

# PBIC Webinar

## Promoting Cycling and Walking for Sustainable and Healthy Cities: Lessons from Europe and North America



John Pucher, professor, Rutgers University

**Feb. 27, 2013, 2 pm**



Pedestrian and Bicycle  
Information Center



# Today's Presentation

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- ⇒ **Introduction and housekeeping**
- ⇒ **Audio issues?**  
Dial into the phone line instead of using “mic & speakers”
- ⇒ **PBIC Trainings and Webinars**  
[www.walkinginfo.org](http://www.walkinginfo.org)
- ⇒ **Registration and Archives at**  
[walkinginfo.org/webinars](http://walkinginfo.org/webinars)
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[www.facebook.com/pedbike](http://www.facebook.com/pedbike)
- ⇒ **Questions at the end**



# Promoting Safe Walking and Cycling: Lessons from Europe and North America

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**John Pucher, Rutgers University and UNC Chapel Hill**

**Ralph Buehler, Virginia Tech**



Photo: Greg Raisman



Photo: Marie Demers

**PBIC Webinar, 27 February 2013: “Livable Communities” Series**

# **Walking and Cycling:** **the MOST sustainable transport modes**

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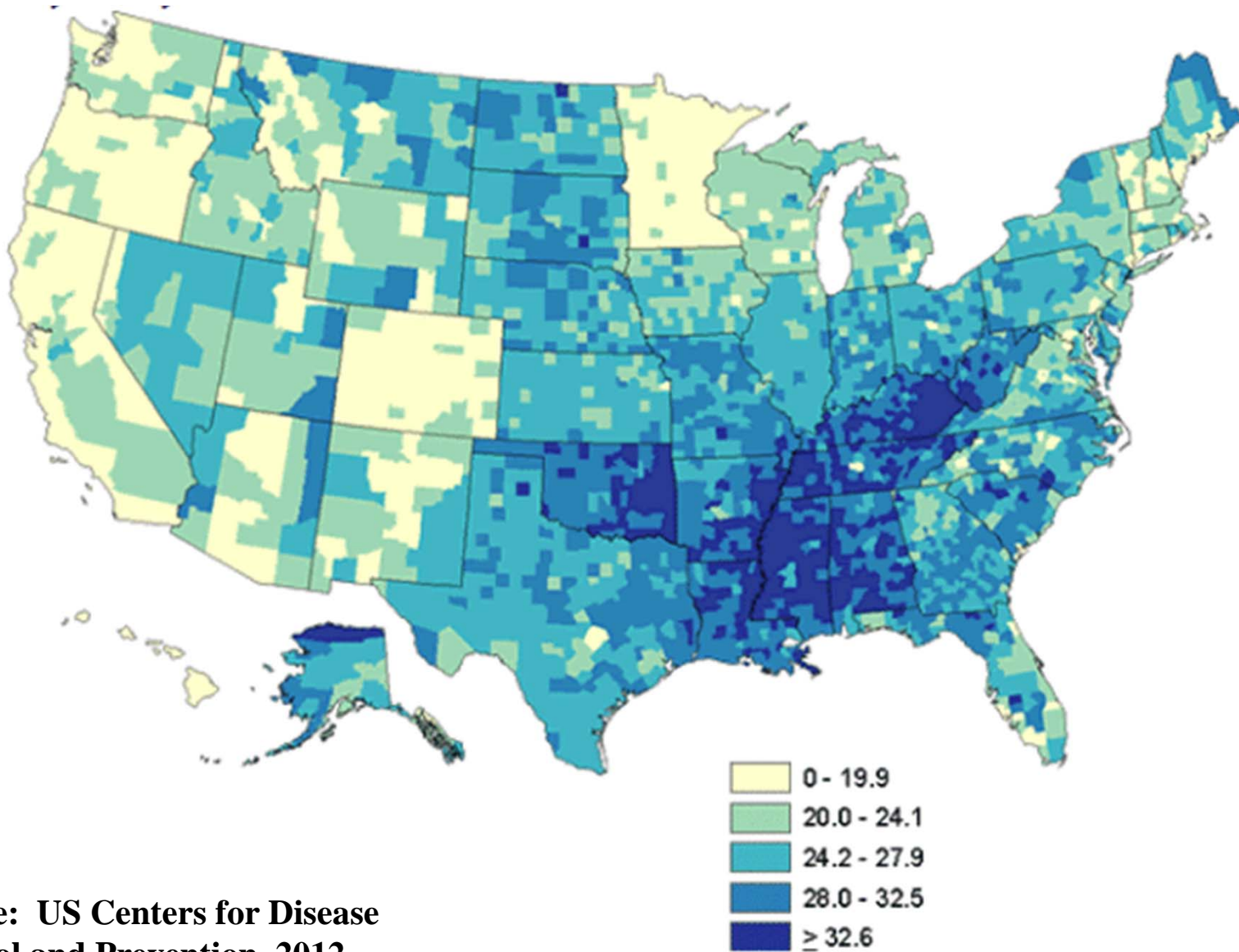
- **MOST environmentally friendly:**
  - > Virtually no pollution at all
  - > Almost no nonrenewable resources used
- **MOST equitable:**
  - > Financially affordable by virtually everyone
  - > Physically possible by all but the severely disabled
- **MOST economical:**
  - > Minimal private and public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

# **WALKING AND CYCLING ARE HEALTHY**

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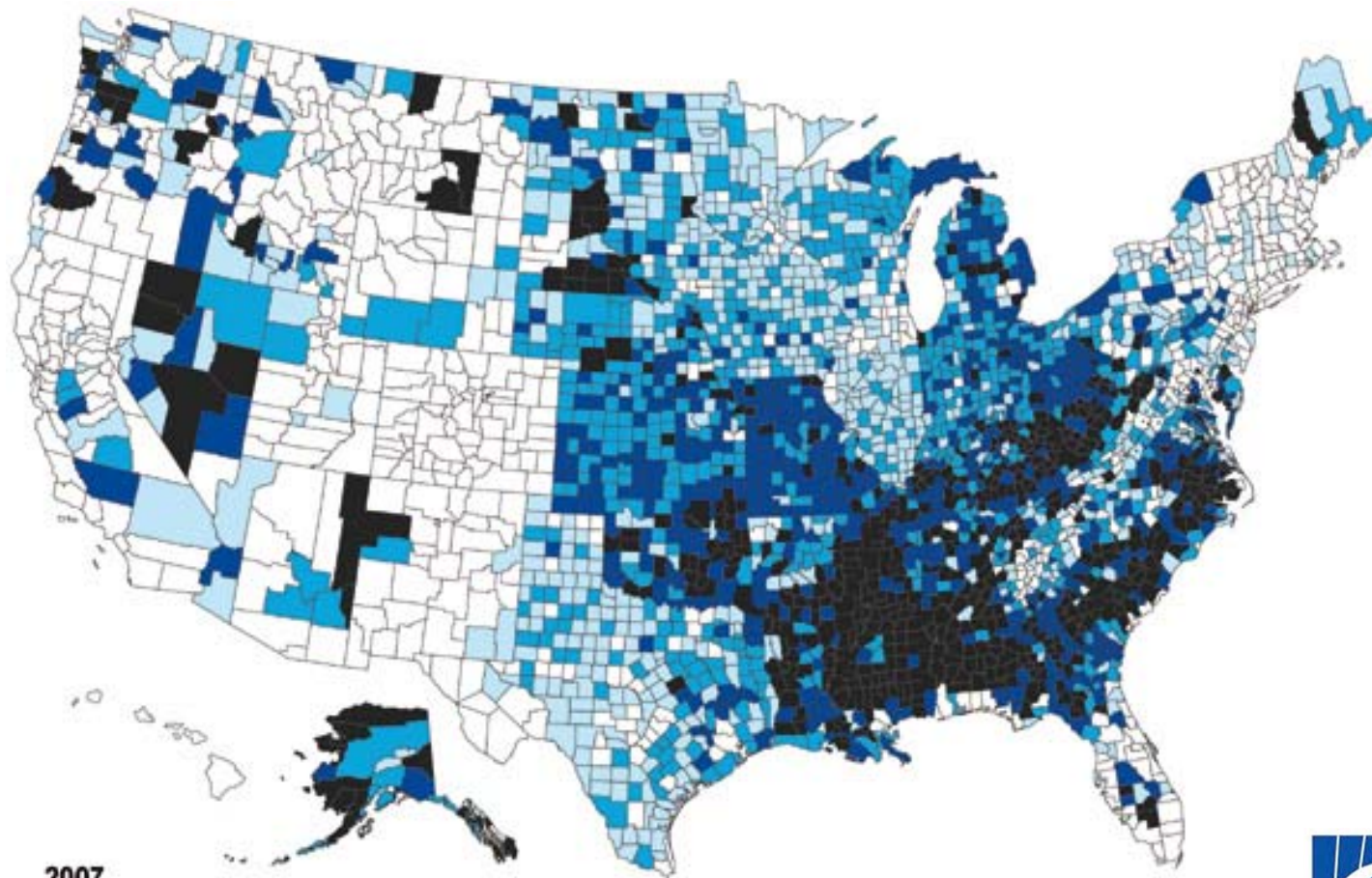
- **GREAT source of physical activity:**
  - **Both for daily travel and for recreation**
  - **Cheaper, easier, and more dependable than formal exercise routines**
  - **Can be integrated into daily lifestyle to achieve practical travel needs**

