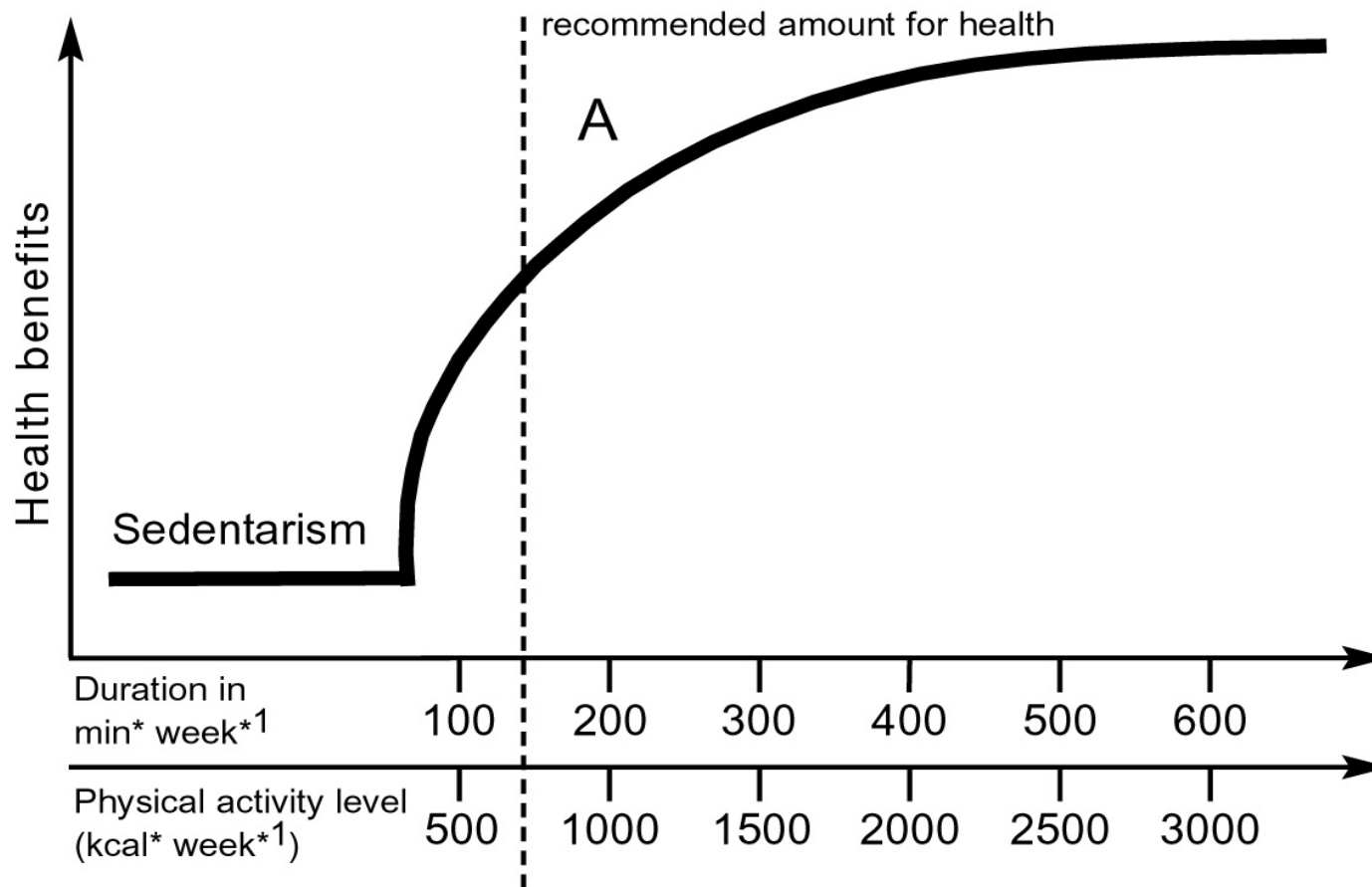
Crucial importance of regular physical exercise:

- Obviously, the daily physical exercise of walking and cycling for practical travel helps burn up calories and helps avoid the problems of overweight and obesity
- Moreover:

“Whether normal-weight, overweight, or obese, physically inactive persons are 2 to 3 times more likely to die prematurely.”

Journal of Am. Med. Assoc. (1999)

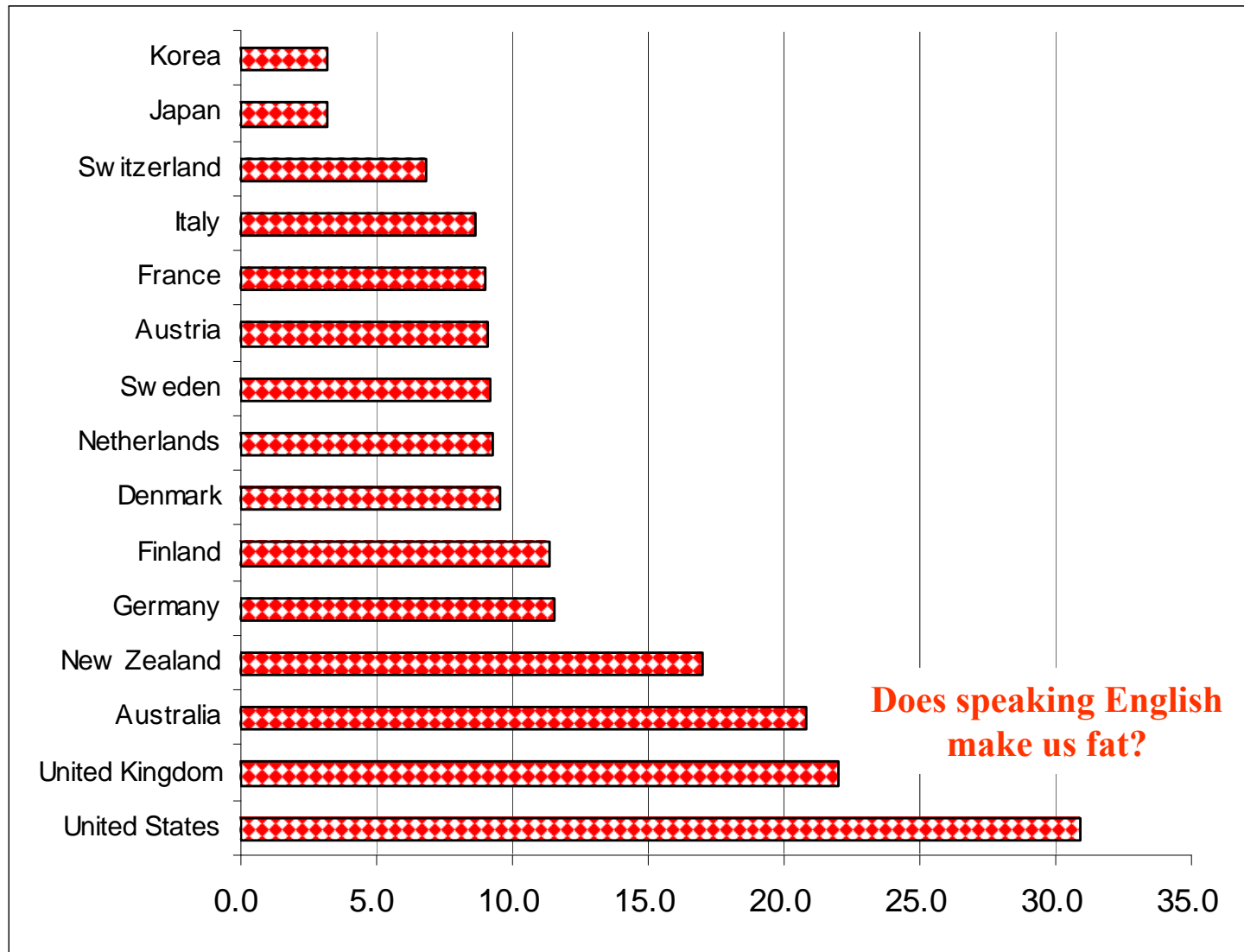
Huge Health Benefits of Even Small Increases in Physical Activity



Bouchard C. Physical activity and health: introduction to the dose-response symposium. *Medicine and Science in Sports and Exercise* 2001; 33: S347-350

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Obesity Rate by Country (Body Mass Index ≥ 30)



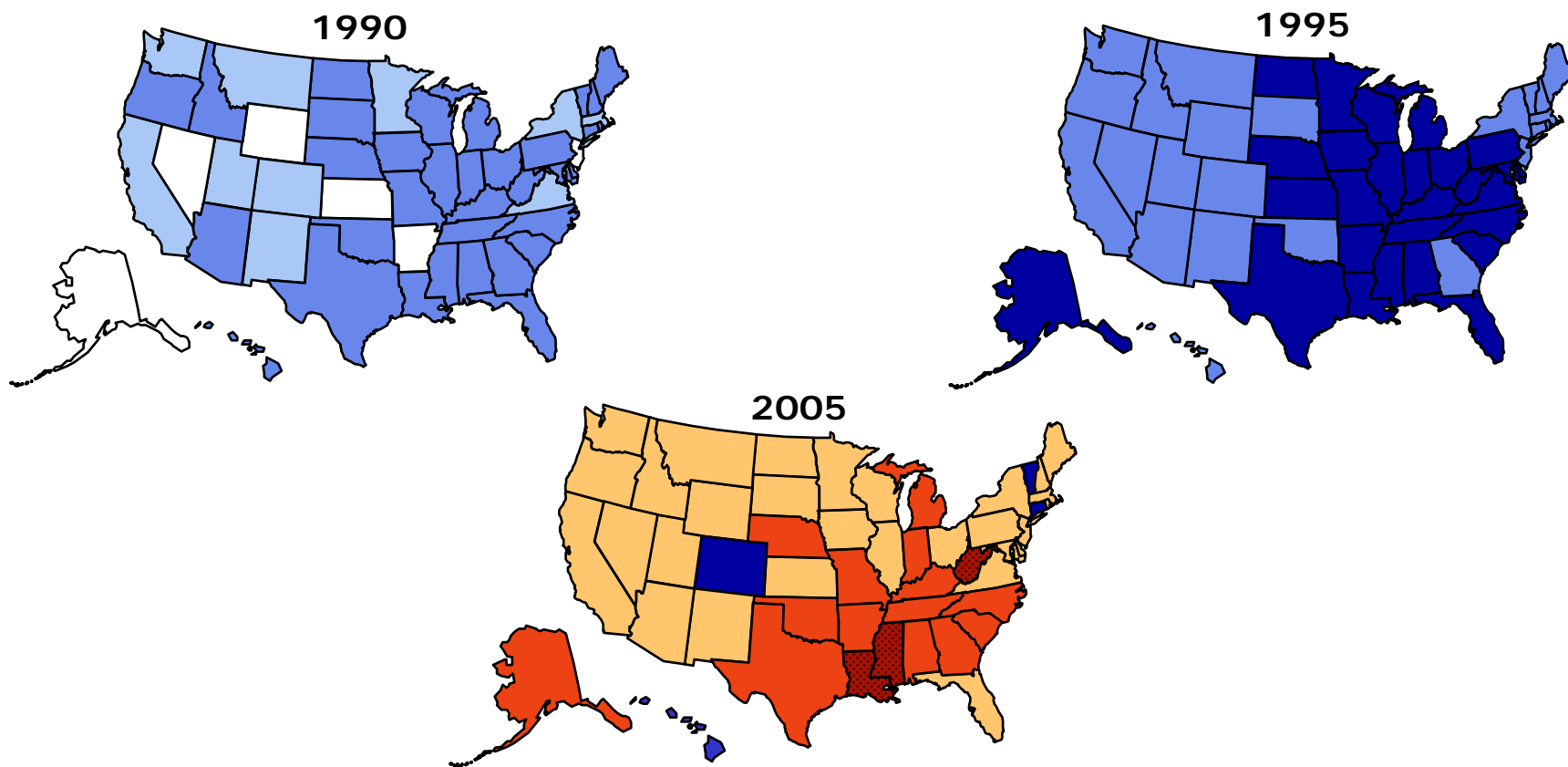
Sources: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; World Health Organization, International Obesity Task Force; Organization for Economic Cooperation and Development, Public Health Statistics.