# 2007 Age-Adjusted Estimates of the Percentage of Adults Who Are Physically Inactive



Source: US Centers for Disease Control and Prevention, 2012

# Obesity, 2007



2007

Age-adjusted percent of adults  $\geq 20$  years old who are obese

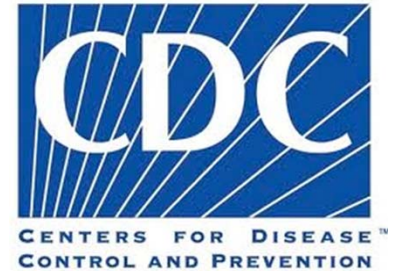
0 - 26.2

26.3 - 27.7

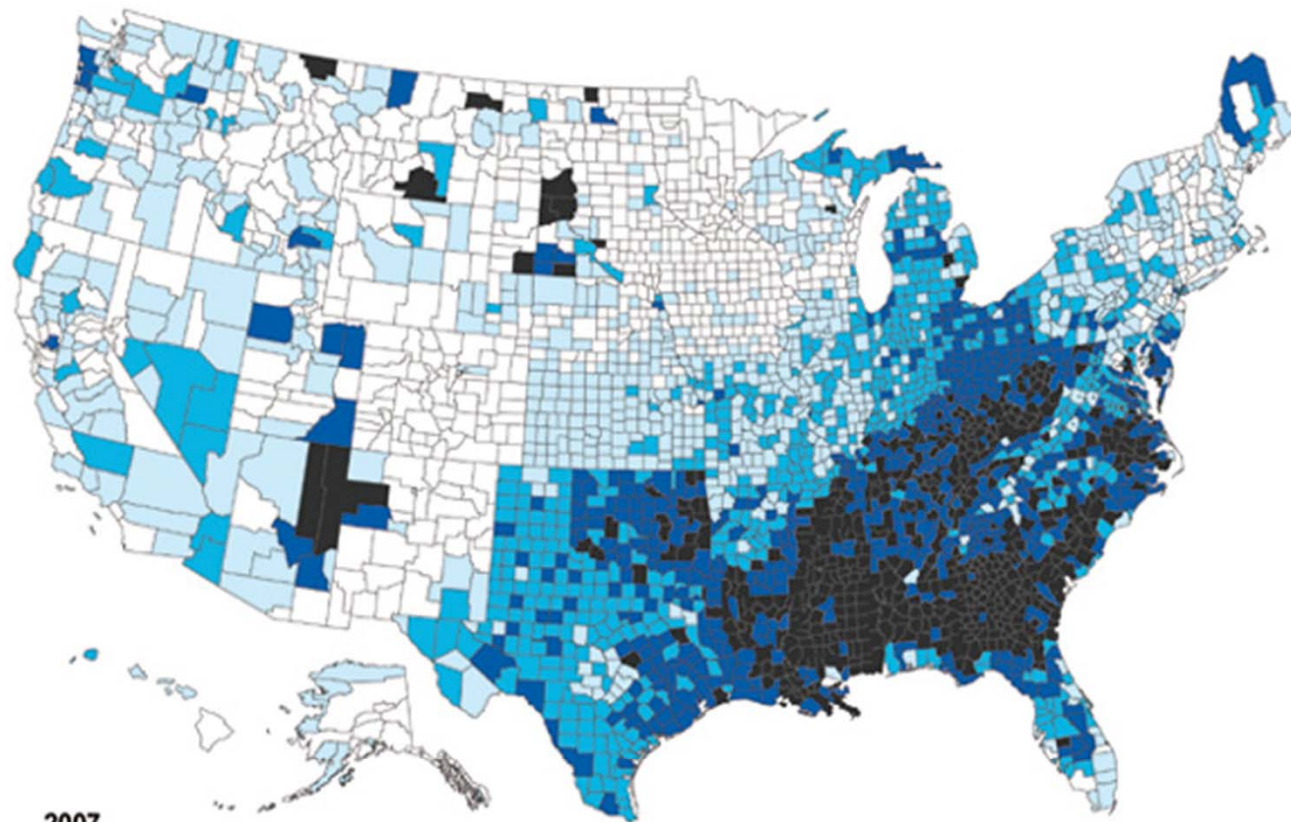
27.8 - 29.1

29.2 - 30.8

$\geq 30.9$



# Diabetes, 2007



2007

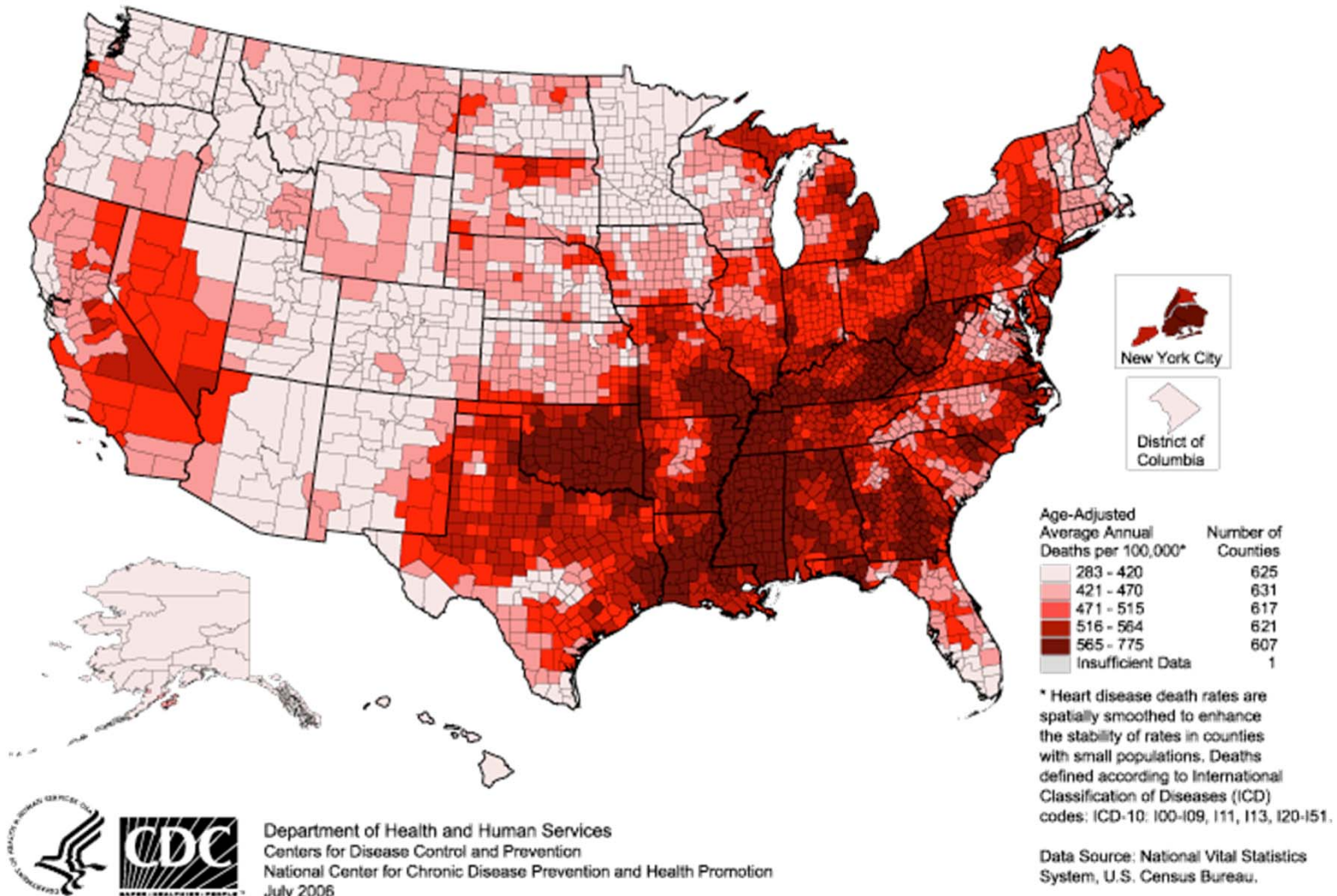
Age-adjusted percent of adults  $\geq 20$  years old with diabetes

0 - 7.0    7.1 - 8.1    8.2 - 9.0    9.1 - 10.5     $\geq 10.6$



# Heart Disease

Heart Disease Death Rates, 1999-2003  
Adults Ages 35 Years and Older by County

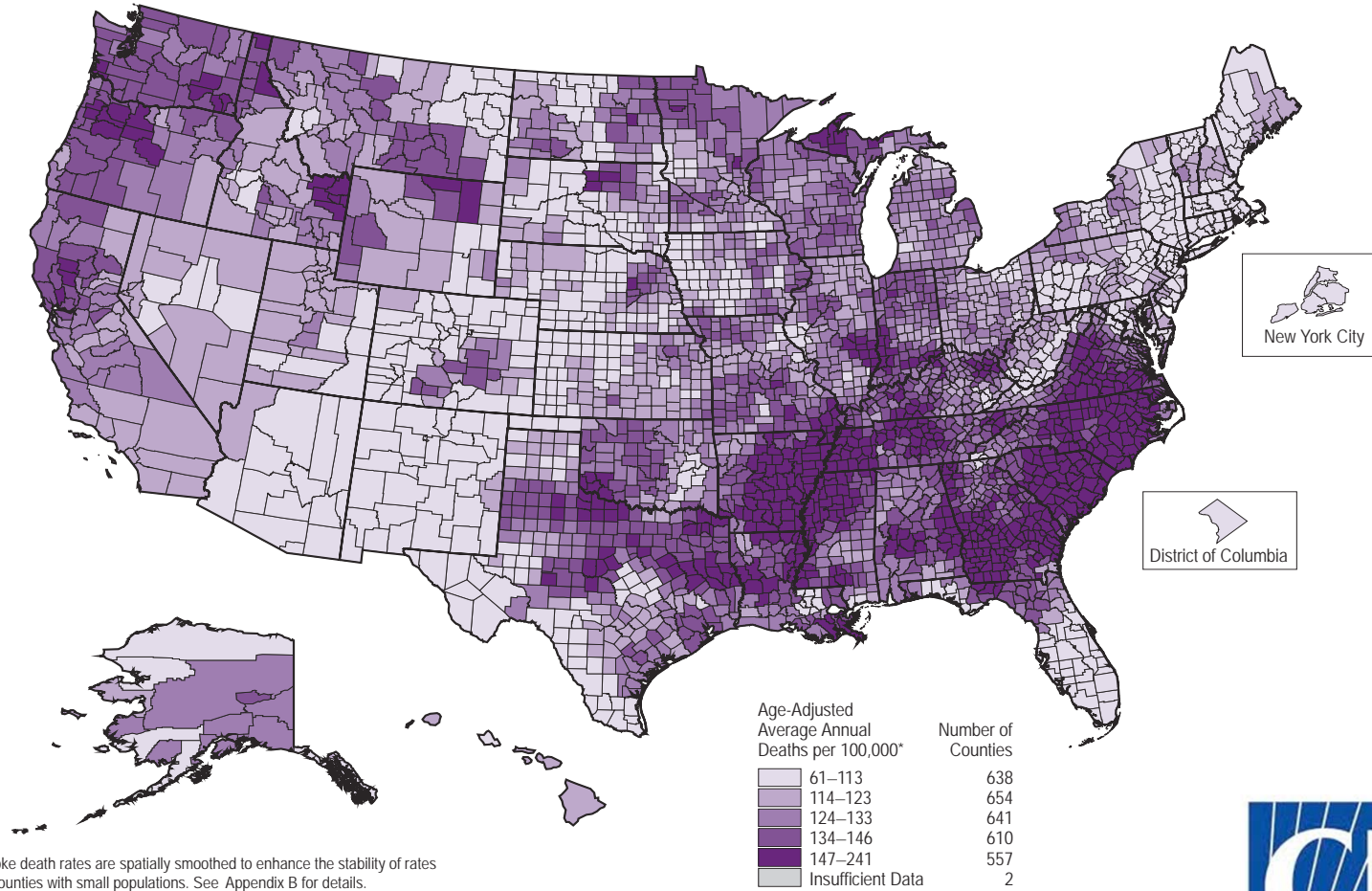


Department of Health and Human Services  
Centers for Disease Control and Prevention  
National Center for Chronic Disease Prevention and Health Promotion  
July 2006

# Stroke

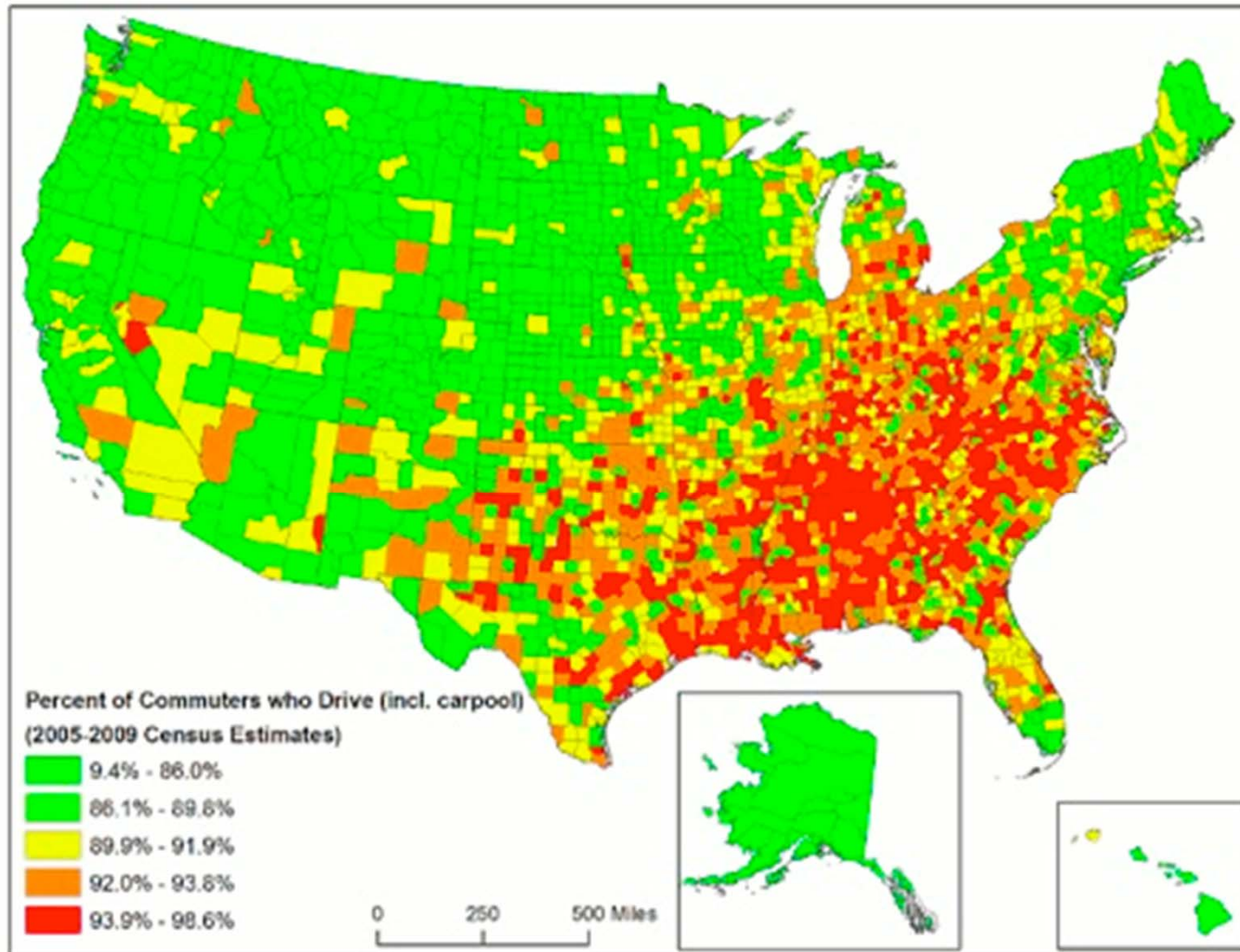
Smoothed County Stroke Death Rates  
1991–1998