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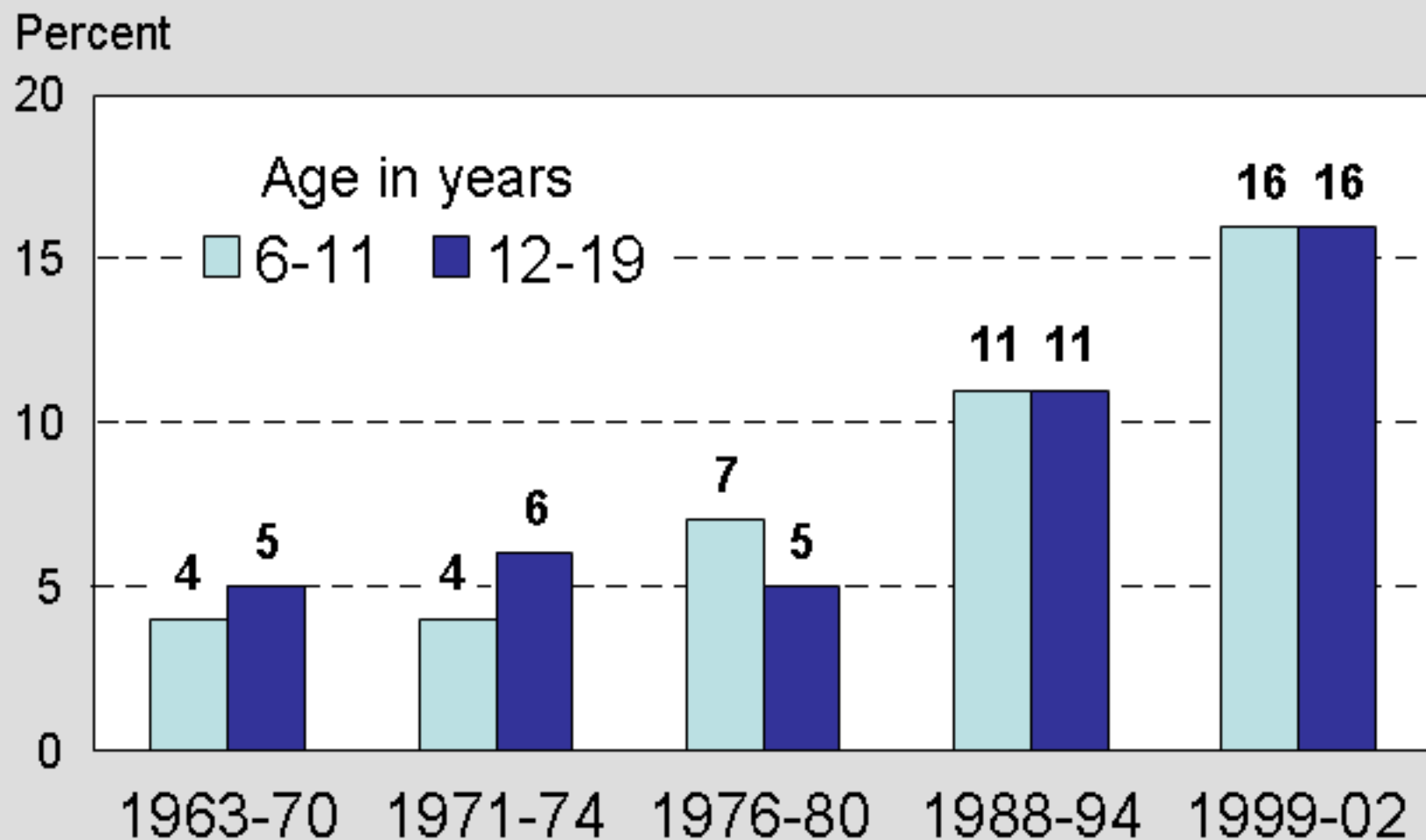
Obesity Trends* Among U.S. Adults

BRFSS, 1990, 1995, 2005

(*BMI ≥ 30 , or about 30 lbs overweight for 5'4" person)



Worsening Obesity Epidemic among American Children and Adolescents, 1963-2002 (% with body mass index of 30+)



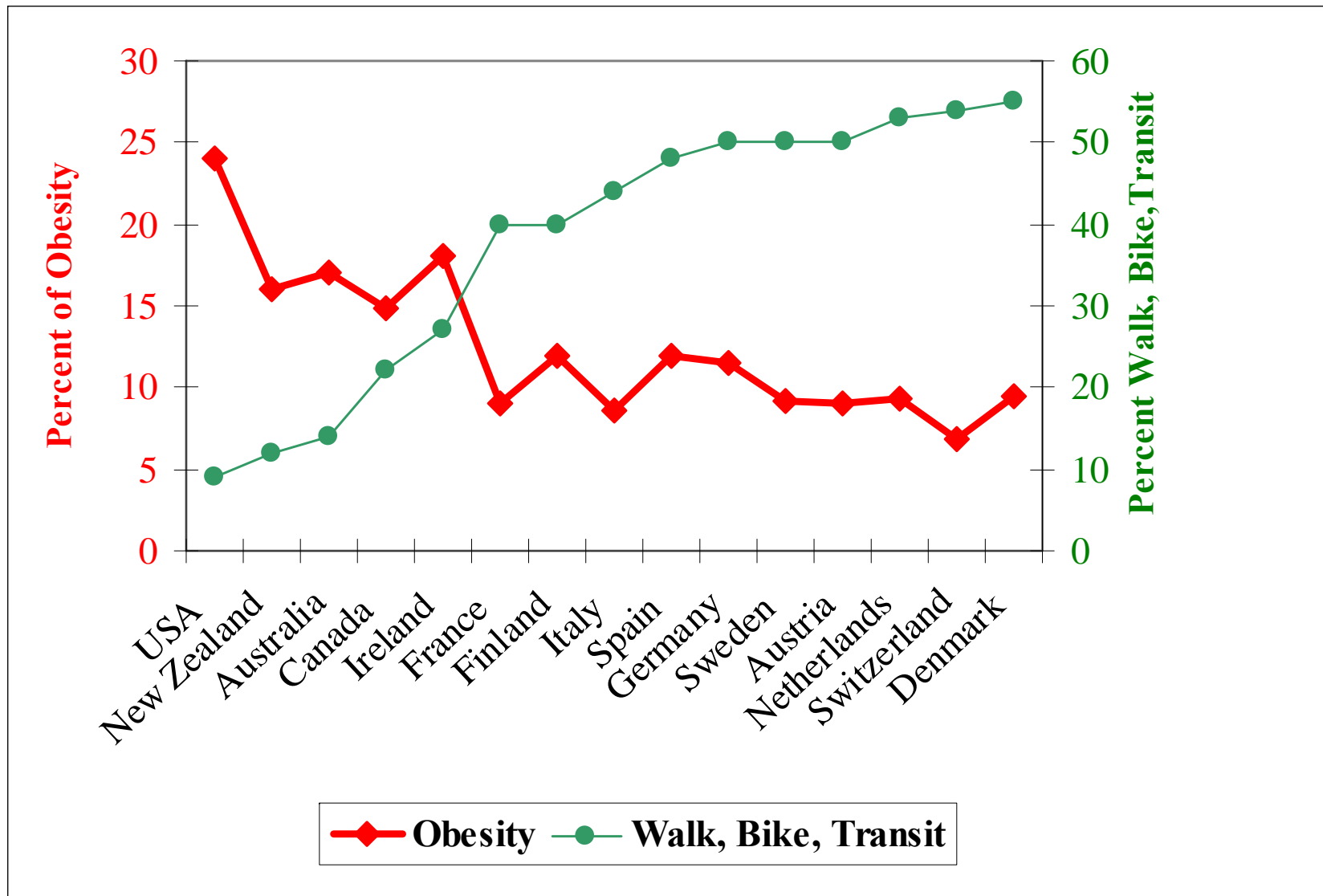
NOTE: Excludes pregnant women starting with 1971-74. Pregnancy status not available for 1963-65 and 1966-70. Data for 1963-65 are for children 6-11 years of age; data for 1966-70 are for adolescents 12-17 years of age, not 12-19 years.

SOURCE: CDC/NCHS, NHES and NHANES

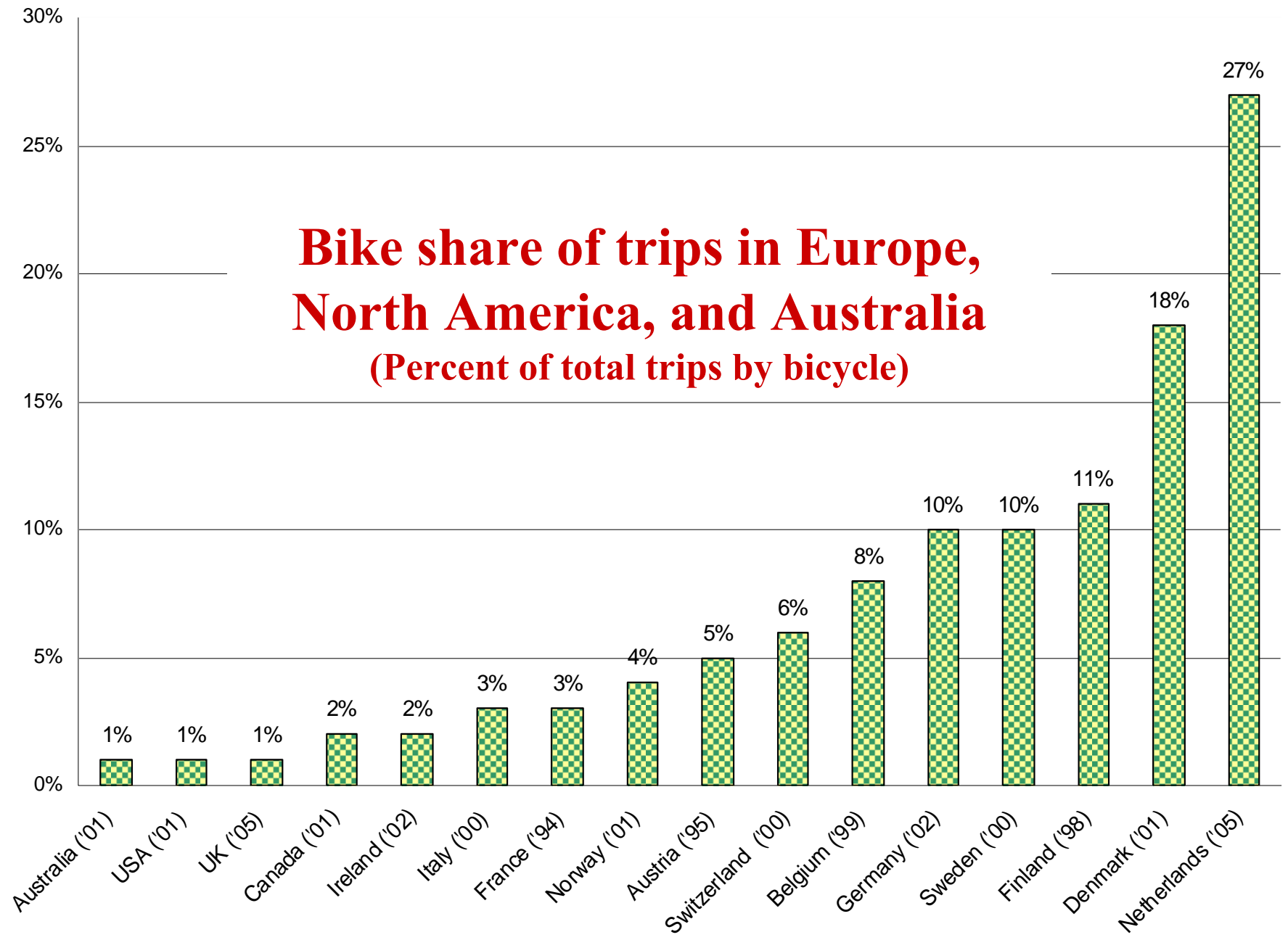
Trend in Obese Children vs. Rate of Biking and Walking to School