Total Population  
Ages 35 Years and Older



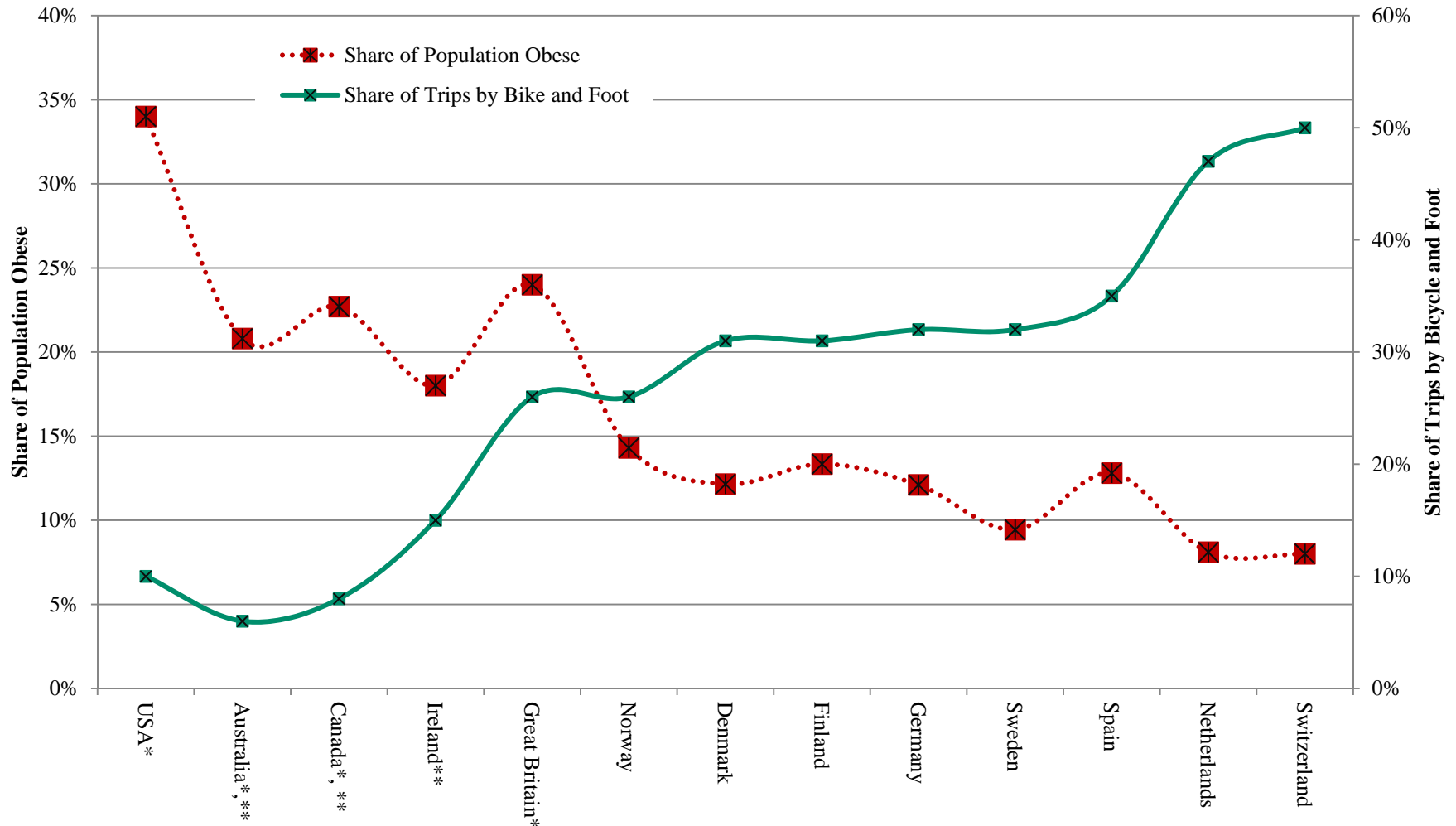
\*Stroke death rates are spatially smoothed to enhance the stability of rates in counties with small populations. See Appendix B for details.

# Percent of Commuters Who Drive



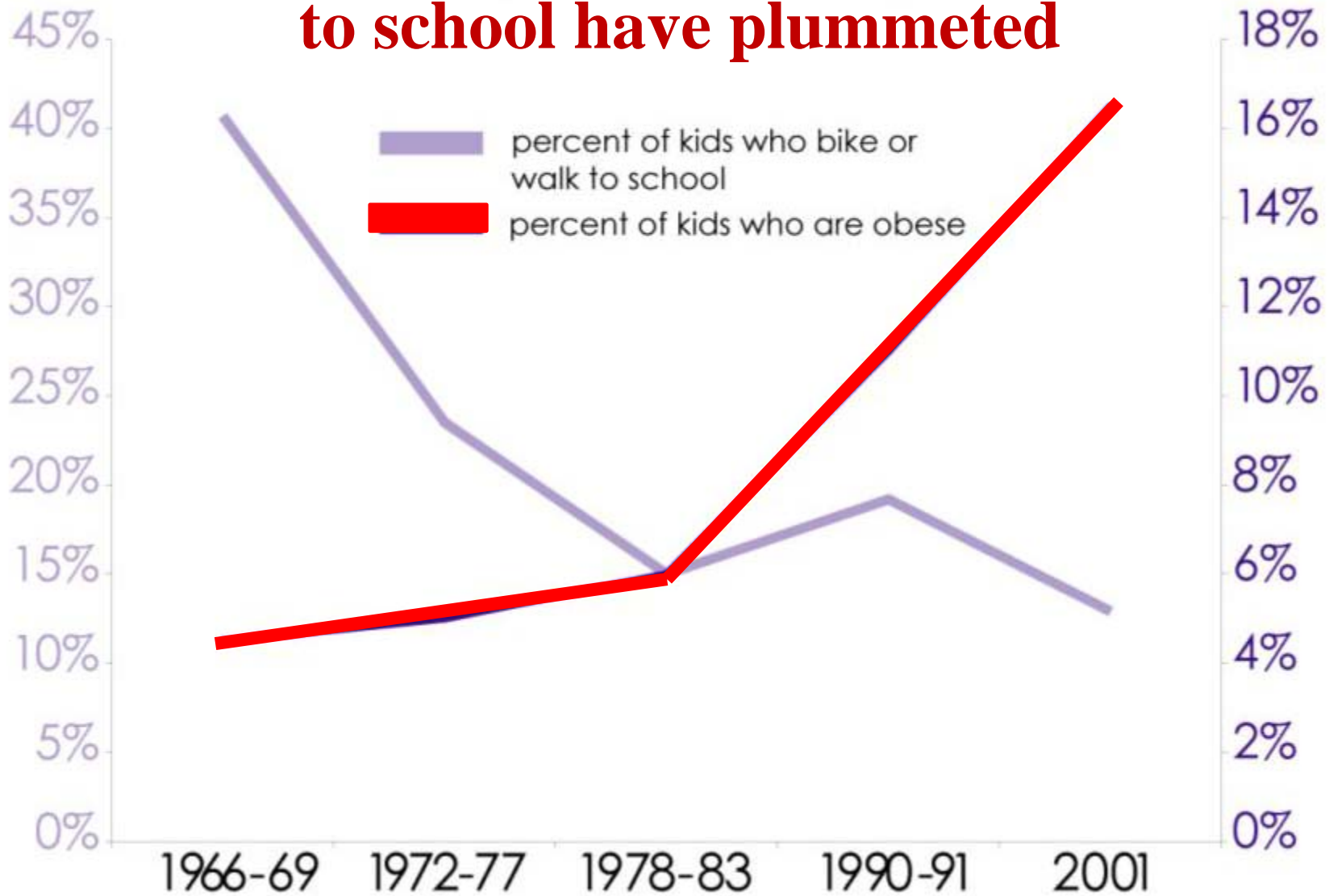
Price and Godwin, *Planetizen* 2012

# Obesity Falls with Increased Walking and Cycling

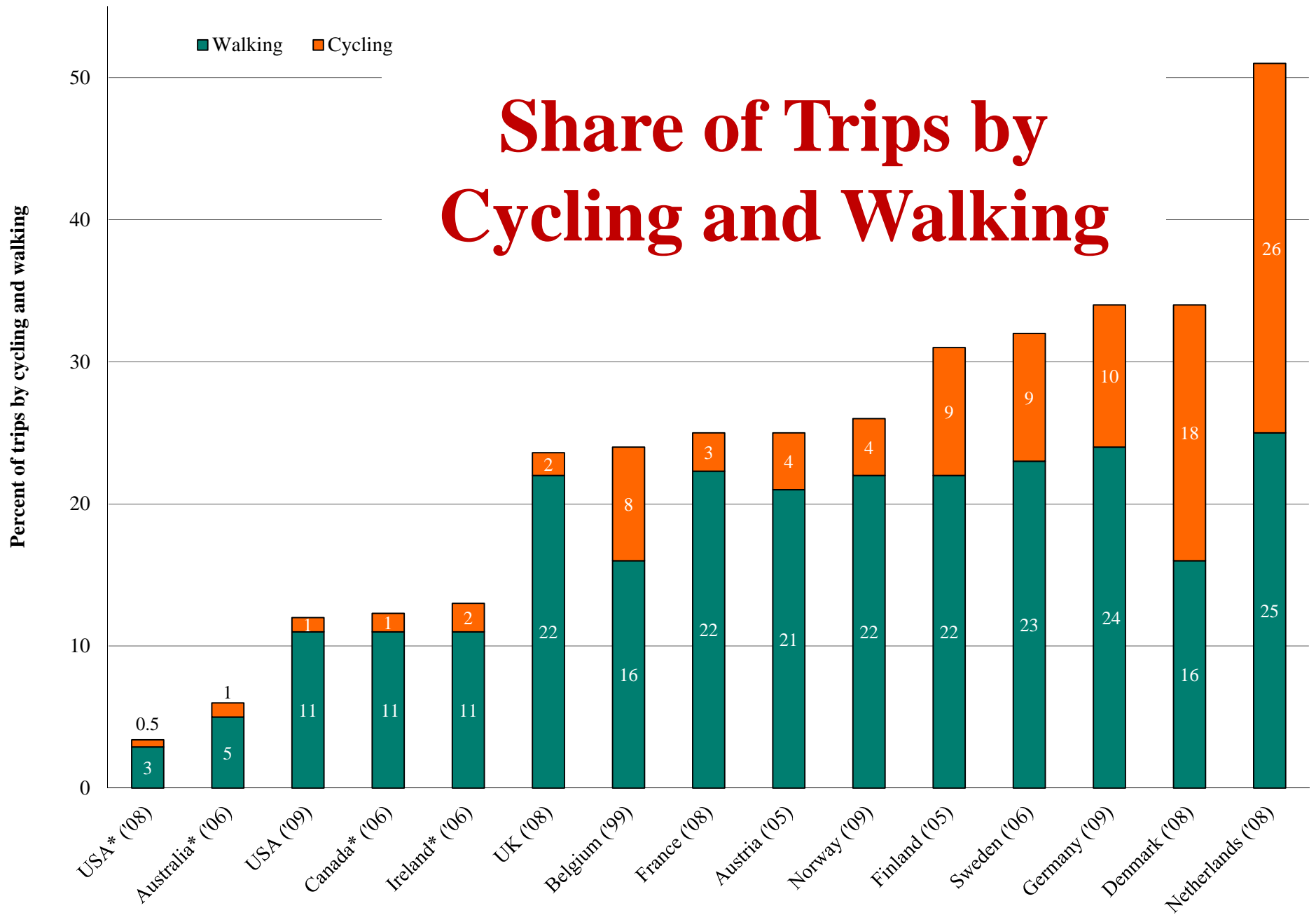


Pucher, J., Buehler, R., Bassett, D., Dannenberg, A. 2010. "Walking and Cycling to Health: Recent Evidence from City, State, and International Comparisons," *American Journal of Public Health*, Vol. 100, No. 10, pp. 1986-1992.