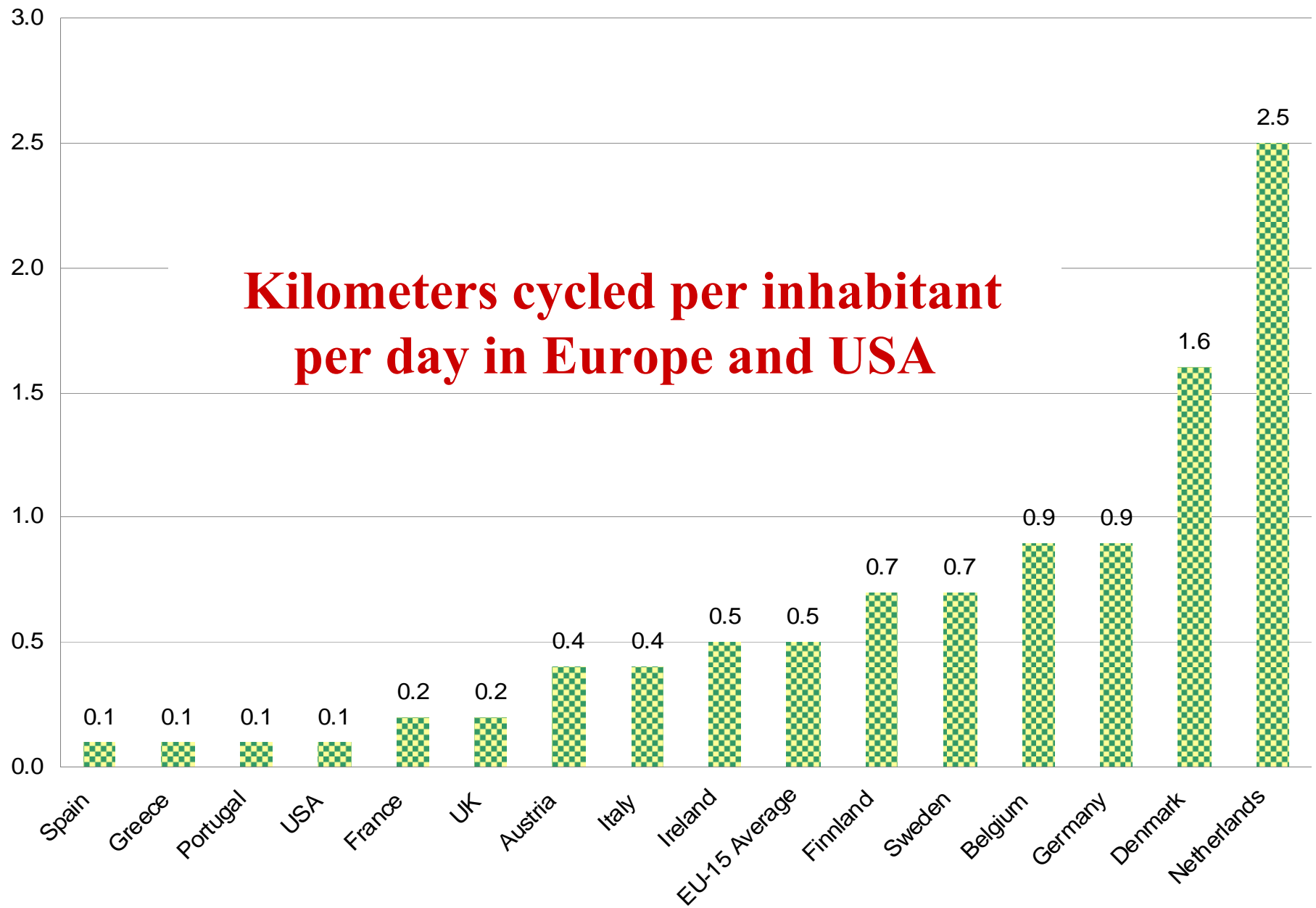
Does auto-dependency make us fat? Obesity falls sharply with increased walking, cycling, and transit use!



**Bike share of trips in Europe,
North America, and Australia
(Percent of total trips by bicycle)**

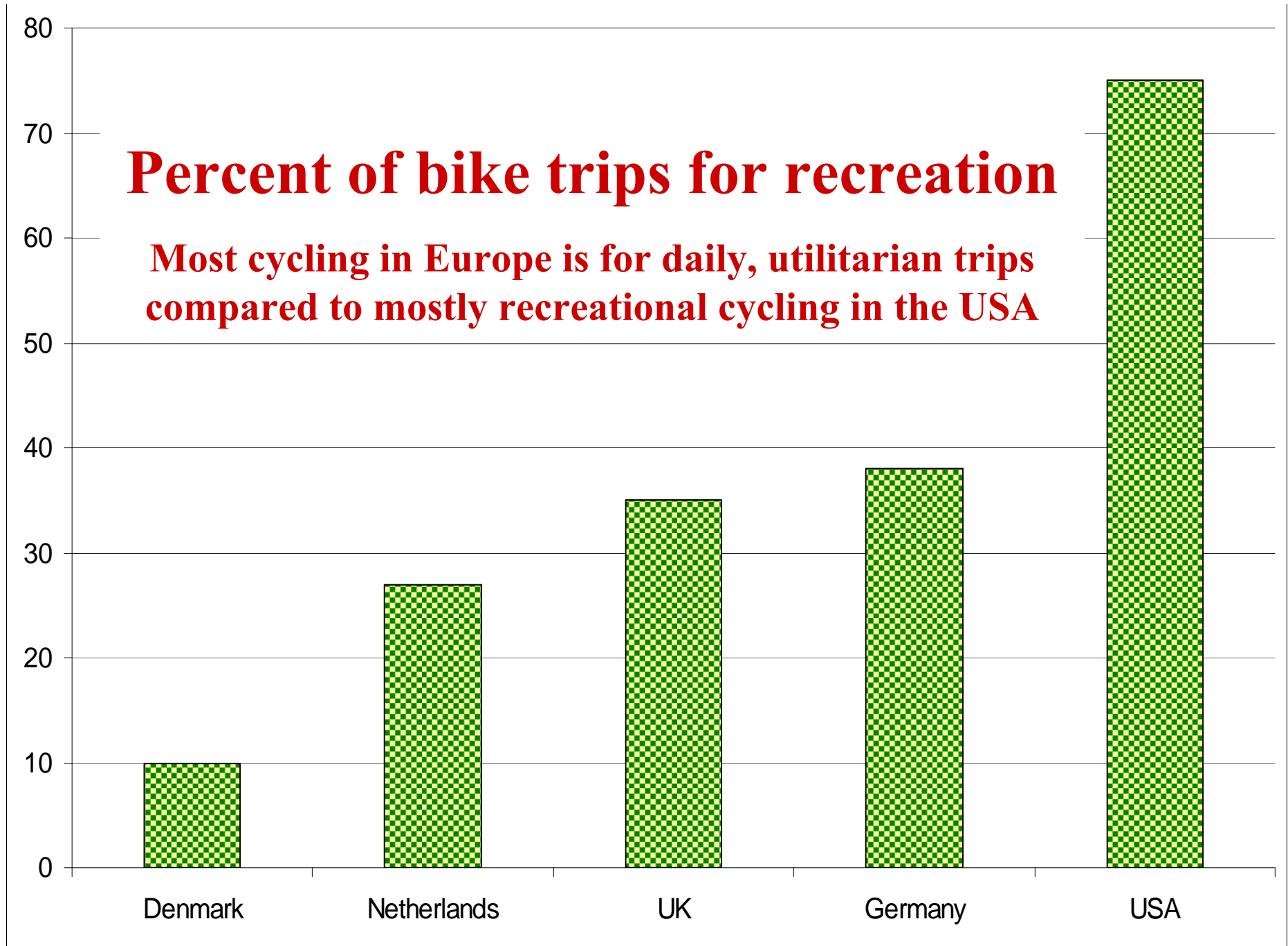


Kilometers cycled per inhabitant per day in Europe and USA



Percent of bike trips for recreation

Most cycling in Europe is for daily, utilitarian trips compared to mostly recreational cycling in the USA



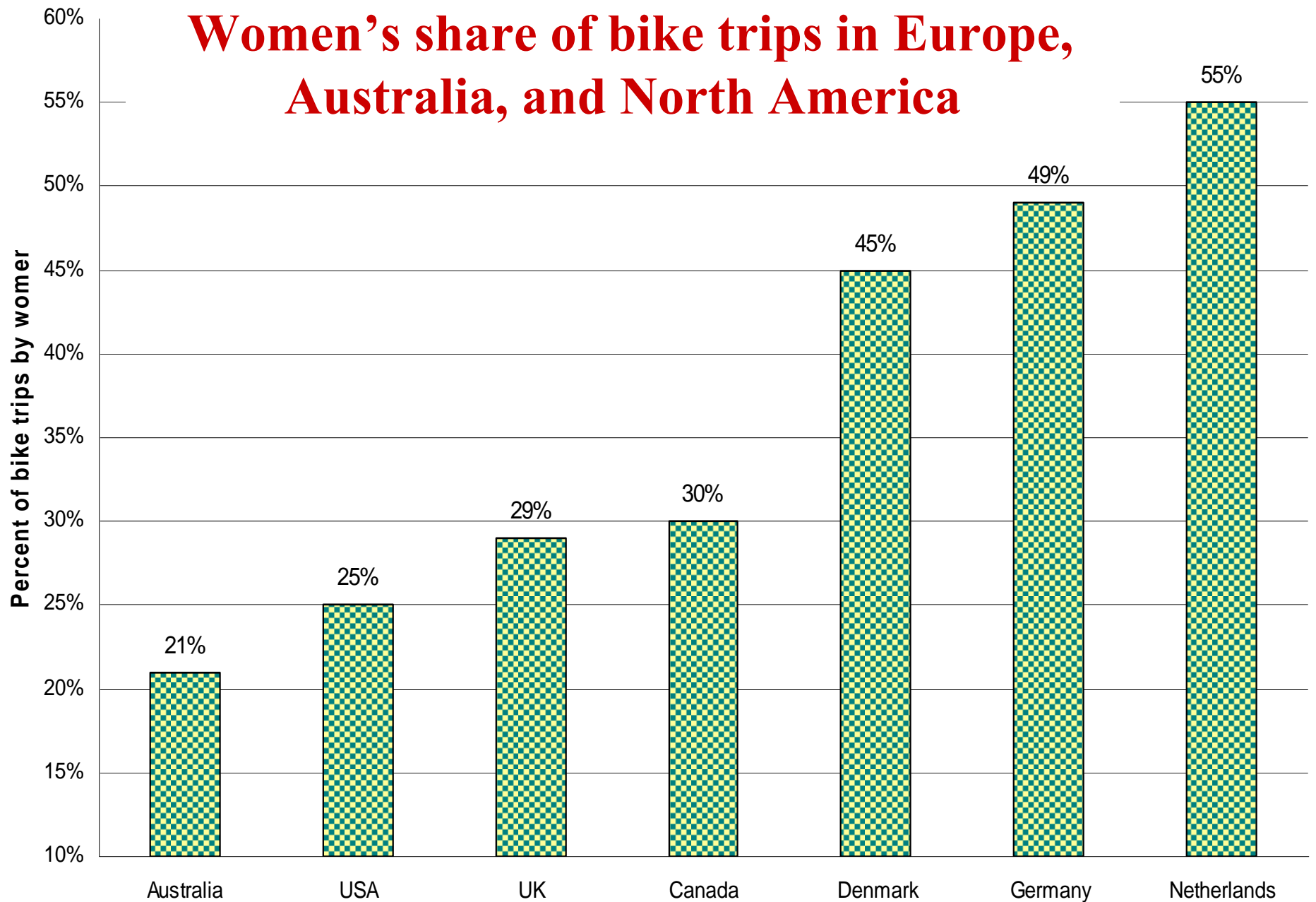


Lots of women
cycle in
Denmark!