# Obesity among US children has quadrupled as rates of walking and cycling to school have plummeted

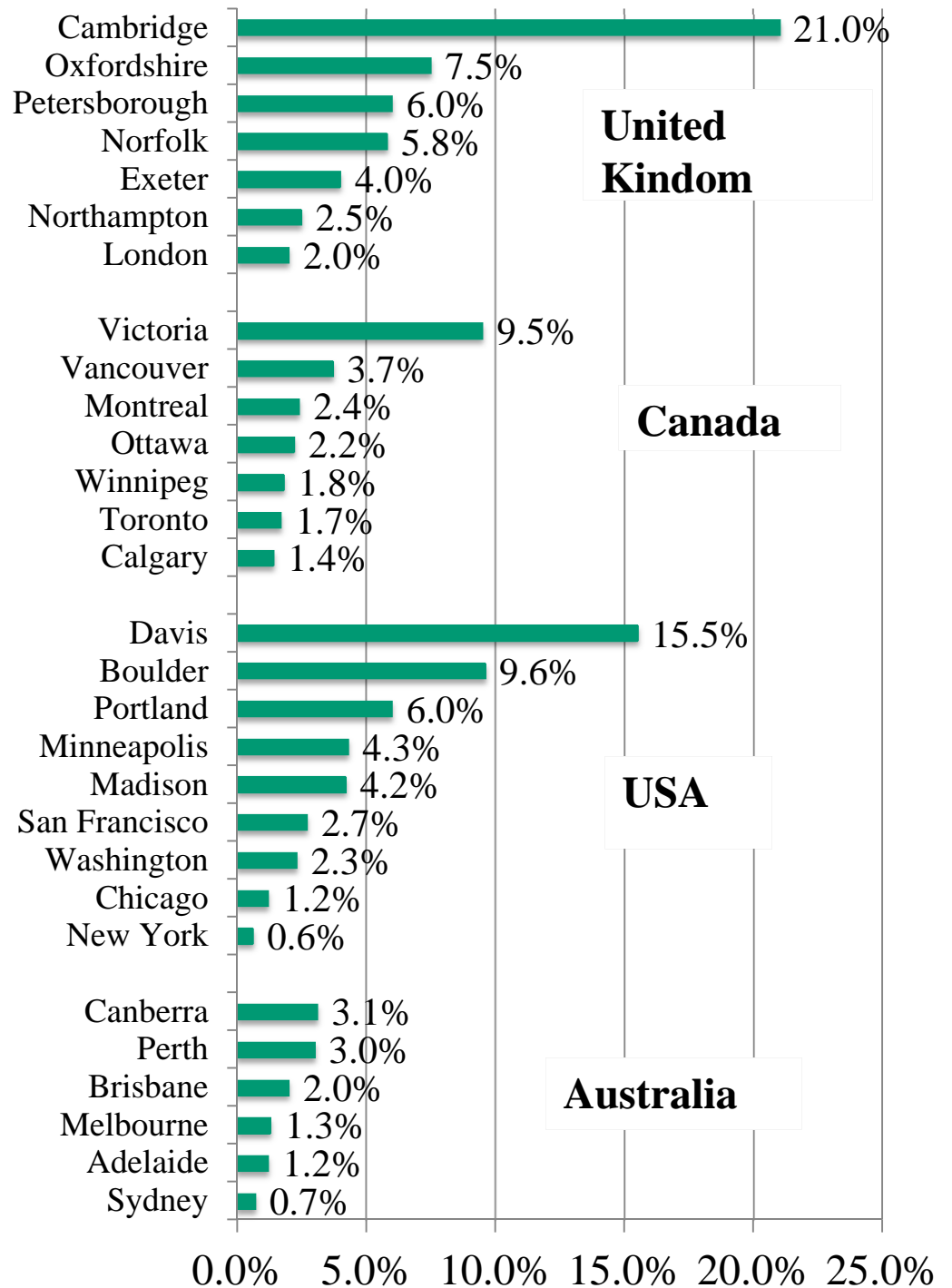


# Share of Trips by Cycling and Walking



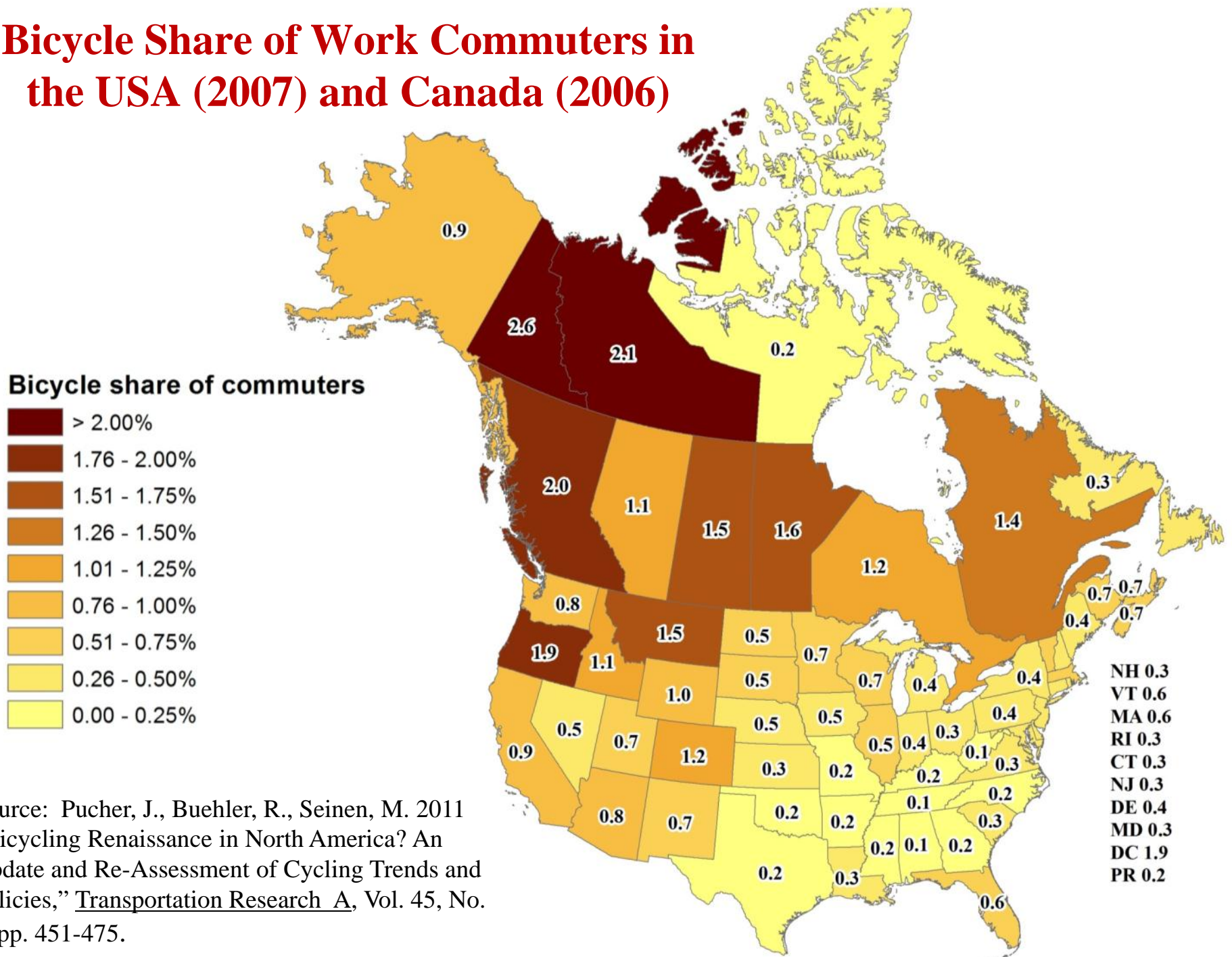
Source: Pucher and Buehler, *City Cycling*, MIT Press, 2012

# Bike Share of Trips in Selected cities in UK, Canada, USA, and Australia (2000-2009)



Source: Pucher, J., Buehler, R. (eds.), *City Cycling*. Cambridge, MA: MIT Press, 2012

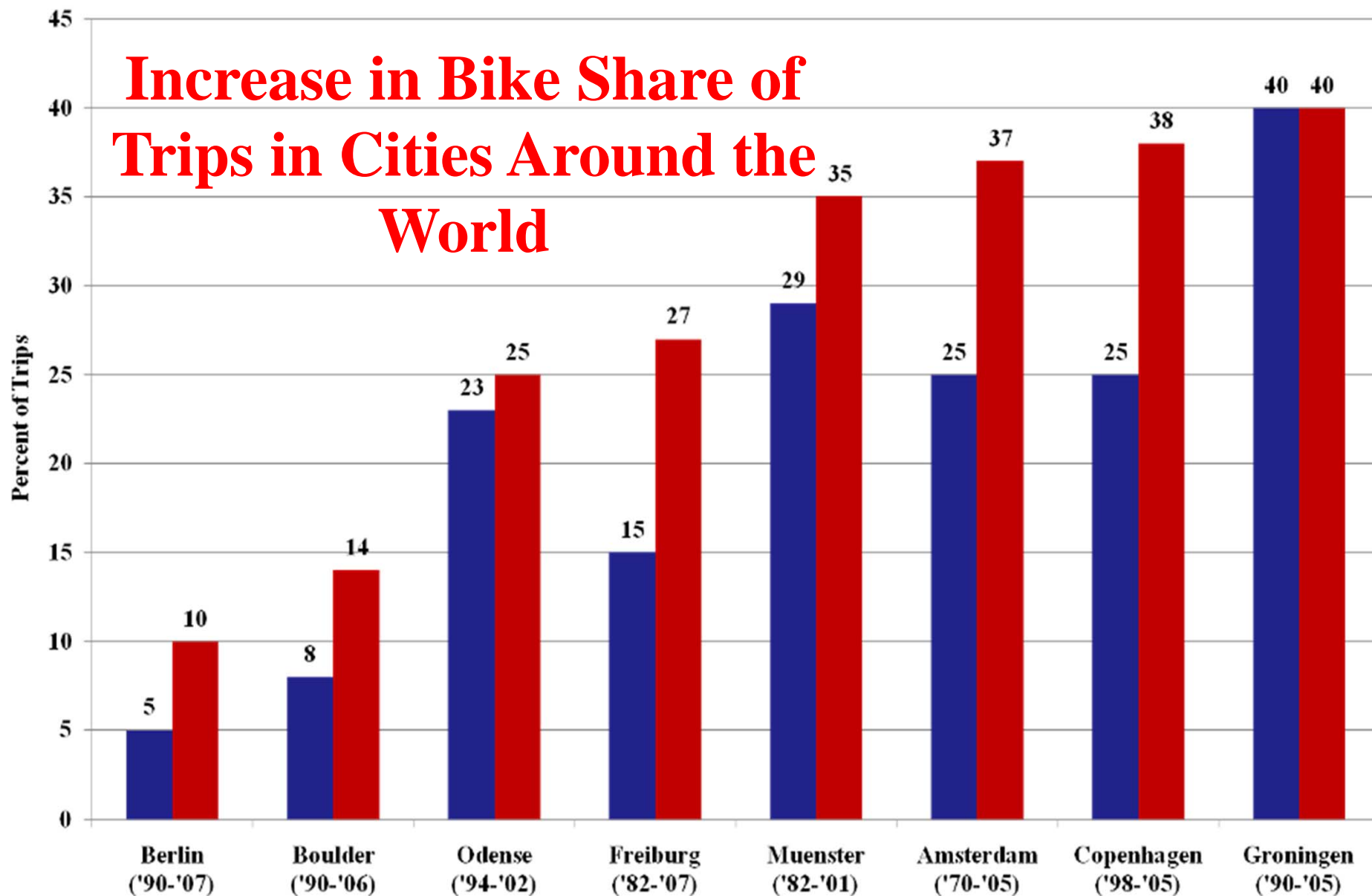
# Bicycle Share of Work Commuters in the USA (2007) and Canada (2006)



Source: Pucher, J., Buehler, R., Seinen, M. 2011 "Bicycling Renaissance in North America? An Update and Re-Assessment of Cycling Trends and Policies," *Transportation Research A*, Vol. 45, No. 6, pp. 451-475.