Photo: Susan Handy

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Women's share of bike trips in Europe, Australia, and North America



Cycling can start at a very young age



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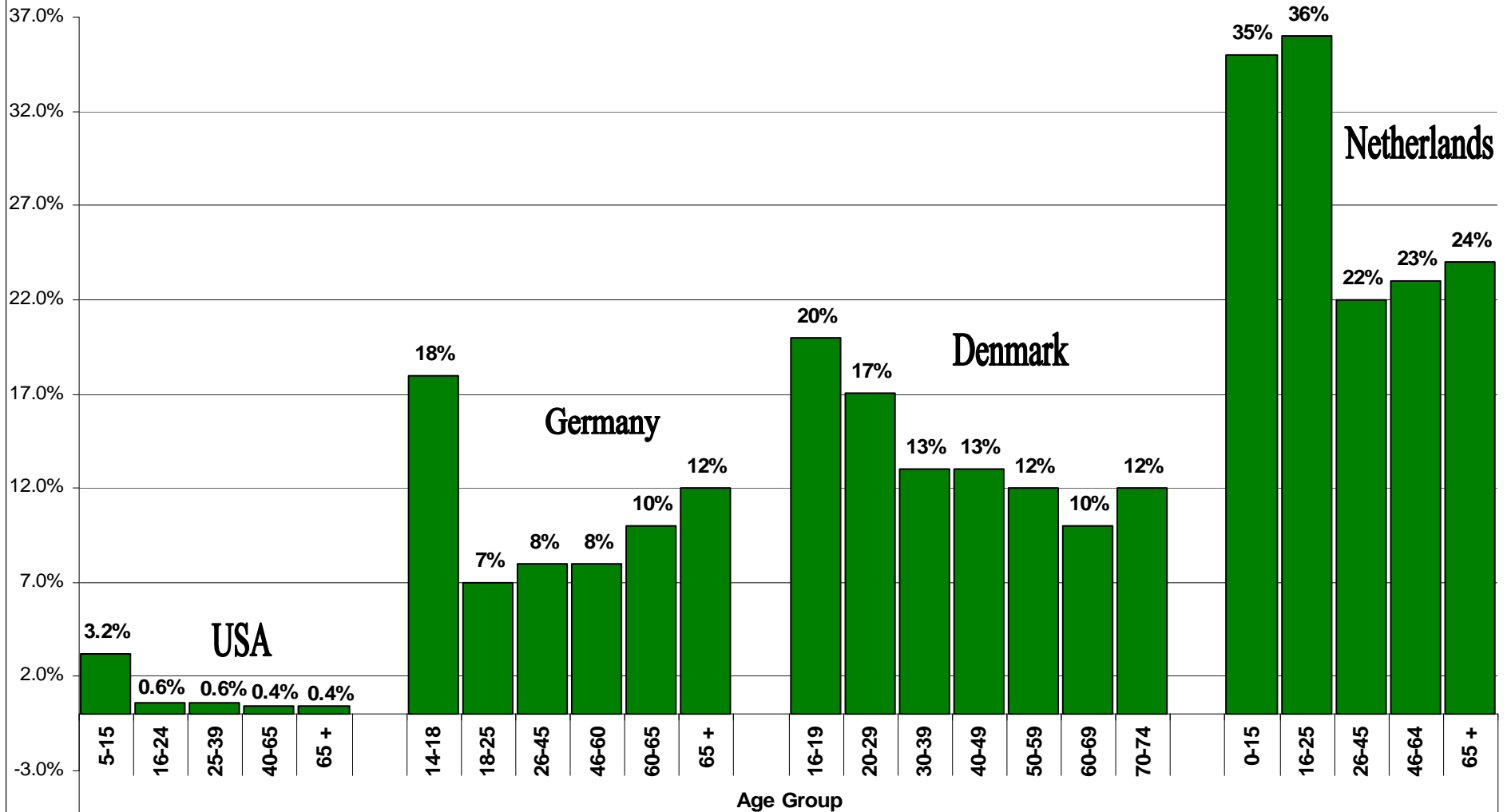


**And we
can
keep
cycling
all life
long!!!**



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Bike Share of Local Trips by Age Group in the USA, Germany, Denmark, and the Netherlands (2000-2002)



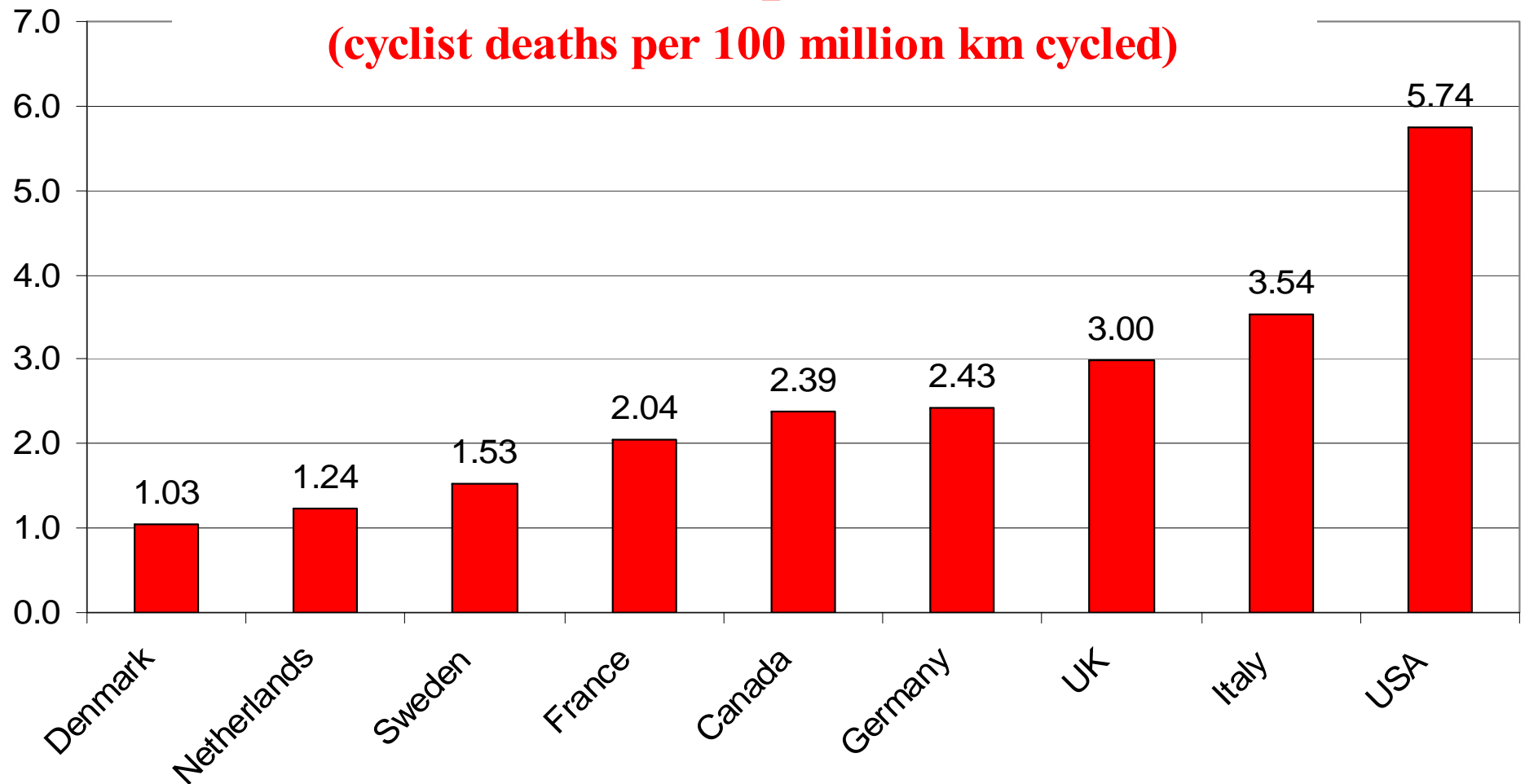
Sources: DIW (2003), U.S. Department of Transportation (2003), National Statistical Offices of Denmark and the Netherlands (2005)

Make Cycling Safe for Everyone !

- **Especially important for the young, the old, for anyone with disabilities, for the timid or risk-averse**
- **Women more sensitive to safety than men**
- **Safety of cycling in the Netherlands, Denmark, and Germany helps explain why everyone cycles there**

Cycling Fatality Rates in North America and Europe, 2002

(cyclist deaths per 100 million km cycled)



Source: Organisation for Economic Cooperation and Development (2005); European Union (2003); and U.S. Department of Transportation (2003 and 2005)



**The Dutch do
NOT wear
safety helmets,
yet have the
safest cycling
in the world!**

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Cycling Safety in Muenster, Germany

- Population of 265,000
- 135 million bike trips per year (370,000 per day)
- Bike share of total trips: 35%
- Most complete and most separate bicycling facilities of any German city*
- Only 222 cyclist injuries per year:

**ONE CYCLING INJURY PER
608,000 BIKE TRIPS!**

SAFETY IN NUMBERS

- *As levels of cycling and walking increase, injury and fatality rates per trip and per km traveled fall dramatically*
- **Fatality rates per trip and per km are much lower for countries and cities with high bicycling and walking shares of total travel, and fatality rates fall for any given country or city as cycling and walking levels rise**

Jacobsen, “Safety in Numbers,” *Injury Prevention*, 2003, 9: 205-209

Fate of Cycling

Determined by Public Policies

- **Pro-car policies in European cities in 1950s and 1960s caused huge decline in cycling**
- **Dramatic policy turn-around since 1970s to limit car use and promote cycling, walking, and public transport in Dutch, Danish, and German cities**
- **Cycling levels rose sharply, doubling or tripling in some cities (such as Munich, Cologne, and Berlin)**
- **WHAT did these cities do to increase cycling?**

German Cycling Boom Engineered by Explicit Shifts in Transport Policy in 1970s

City	Time Period	Change in Bicycle Modal Split Share	Percentage Increase in Bicycle Share
Munich	1976 to 1996	6% to 13%	+117%
Nuremberg	1976 to 2001	4% to 9%	+125%
Cologne	1976 to 1998	6% to 12%	+100%
Freiburg	1976 to 1998	12% to 19%	+58%
Stuttgart	1976 to 2000	2% to 6%	+200%
Bremen	1976 to 1997	16% to 21%	+31%
Muenster	1976 to 2001	29% to 35%	+21%
Average for all urban areas in Western Germany	1972 to 2002	8% to 10%	+25%

Sources: Broeg and Erl, *Mobilitaet und Verkehrsmittelwahl*. Muenchen: Socialdata, 2003; Deutsches Institut fuer Wirtschaftswissenschaften, *Mobilitaet in Deutschland*, 2002. Berlin: Bundesministerium fuer Verkehr, 2004. Fucher and Buehler. Cycling for Everyone

How to Increase Cycling by Broadening its Appeal to all Groups

- **Better cycling facilities (incl. bike-friendly roads!)**
- **Integration of bike with public transport**
- **Traffic calming of residential neighborhoods**
- **Mixed-use zoning and improved urban design**
- **Restrictions on motor vehicle use**
- **Traffic education**
- **Traffic regulations and enforcement**



**Extensive
car-free
districts
ideal for
walking
and cycling**

Bikes and buses take up much less space than cars!!



Demonstration on main street of Muenster how much space cars take compared to buses or bikes to transport the same number of people

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Peaceful co-existence of trams, bicyclists, and pedestrians in Freiburg's center



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Car-free intermodal harmony in Amsterdam



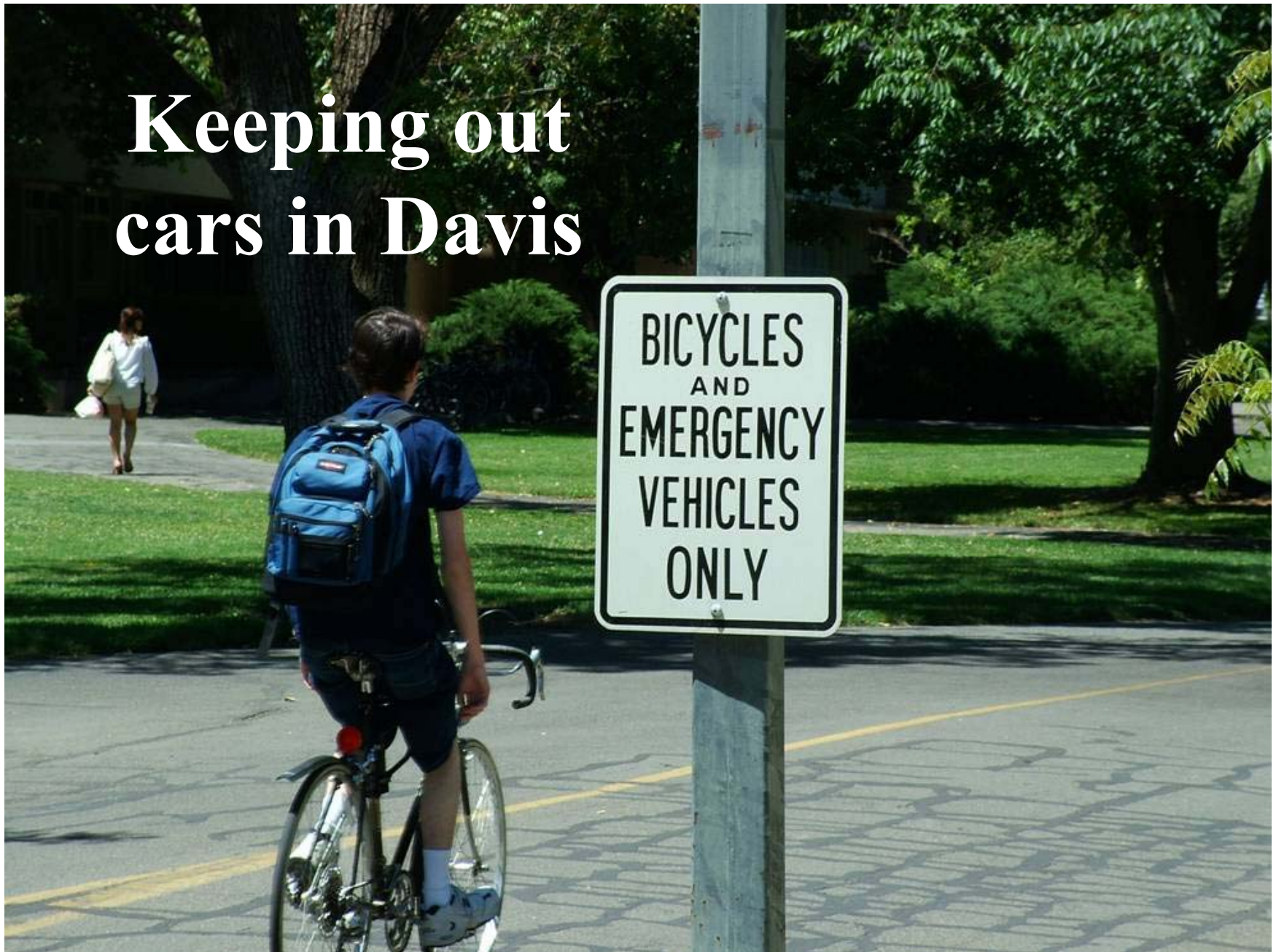
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Car-free zones in the USA: Davis, California



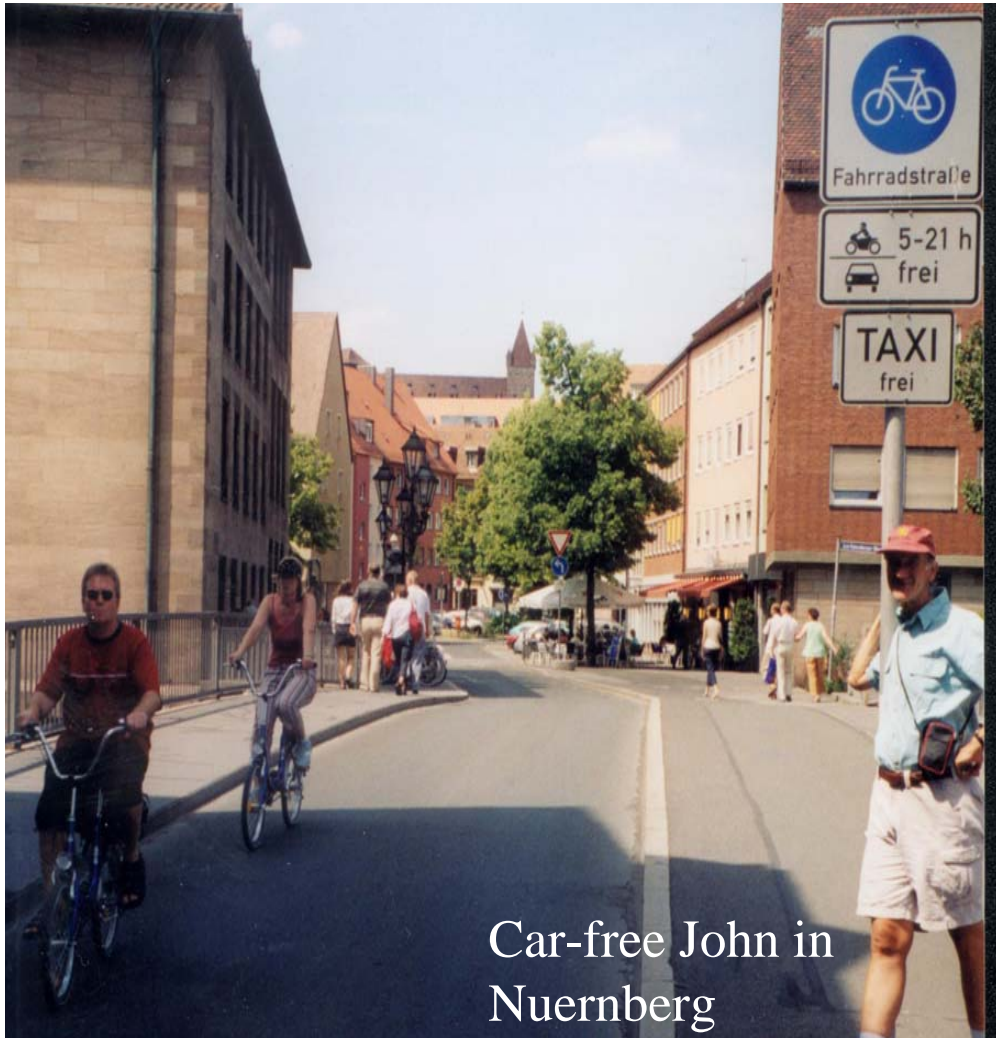
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Keeping out cars in Davis



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Fahrradstrassen in Germany, bicycle streets where cyclists have absolute priority over cars for entire width of roadway



Car-free John in
Nuernberg



Muenster

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Bicycling facilities in Berlin, Germany's capital and largest city

- **860 km of completely separate bike paths**
- **60 km of bike lanes on streets**
- **70 km of combined bike/bus lanes on streets**
- **100 km of combined pedestrian/bike paths**
- **3,800 km of city streets (72%) are traffic calmed, with speed limit of 30km/hr or less, and thus ideal for cycling on street, without any special lanes or paths**



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**Muenster
offers 280 km
of separate
bike lanes
and paths,
and shared
bus-bike
lanes**



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**Two-way bike path
in middle of
pedestrian zone in
Amsterdam**



**Bike lanes and paths in
Amsterdam designed to reduce
traffic conflicts with other modes**



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Bicycle expressway-beltway in Muenster, Germany



This 6 km beltway encircles central city and connects 16 major bike paths radiating outward toward the suburbs and 26 bike paths and lanes leading to Cathedral Square.

Note exclusive cycle path in middle and completely separate pedestrian walkways on both sides



**Regular laser inspection
of bikeway surfaces for
preventive maintenance!**



**Bike lanes sprayed with salt
water and cleared before rest
of roadway!**

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**Special contraflow lanes in
Toronto and Melbourne
that permit cyclists to travel
in both directions**



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Relaxing traffic restrictions for cyclists by permitting bi-directional travel on one-way streets, turns, and thru-travel for bikes where prohibited for cars



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Foto by Peter Berkeley

Convenient bike cut-thru for cyclists in Melbourne

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Some Australian successes: Extensive ped-bike cut-throughs and dead-ends for cars in Newtown (Sydney)

(on Car-free John's daily route to University of Sydney)



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Bike path along major arterial in Davis



**House knocked down
to build cut-thru for
cyclists in Davis**



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Combined pedestrian/bike paths in Muenster



*Cyclists and pedestrians
can peacefully and safely
use the same paths!*





Short-cut for cyclists between two adjacent streets to avoid round-about route that would involve crossing street and making two left turns

“Cut-thru” short cut for cyclists in residential area



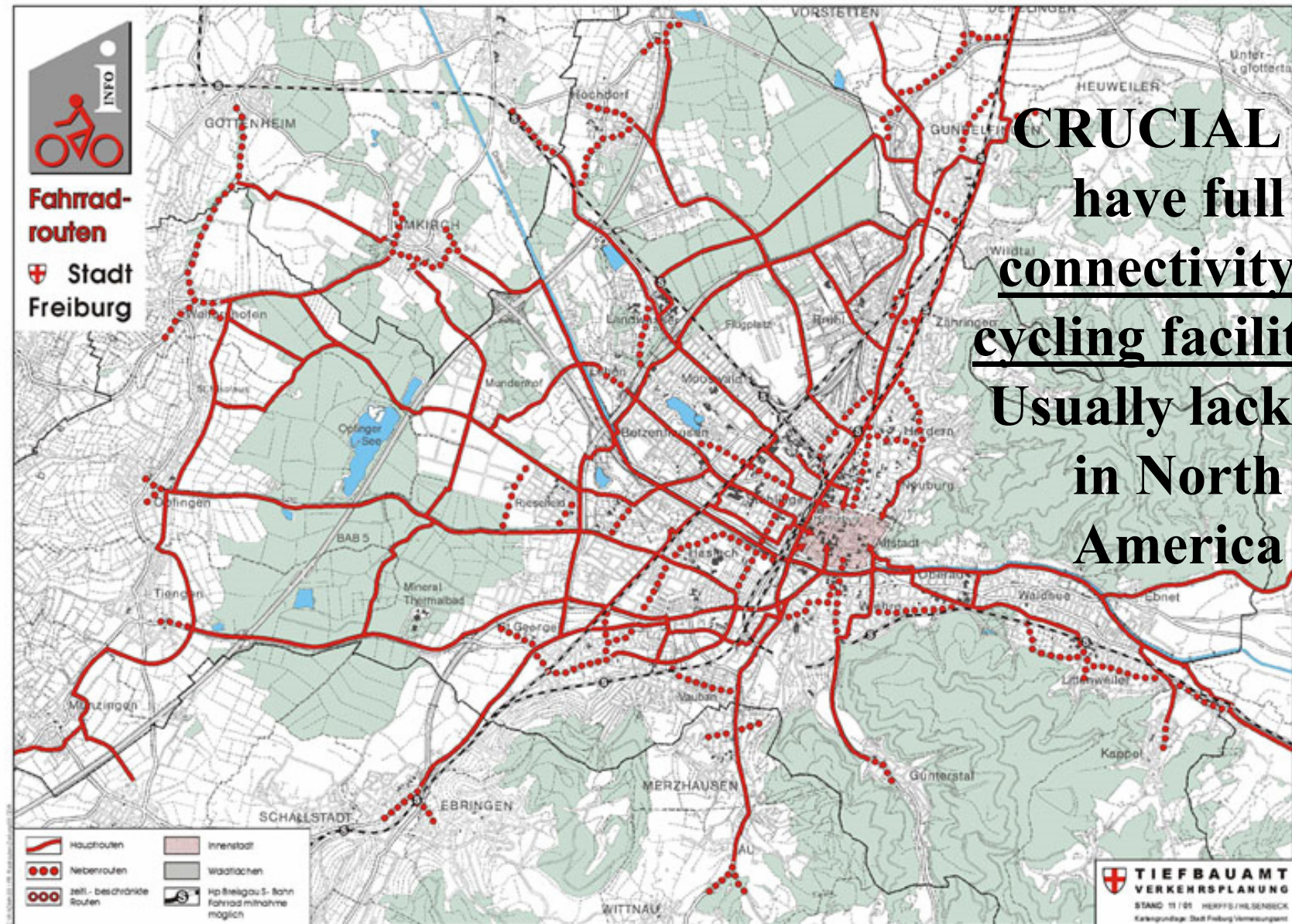
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Bikeable European suburbs

Most new suburban developments in Germany and the Netherlands have sidewalks and cycle paths