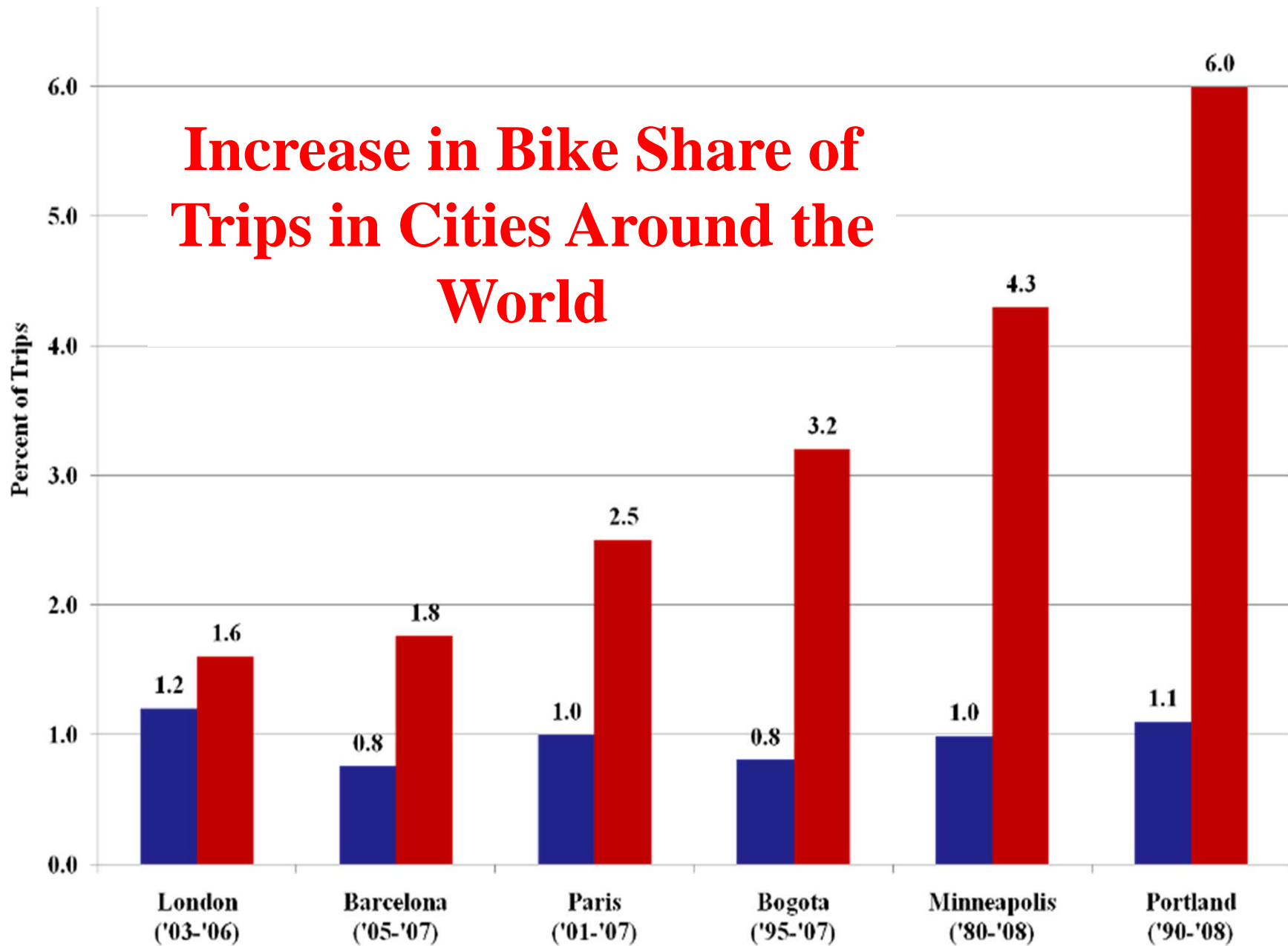


# Increase in Bike Share of Trips in Cities Around the World



Source: Pucher, Dill, and Handy, "Infrastructure, Programs, and Policies to Increase Bicycling," *Preventive Medicine*, Jan 2010, Vol. 50, S.1, pp. S106-S125.

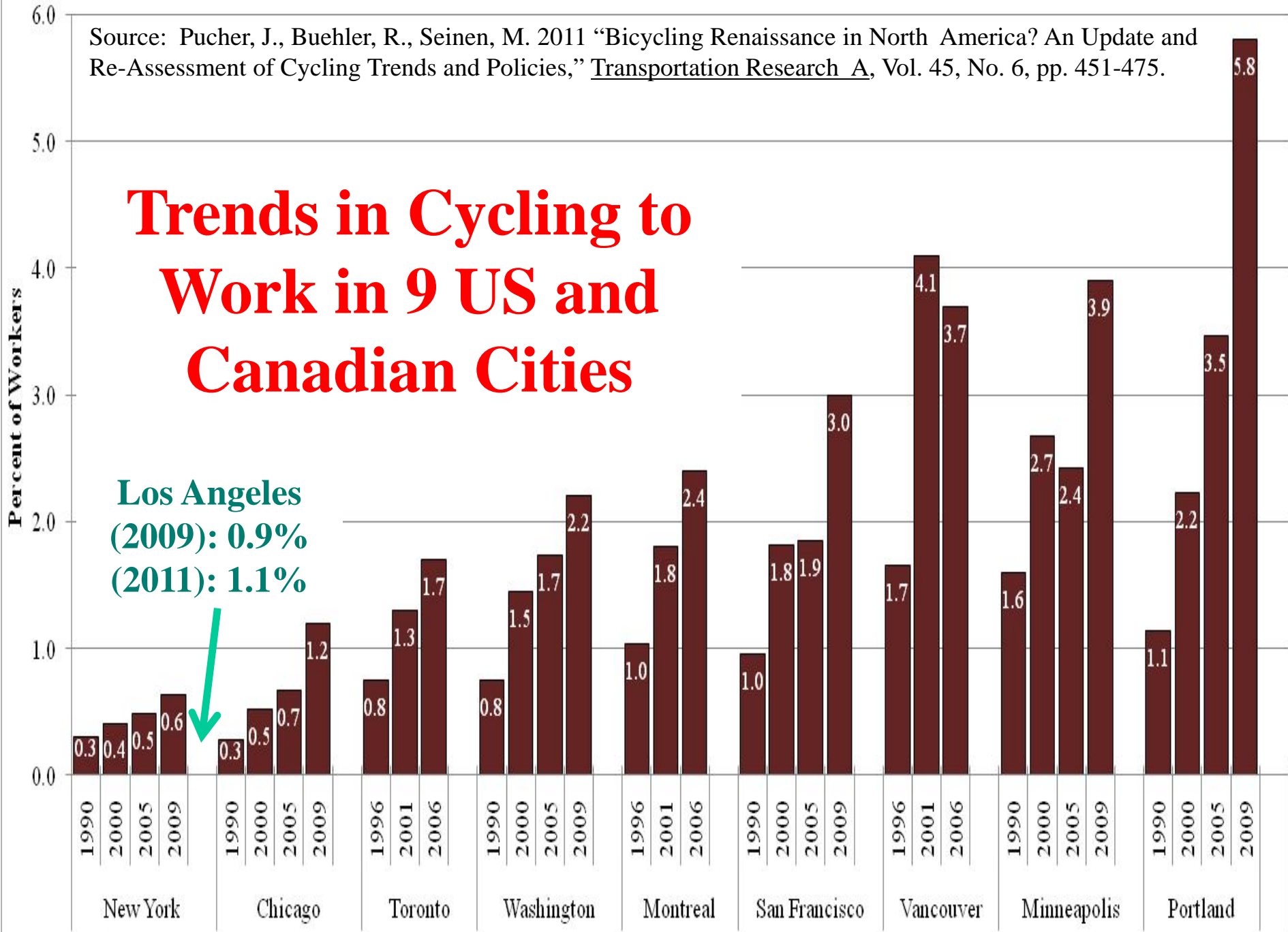
## Increase in Bike Share of Trips in Cities Around the World



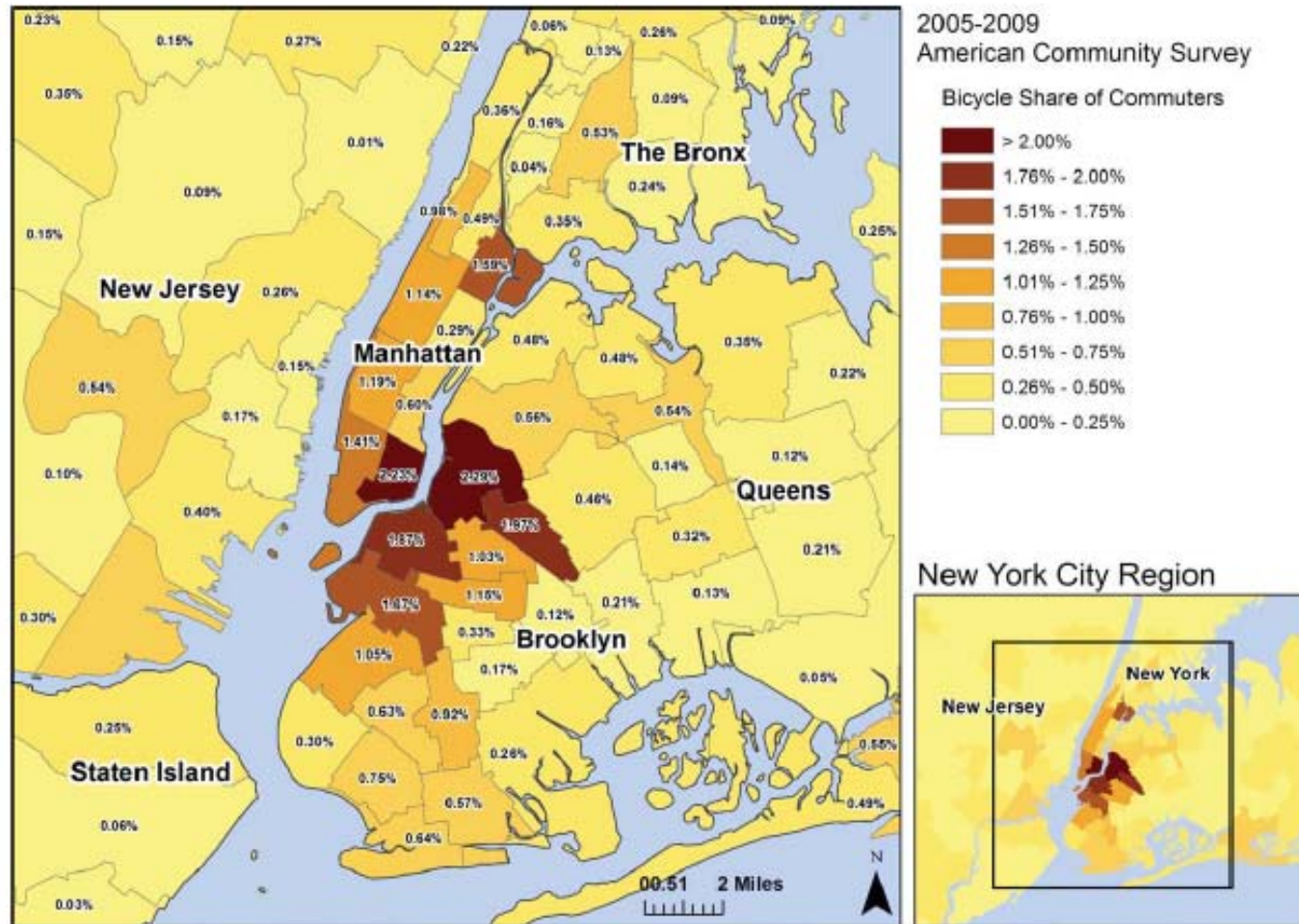
Source: Pucher, Dill, and Handy, "Infrastructure, Programs, and Policies to Increase Bicycling," *Preventive Medicine*, Jan 2010, Vol. 50, S.1, pp. S106-S125.