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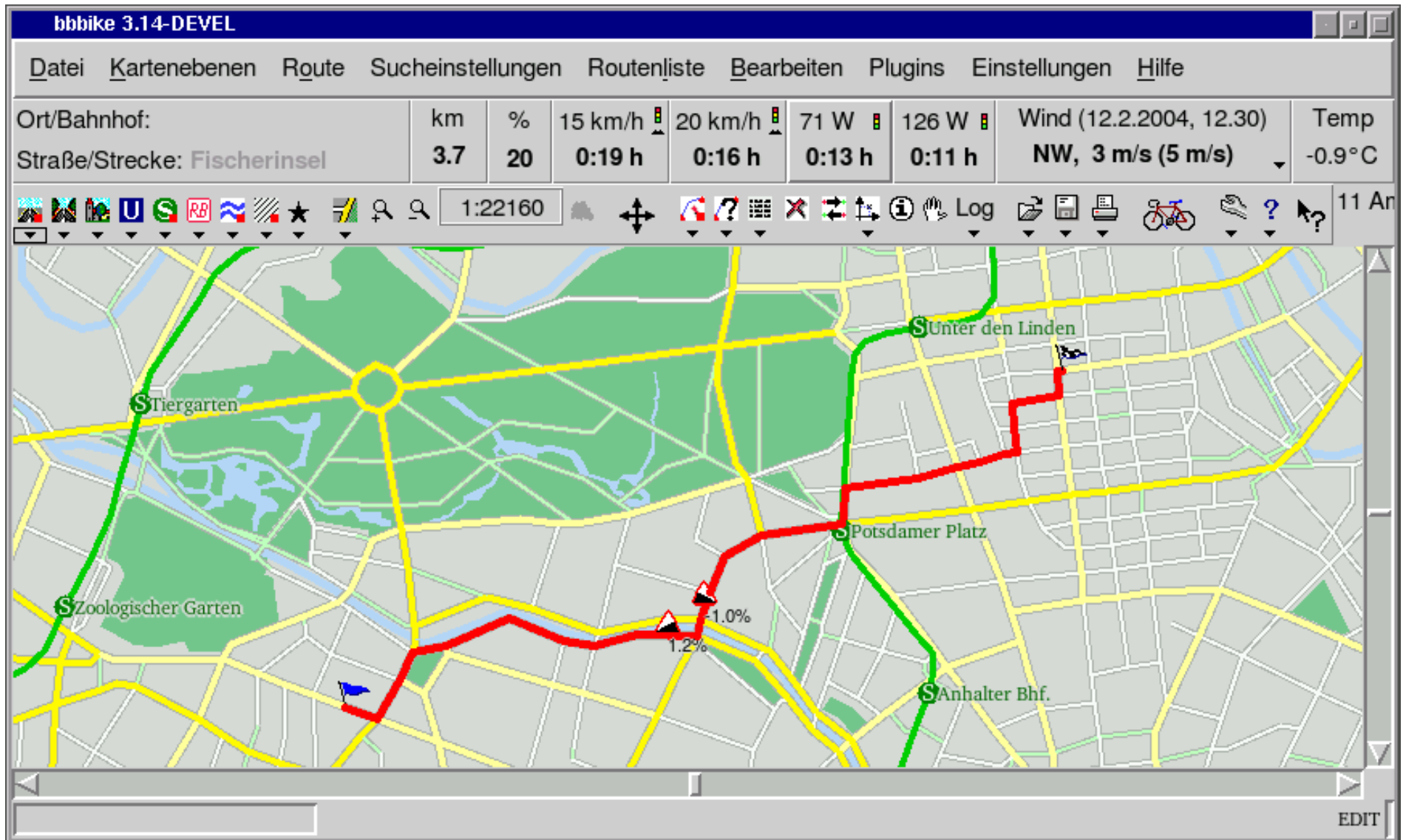
Extensive, fully-integrated bikeway network in Freiburg, Germany



Free internet bike trip planning in Berlin

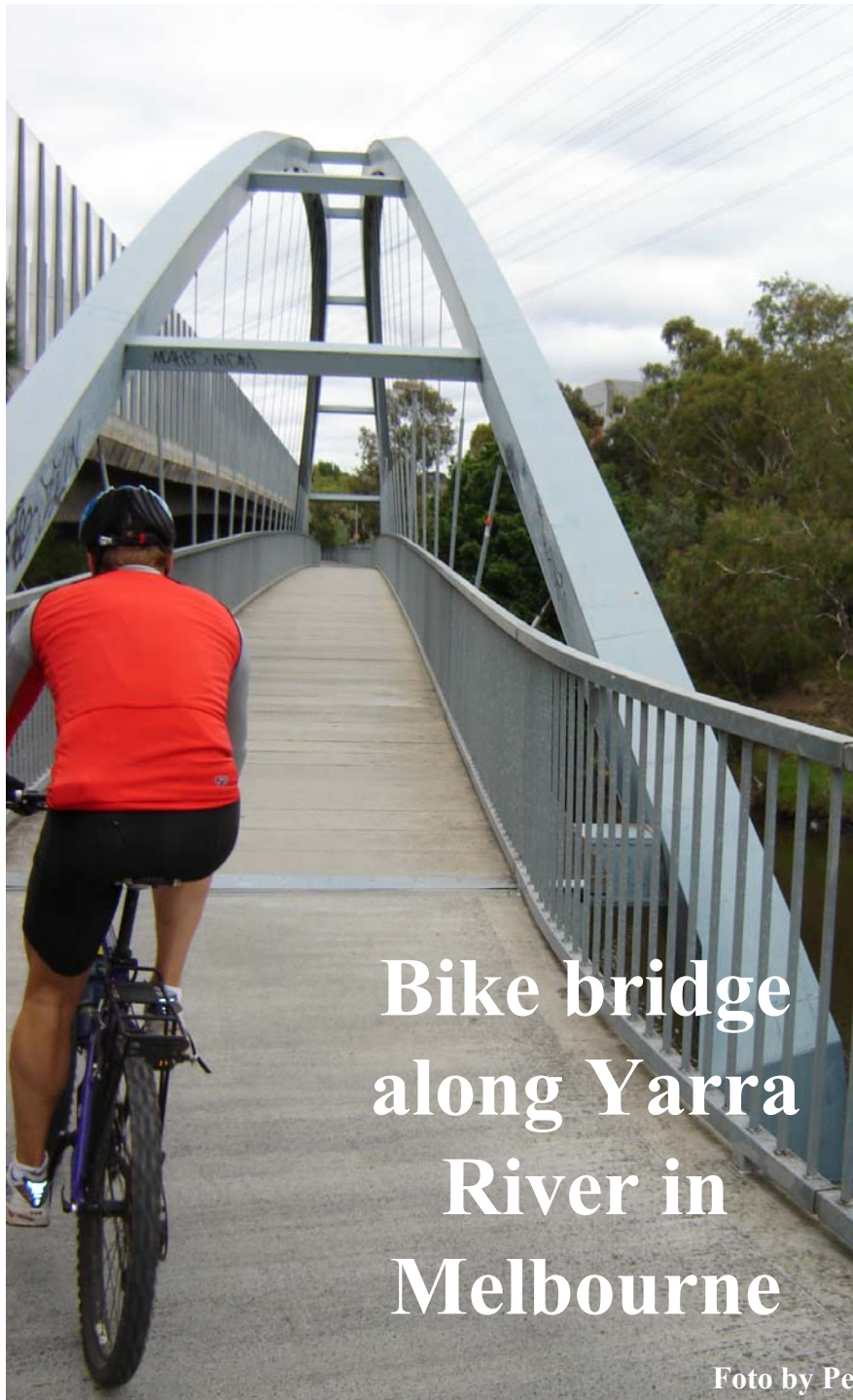
- **Cyclists enter origin, intermediate stops and final destination of their intended bike trips**
- **Cyclists can indicate preferences for route speeds, whether main streets or side roads, type of pavement, whether on separate bikeways, light or heavy traffic, through parks, etc.**
- **Program determines optimal route, shows route on map, and provides exact directions, segment by segment**
- **For recommended route, program calculates the total trip length, total trip time, and number of traffic lights encountered**

Recommended route appears in red on computer screen, as shown below, along with trip details shown at top of screen



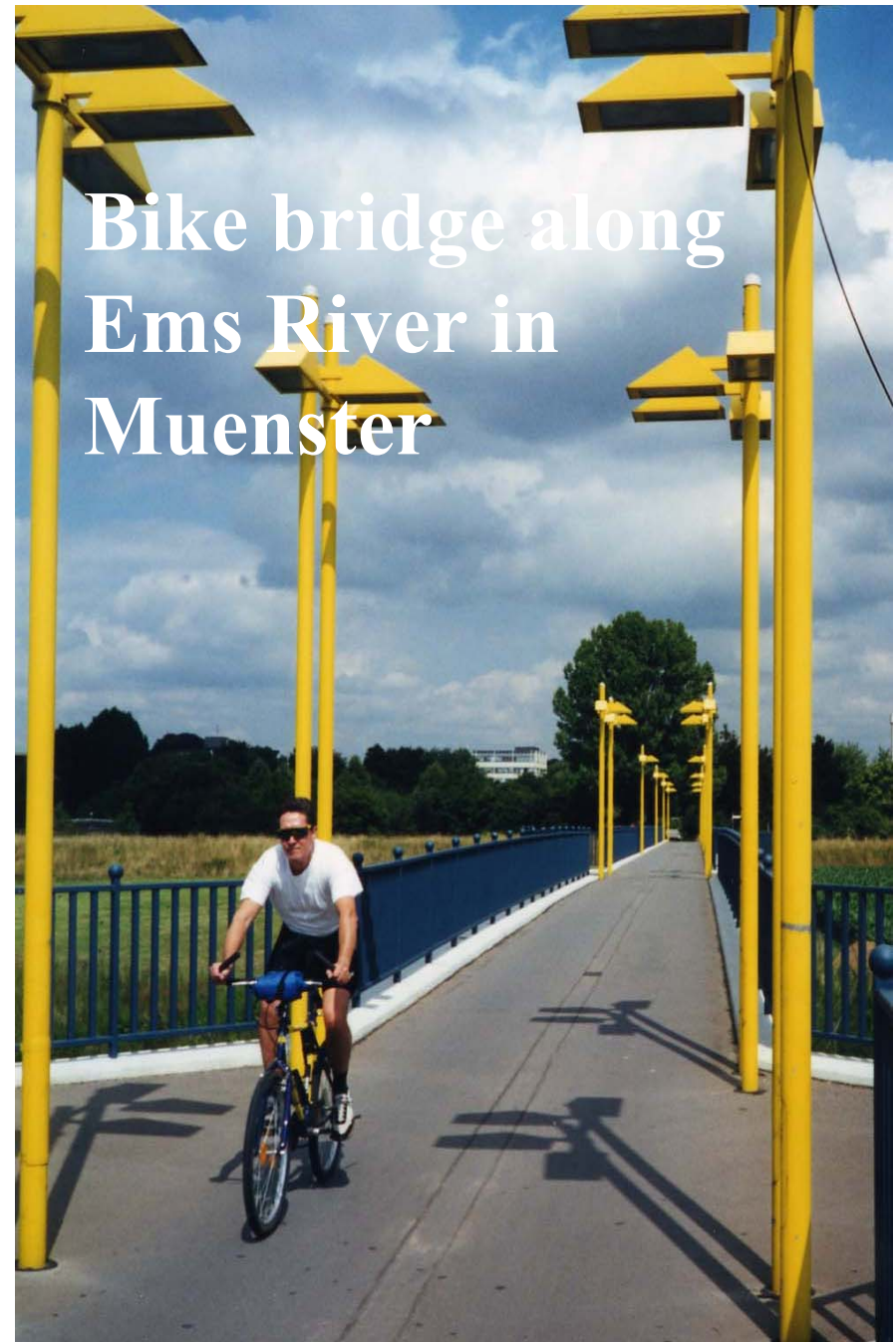
Bike Route Planning by Mobile Phone, with suggested route shown on LCD display