Source: Pucher, J., Buehler, R., Seinen, M. 2011 "Bicycling Renaissance in North America? An Update and Re-Assessment of Cycling Trends and Policies," *Transportation Research A*, Vol. 45, No. 6, pp. 451-475.

# Trends in Cycling to Work in 9 US and Canadian Cities

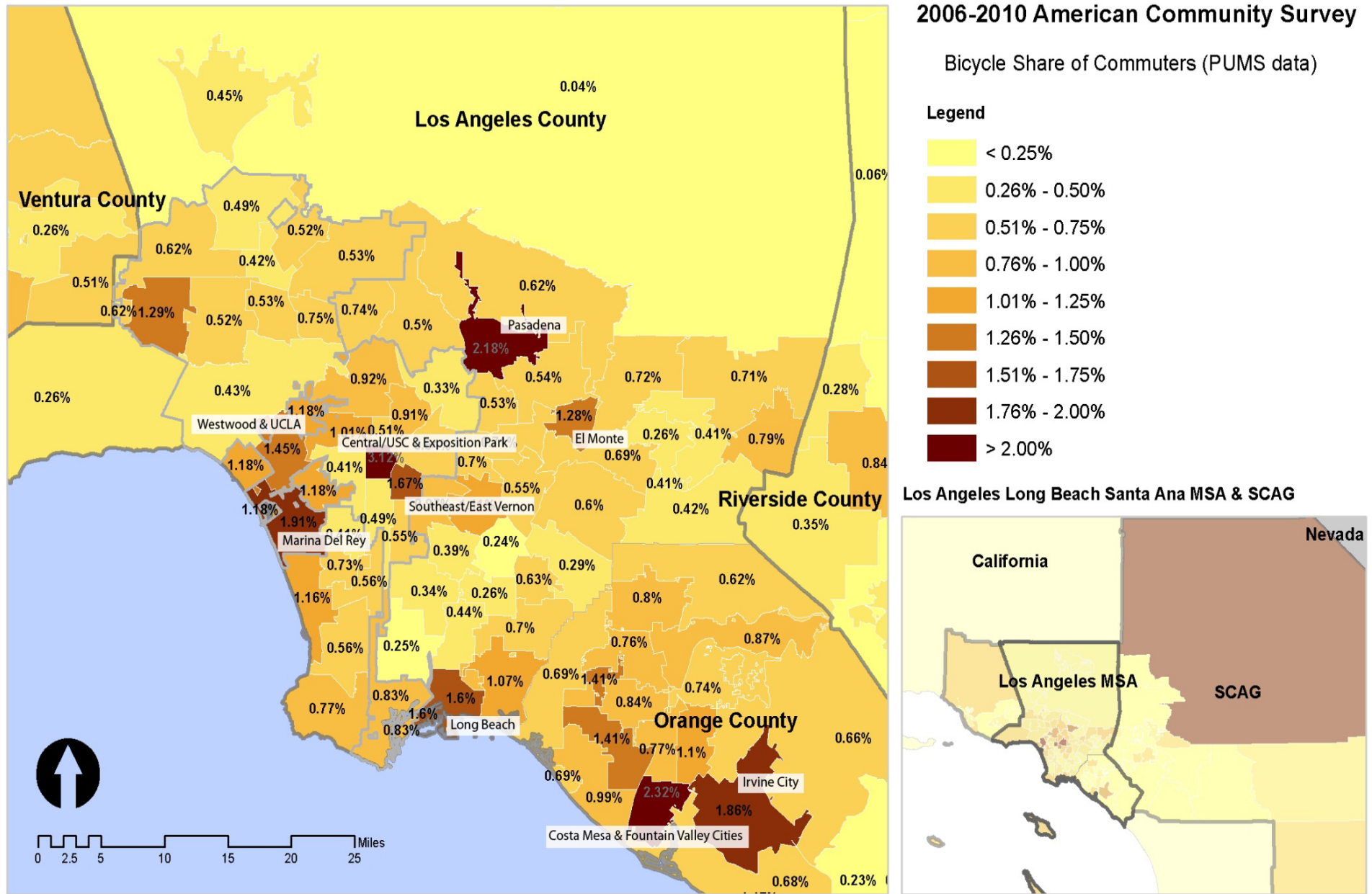


# Spatial Variation in Bicycle Share of Work Commuters in New York City Area, 2005-2009



Pucher, J., Buehler, R., Seinen, M. 2011 “Bicycling Renaissance in North America? An Update and Re-Assessment of Cycling Trends and Policies,” Transportation Research A, Vol. 45, No. 6, pp. 451-475.

# Bike Share of Work Commuters in Los Angeles Area, 2006-2010



GIS map by Haofei Liu, UCLA

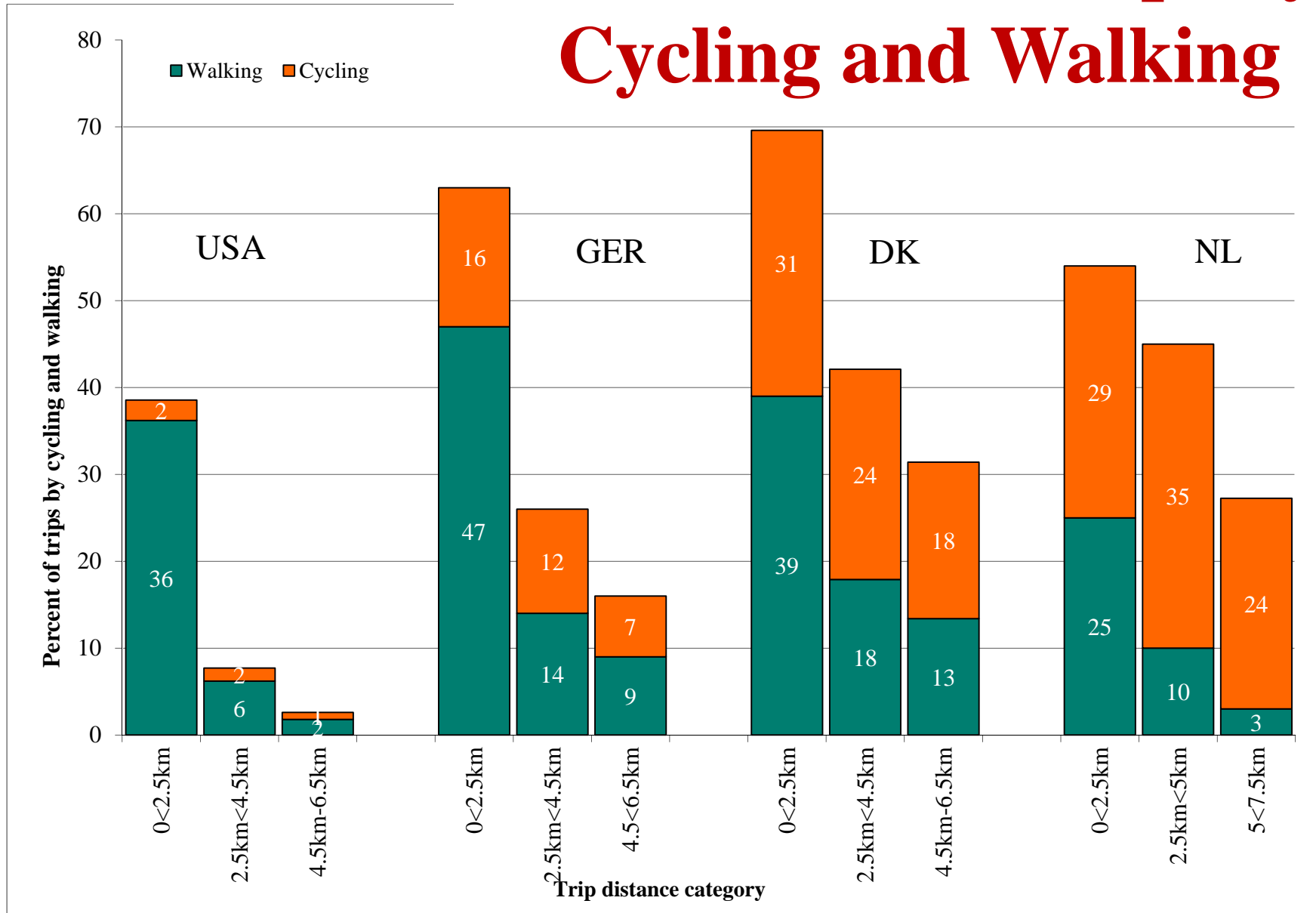
# **Lots of Potential for Increased Walking and Cycling:**

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**Many daily trips in American and Canadian urban areas are short enough to walk or bike!**

- ~27% of all trips in the U.S. were a mile or shorter in 2009**
- ~41% of all trips were shorter than two miles**

# Share of Short Trips by Cycling and Walking



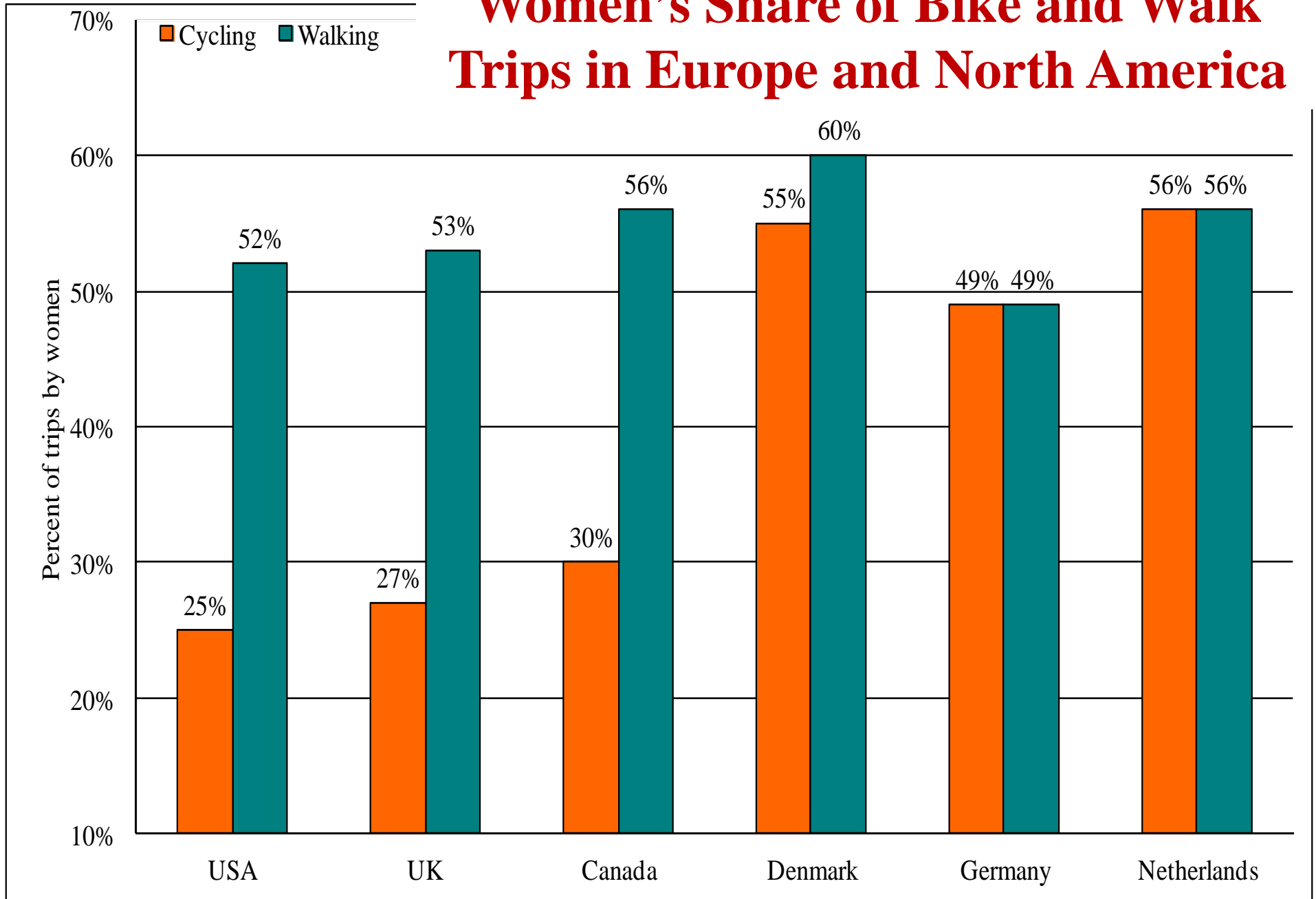
Source: Pucher and Buehler (eds.), *City Cycling*. Cambridge, MA: MIT Press, 2012

# Europeans cycle for many trip purposes





# Women's Share of Bike and Walk Trips in Europe and North America

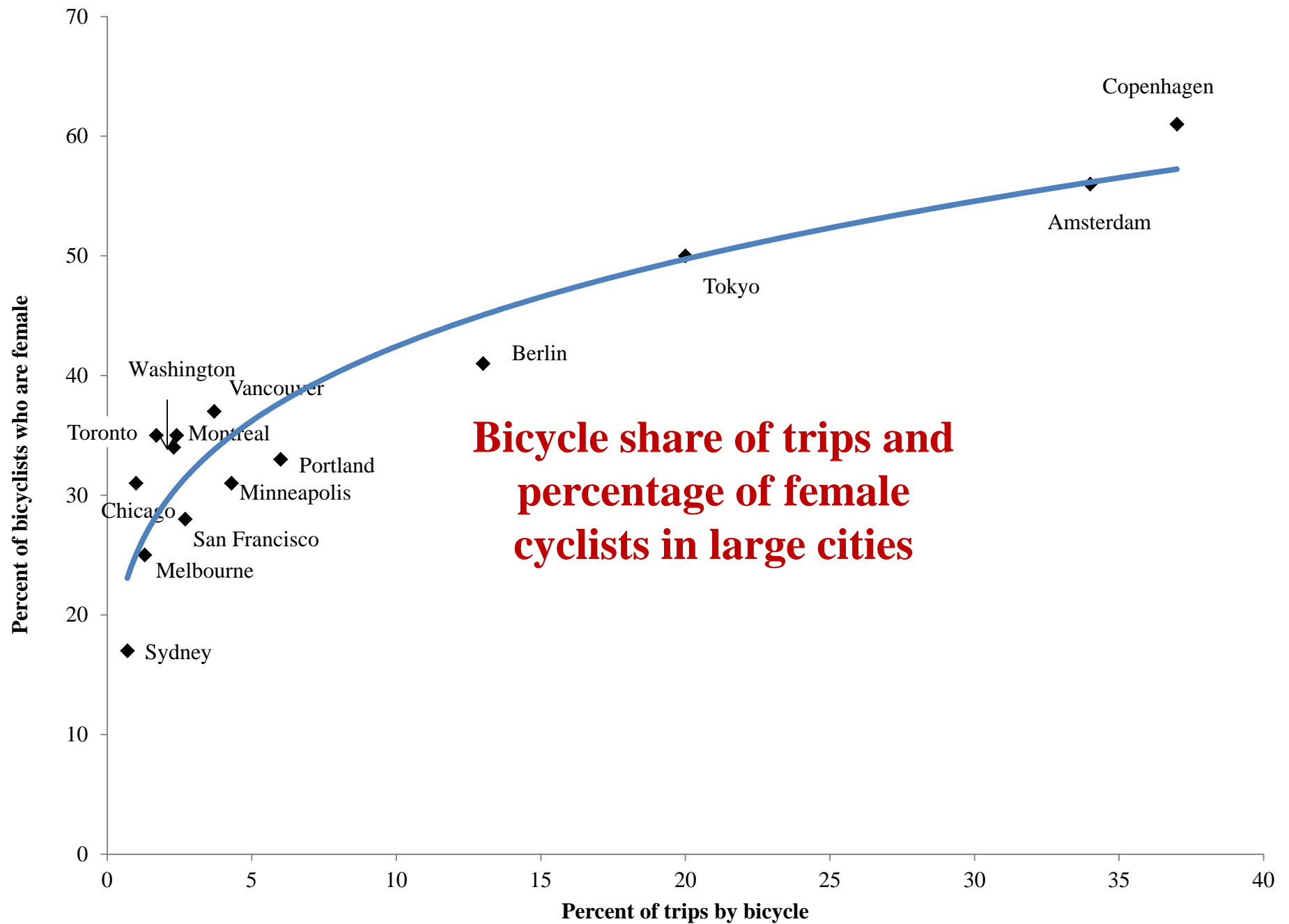


Source: Pucher and Buehler (eds.), *City Cycling*. Cambridge, MA: MIT Press, 2012



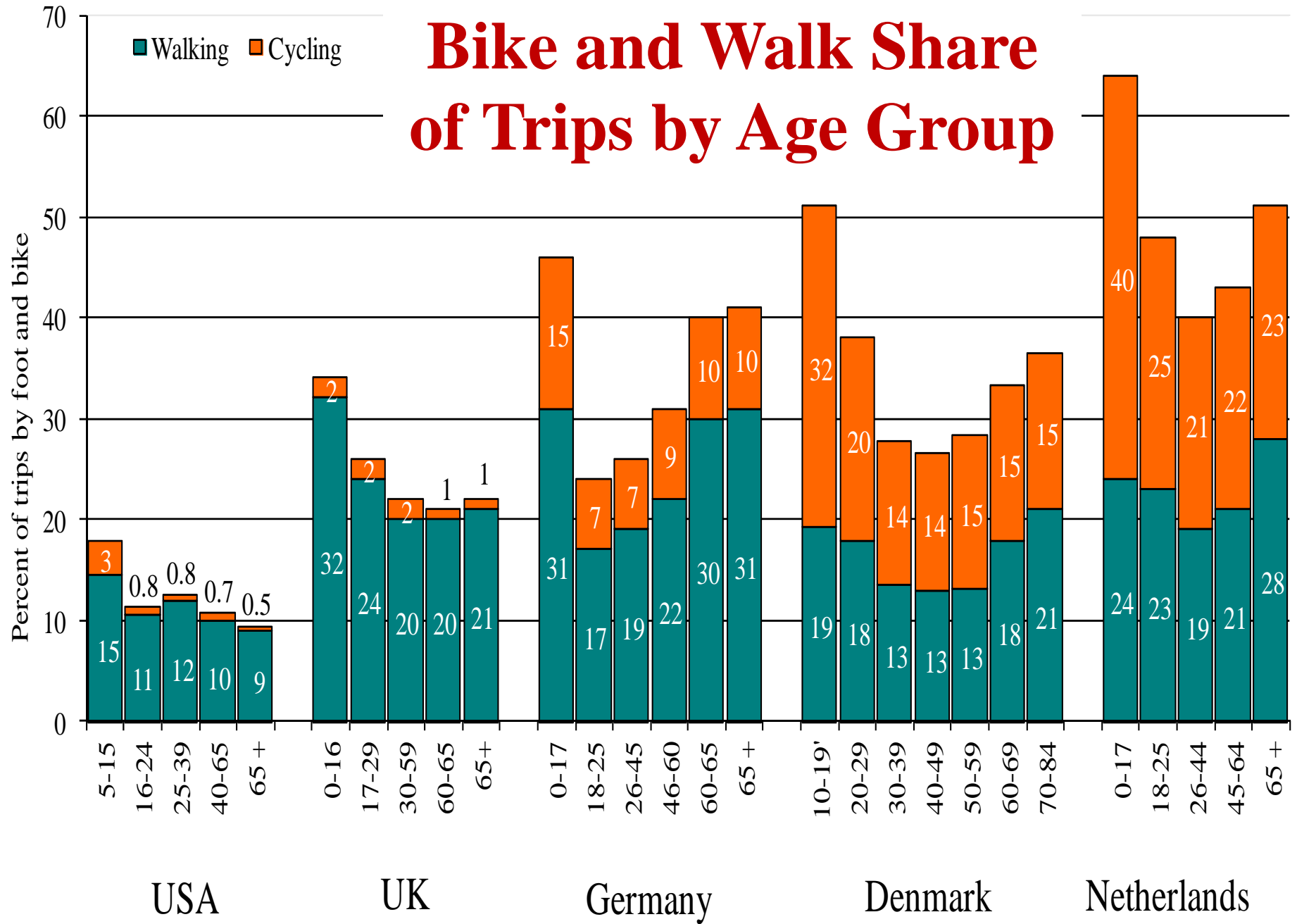
55% of all bike trips in  
Denmark are by women

Photo Susan Handy



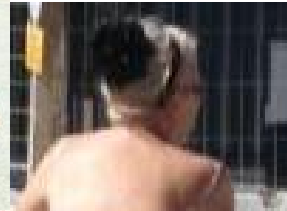
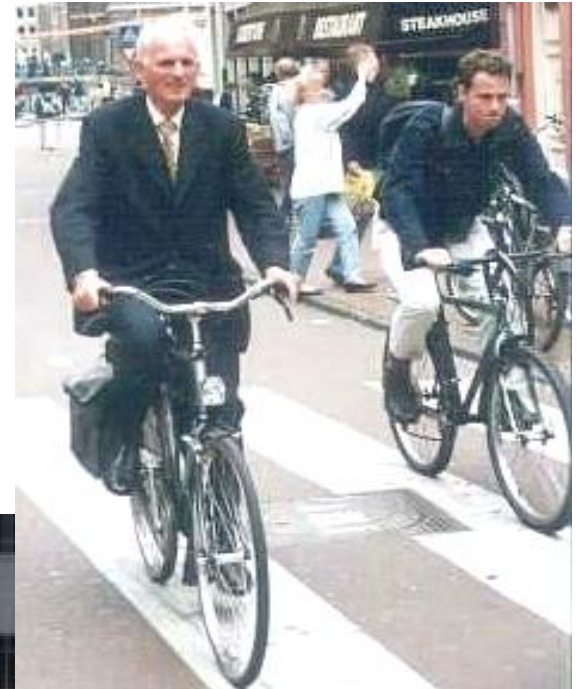
Source: Garard, Handy, and Dill, "Women and Cycling," in Pucher and Buehler (eds.), *City Cycling*. Cambridge, MA: MIT Press, 2012

# Bike and Walk Share of Trips by Age Group



Source: Pucher and Buehler (eds.), *City Cycling*. Cambridge, MA: MIT Press, 2012