Bike bridge
along Yarra
River in
Melbourne

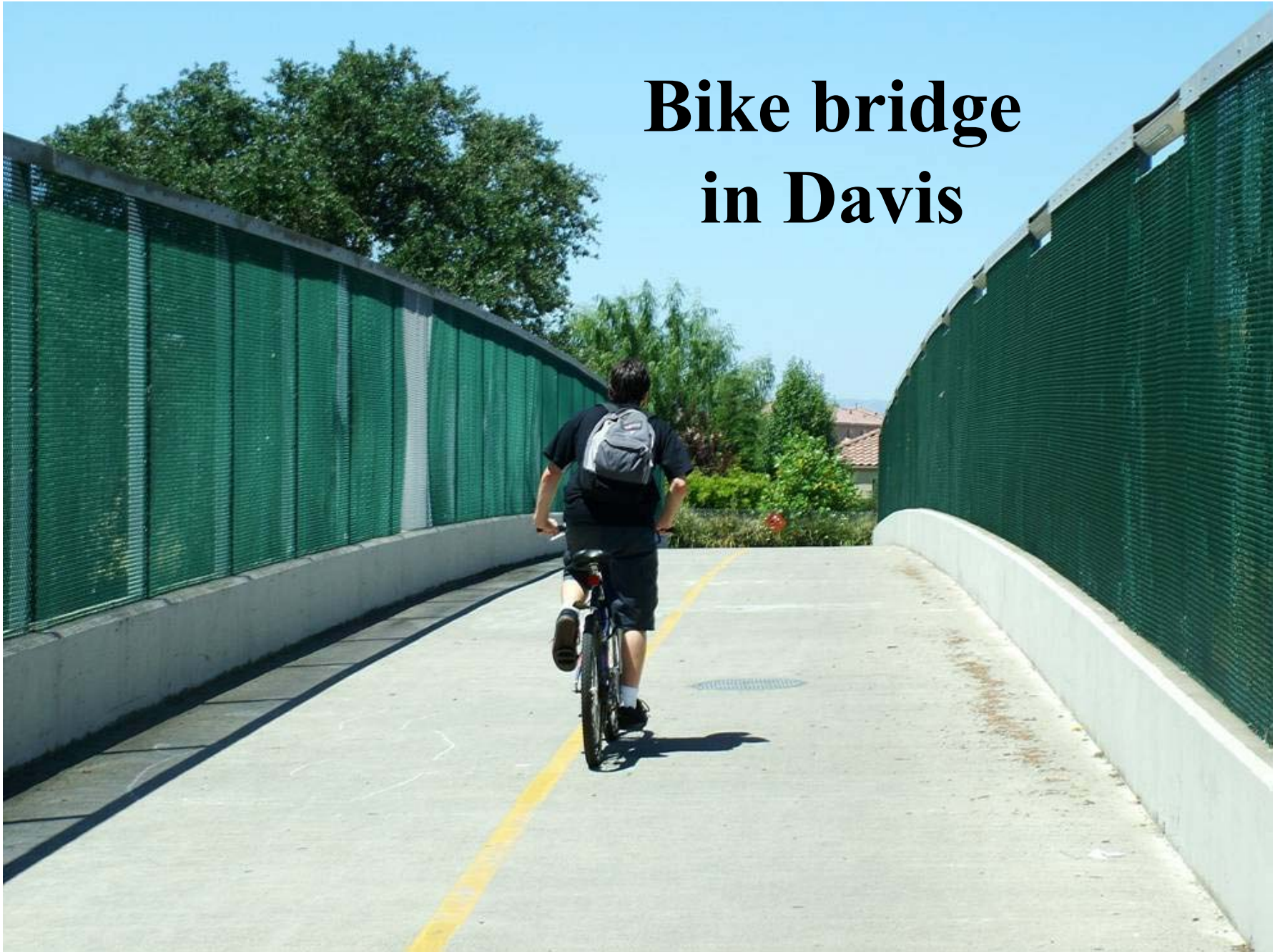
Foto by Pe



Bike bridge along
Ems River in
Muenster

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Bike bridge in Davis



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Bike lane in Davis with parallel off-street path



Lots of obstacles to bicycling



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Brisbane's floating bikeway



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Floating Bike Path in Portland, Oregon

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Special
traffic
signals
and signs
give
priority
to cyclists



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Bike lane, advance stop line, and priority signal for cyclists in Muenster



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Special bike lane to permit direct access to intersection



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Left-hand turn, in two stages, with special waiting space reserved for cyclists, and advance green light for cyclists



Highly visible red bike lanes for intersection crossings on all four sides

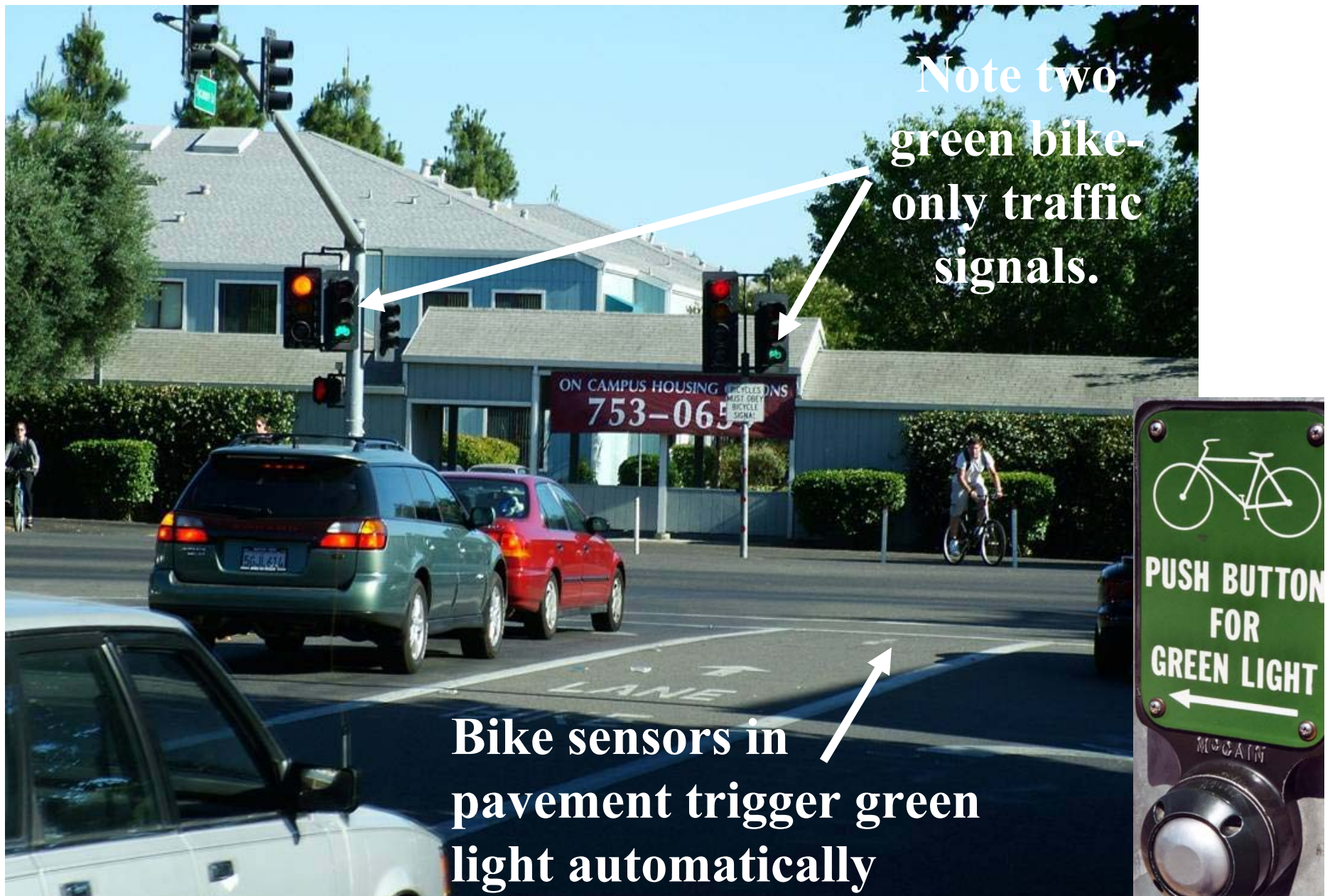


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Four-way all-green signal for cyclists in Portland



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Note two
green bike-
only traffic
signals.

Bike sensors in
pavement trigger green
light automatically

Bike lane approach to intersection in Davis



Denmark: Ubiquitous short-cuts for right-hand turns and full-speed ahead for cyclists at red lights at T-intersections

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Green wave
for cyclists in
Odense,
Denmark

Troels Andersen, "Cycling in Odense, Denmark"



Express
bikeways
for
commuters

Bike speed
indicators





Green wave for cyclists in Copenhagen, Denmark

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Innovative directional signs and bike trip counters in Denmark



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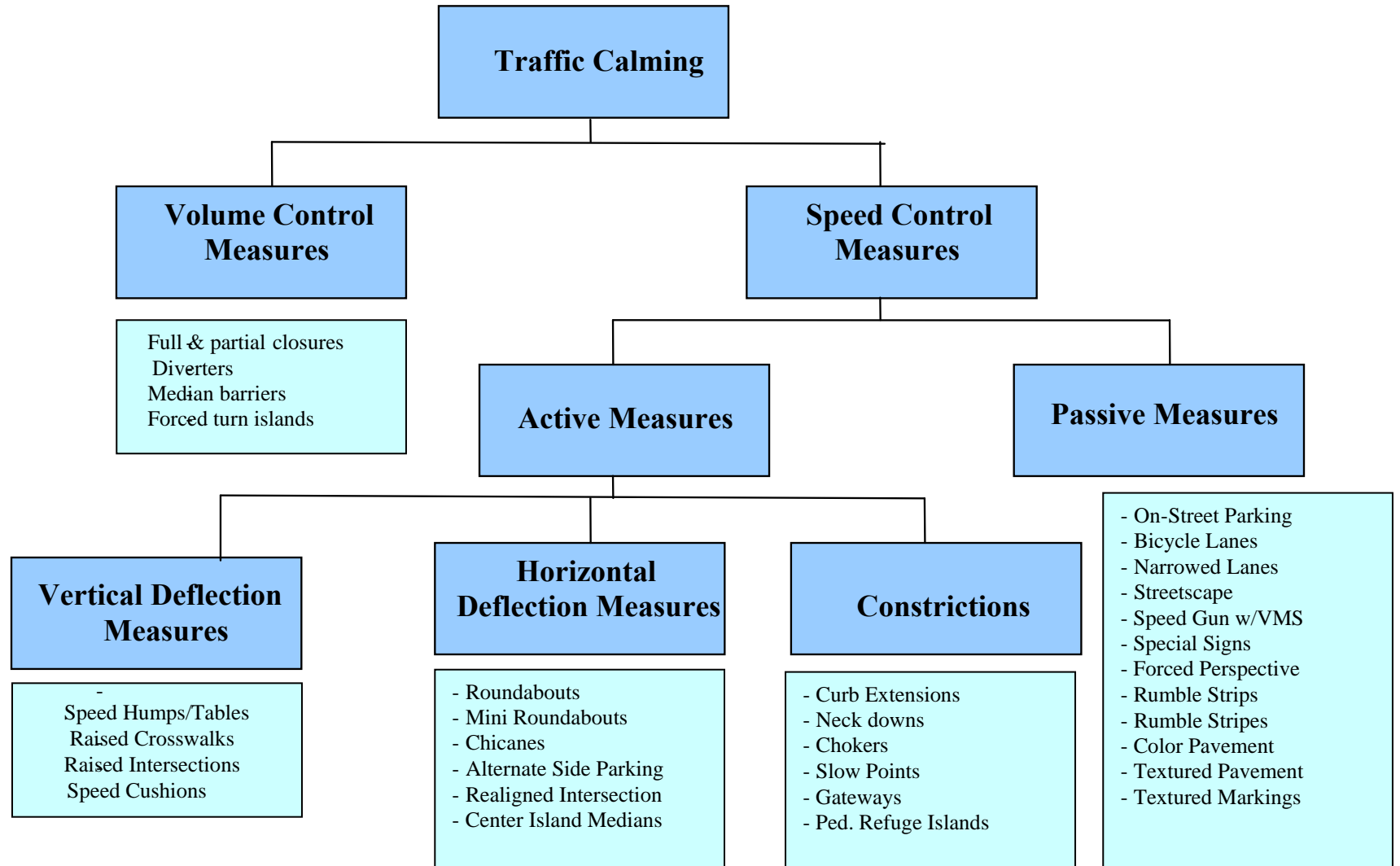
Convenient air pumps for bikes throughout Odense

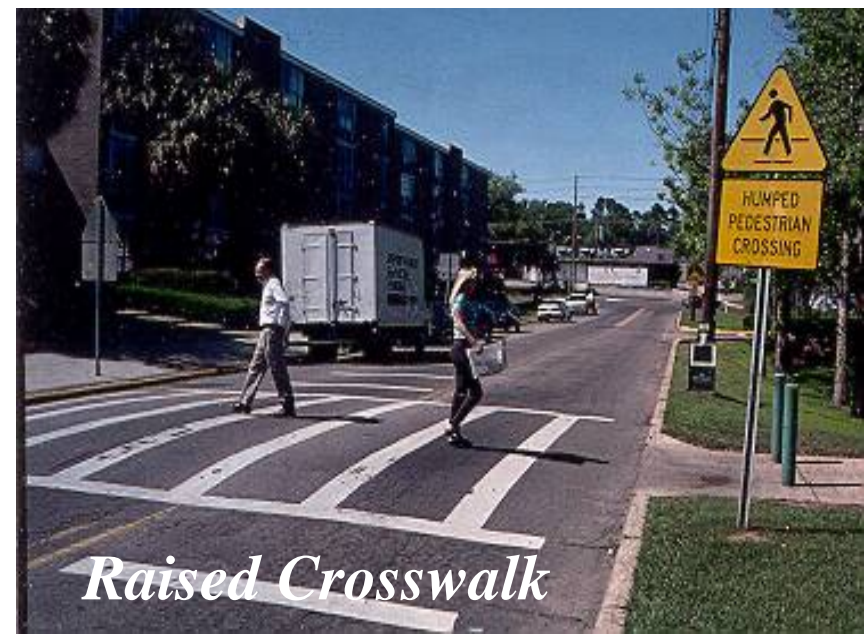
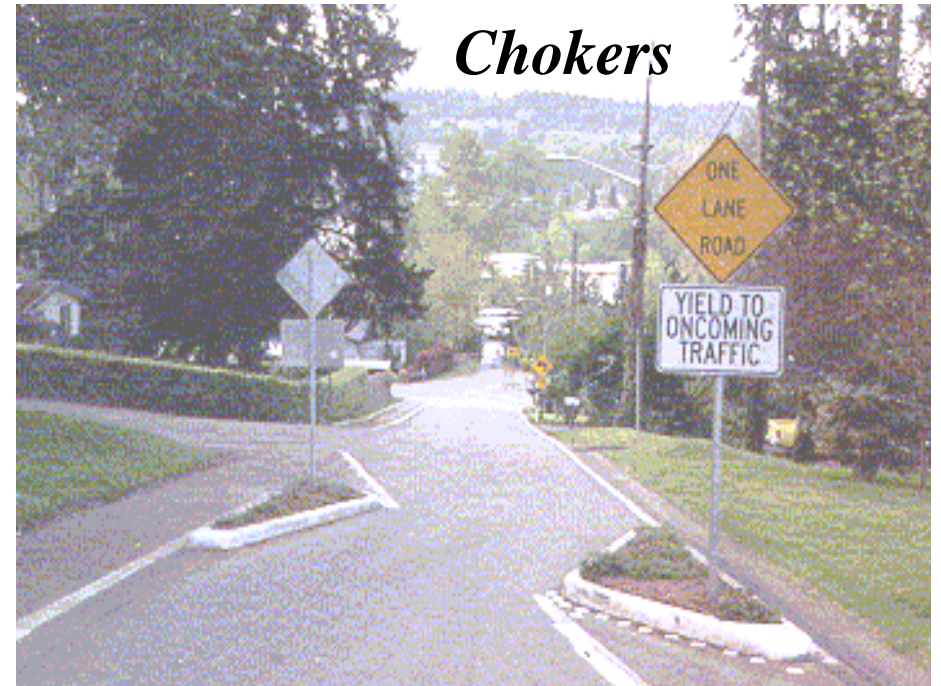
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Traffic Calming of Residential Neighborhoods

- **Speed limited *by law* to 30km per hour (19mph) or less**
- ***Physical measures* that force cars to slow down:**
 - Road narrowing, zigzag routing, chicanes
 - Raised intersections and crosswalks
 - Traffic circles
 - Speed humps and bumps
 - Mid-block closures and artificial dead-ends
 - Bulb-outs at intersections and crosswalks, with sidewalk widening

Traffic Calming Measures





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Curb Extension



Neckdown/Bulbout



Median Island



Chicanes

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**3,800 km of traffic-calmed streets in Berlin:
ideal for cycling**

Traffic Calming of Residential Neighborhoods

Improves safety and encourages more walking and cycling



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Traffic Calming of Residential Neighborhoods

Improves safety and encourages more walking and cycling



Pucher and Buehler: Cycling for Everyone

Traffic Calming of Residential Neighborhoods

Improves safety and encourages more walking and cycling



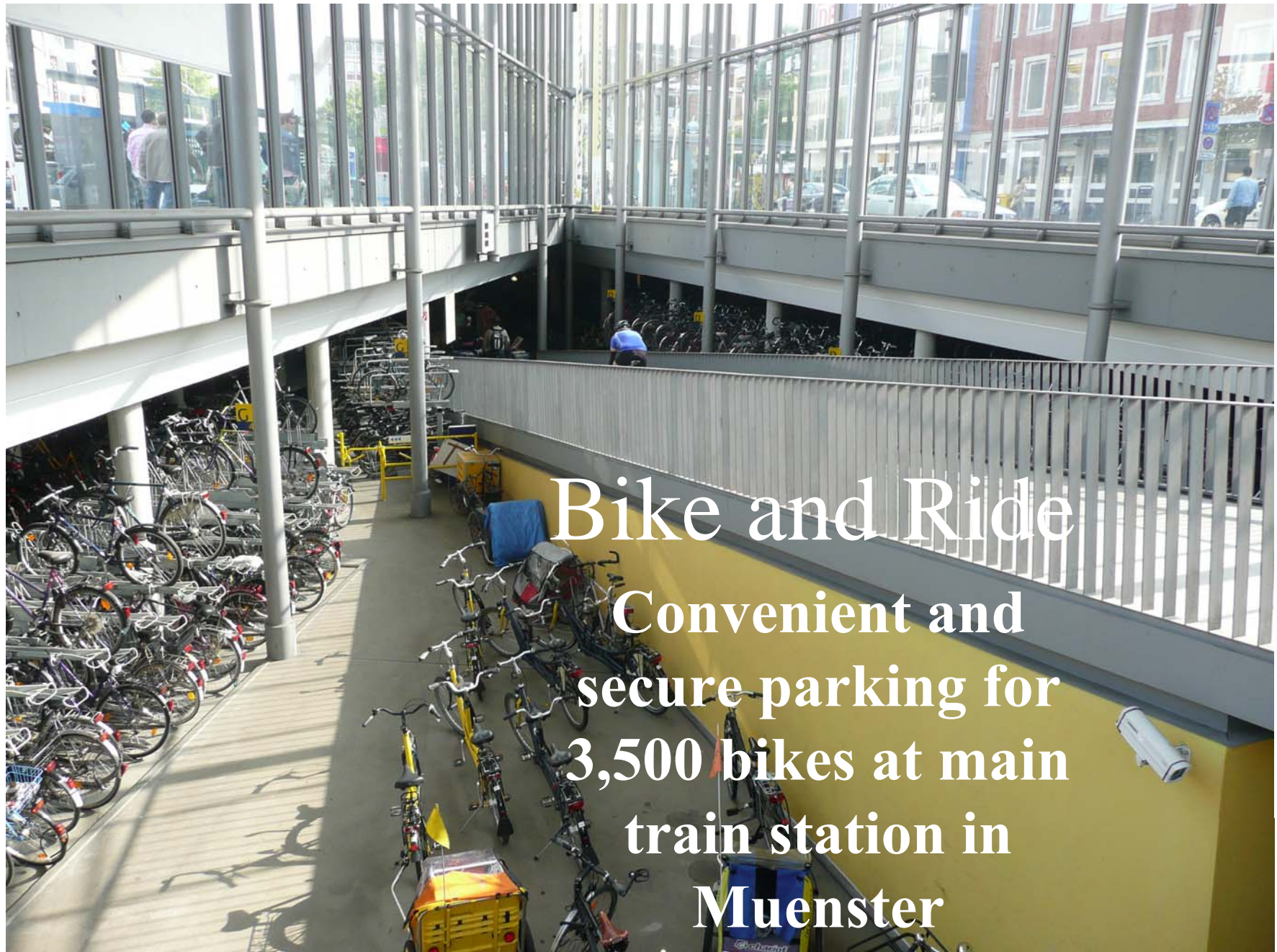
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Bike and Ride



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Bike Wash at Muenster Bike Station

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Millennium Park Bike Station, Chicago

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**Deluxe
bike
parking
even at
bus stops!**

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**Simple but convenient bike
parking even at bus stops**



Bike and Ride

Over 50,000 buses in the USA now come equipped with bike racks, as here in Seattle



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bike and ride in Davis





**On-street car parking
in German and Dutch
cities often replaced by
bike parking**



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Conversion of car parking to bike parking in San Francisco

**Also being
adopted in other
US cities**

Cycling Can Serve Many Different Travel Purposes

- **Commuting to work**
- **Traveling to school or university**
- **Shopping**
- **Recreation and exercise**
- **Visiting friends, running errands, etc.**



Transporting kids in Copenhagen: the famous Christiania bike

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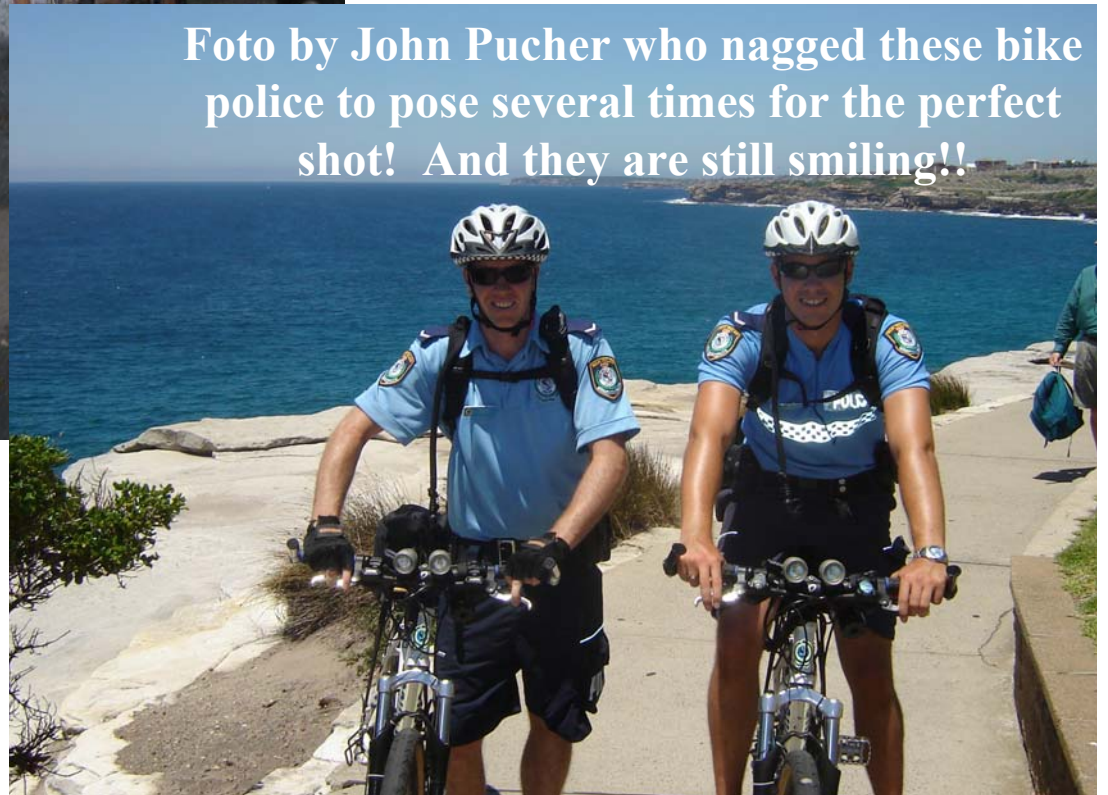
Police are friendlier and more effective on bikes!



Foto by Damon Rao

Melbourne Bike Police

Foto by John Pucher who nagged these bike police to pose several times for the perfect shot! And they are still smiling!!



**NSW Police patrolling
coastal path from Bondi
to Coogee**

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Postal deliveries by bike in Germany and Denmark



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Many potential uses of bikes



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Cycling, eating, and drinking wine along 80km of the *car-free* German Wine Route every August



On Sundays in August, cars are banned from 80km of the German Wine Route connecting dozens of scenic wine villages in southwest Germany

Why not do this in Napa and Sonoma Counties?

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MARKETING CYCLING TO ALL SOCIAL GROUPS

- **Very diverse needs of different groups**
- **Need to tailor cycling facilities, policies, and programs to serve this broad range**
- **Be as inclusive as possible**
- **Need good facilities as well as active marketing of cycling, with different approaches to each potential group of cyclists**



Troels Andersen, "Cycling in Odense, Denmark"



Cycling Duckie for very young kids in Odense, Denmark



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Cycling competitions for somewhat older kids in Odense, Denmark



Troels Andersen, "Cycling in Odense, Denmark"



Cycling training and testing course in Berlin

Most German and Dutch children take cycling lessons by the 3rd or 4th grade and must pass a police-administered cycling safety test!





German traffic laws generally favor cyclists and pedestrians over motorists



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For Employees: Company bicycles provided by firms for business trips during the day



Get on a bike and lose weight!



Troels Andersen, "Cycling in Odense, Denmark"

**"Get rid of the sack" Campaign
aimed at overweight middle-aged
men with pot bellies**



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Troels Andersen, "Cycling in Odense, Denmark"

Guided Bicycle Tours for Seniors

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CONCLUSIONS

- Almost everyone has the potential to cycle
- Many local trips in American cities are short enough to cover by bike
- Crucial to design cycling policies and programs for everyone!
- Must cater to huge range of cycling preferences and meet the diverse needs of different groups
- Must be inclusive in cycling policies and programs to encourage widespread cycling and thus generate widespread public and political support