# Cycling for all ages



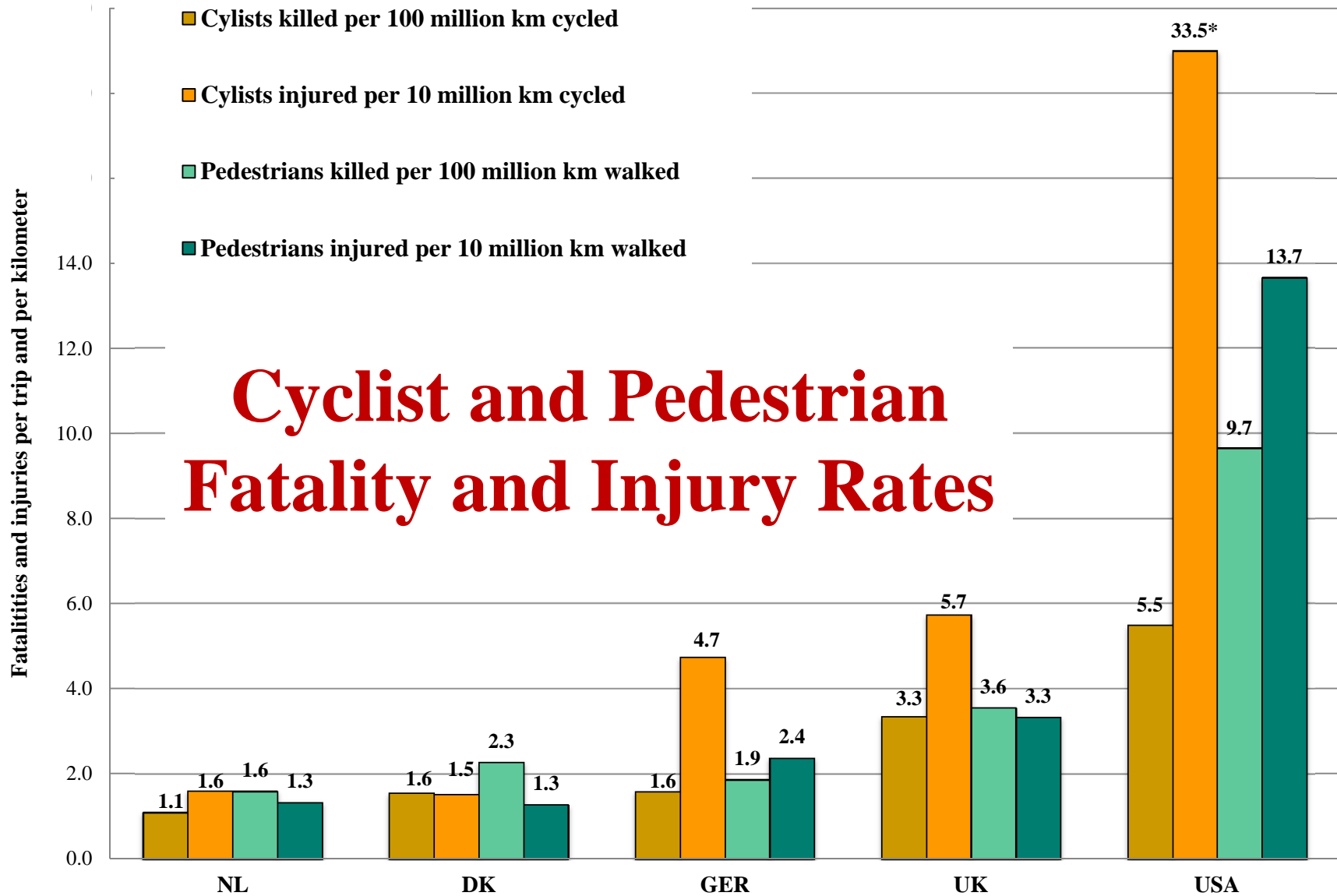
# Parents and kids cycling together in Portland



# **Make Walking and Cycling Safe for Everyone !**

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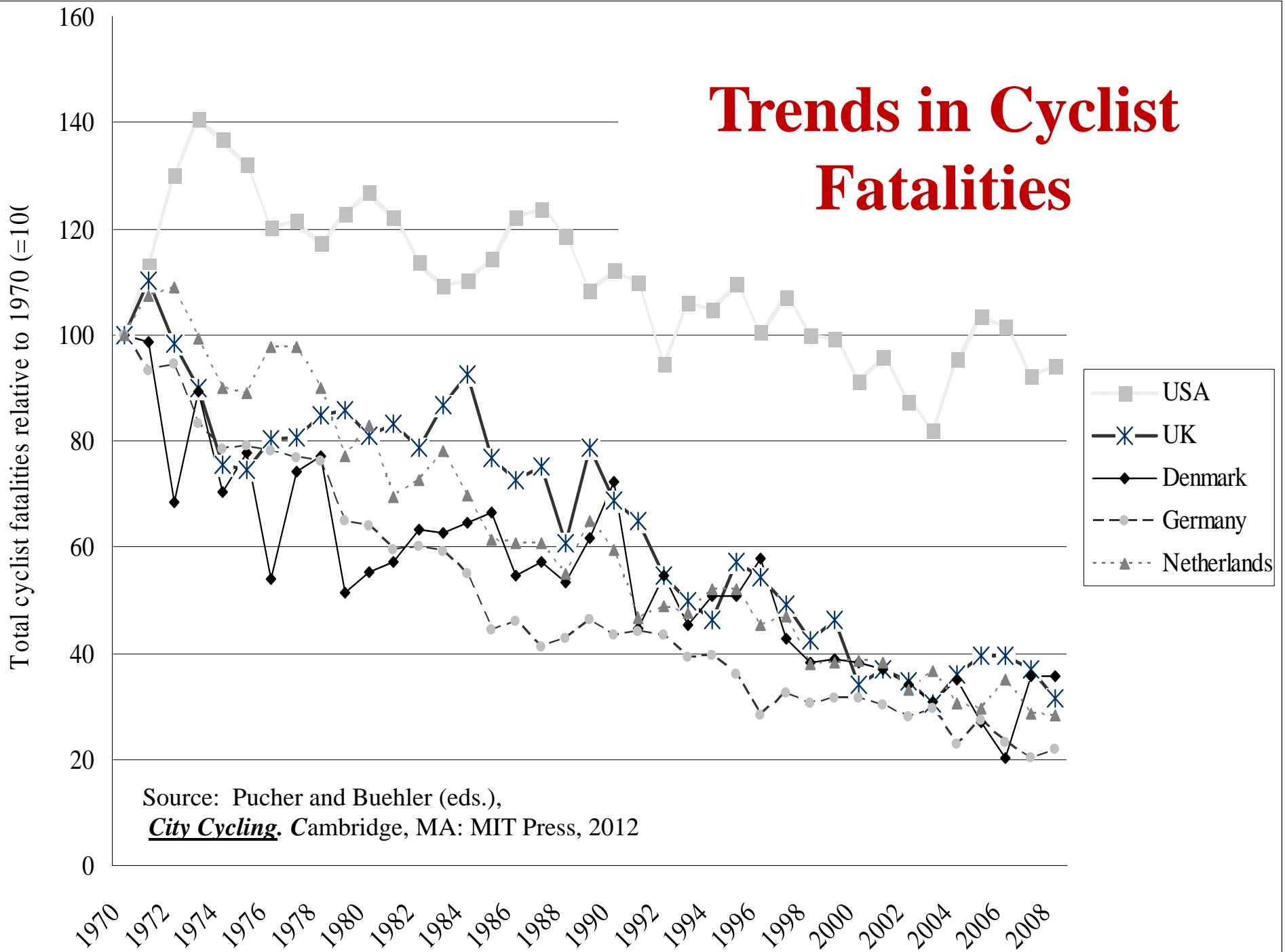
- Especially important for the young, the old, for anyone with disabilities, for the timid or risk-averse**
- Women more sensitive to safety than men**
- Safety of walking and cycling in the Netherlands, Denmark, and Germany helps explain high levels of walking and cycling there**



Source: Pucher and Buehler (eds.), *City Cycling*. Cambridge, MA: MIT Press, 2012

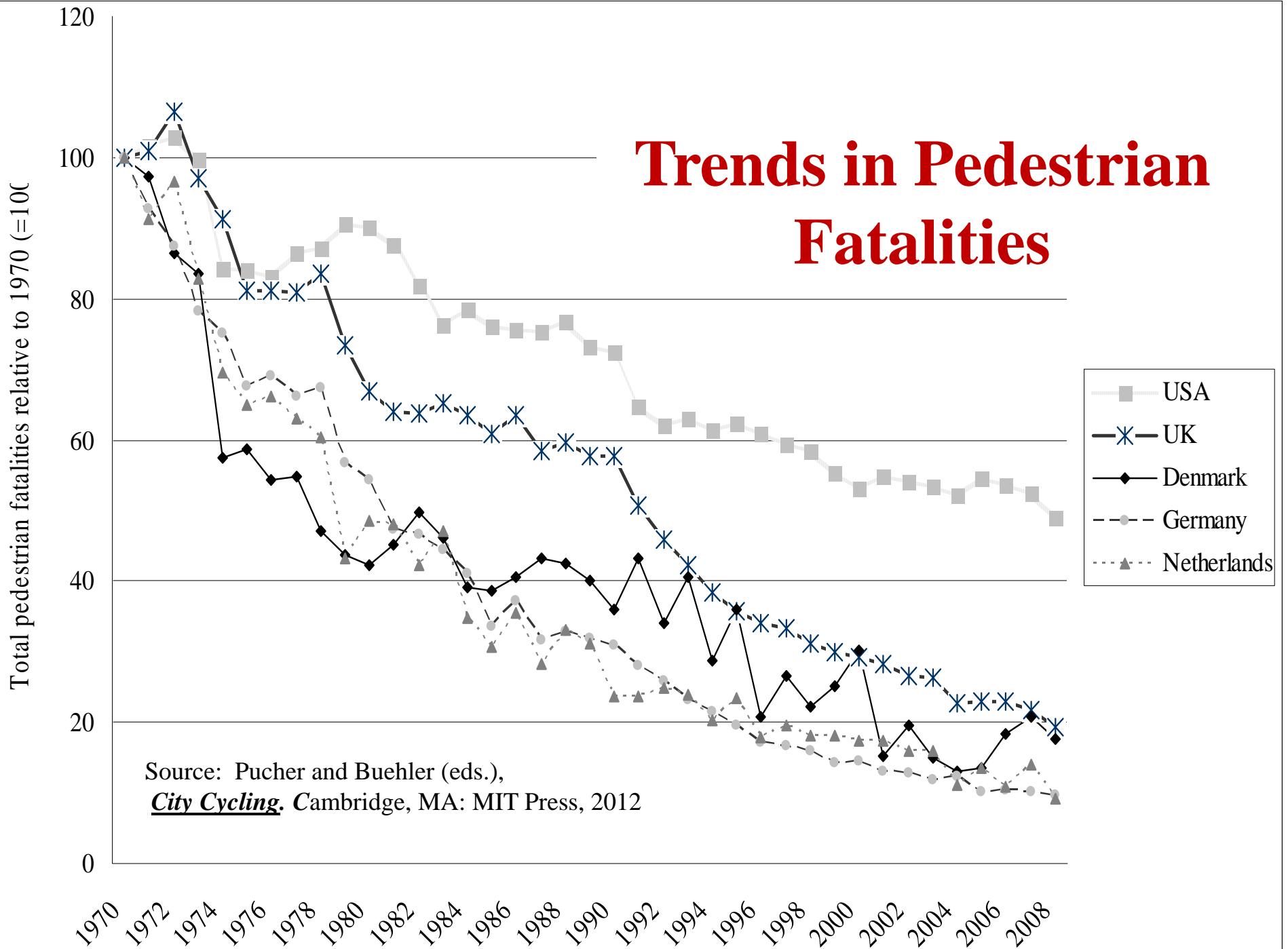


# Trends in Cyclist Fatalities



Source: Pucher and Buehler (eds.),  
*City Cycling*. Cambridge, MA: MIT Press, 2012

# Trends in Pedestrian Fatalities

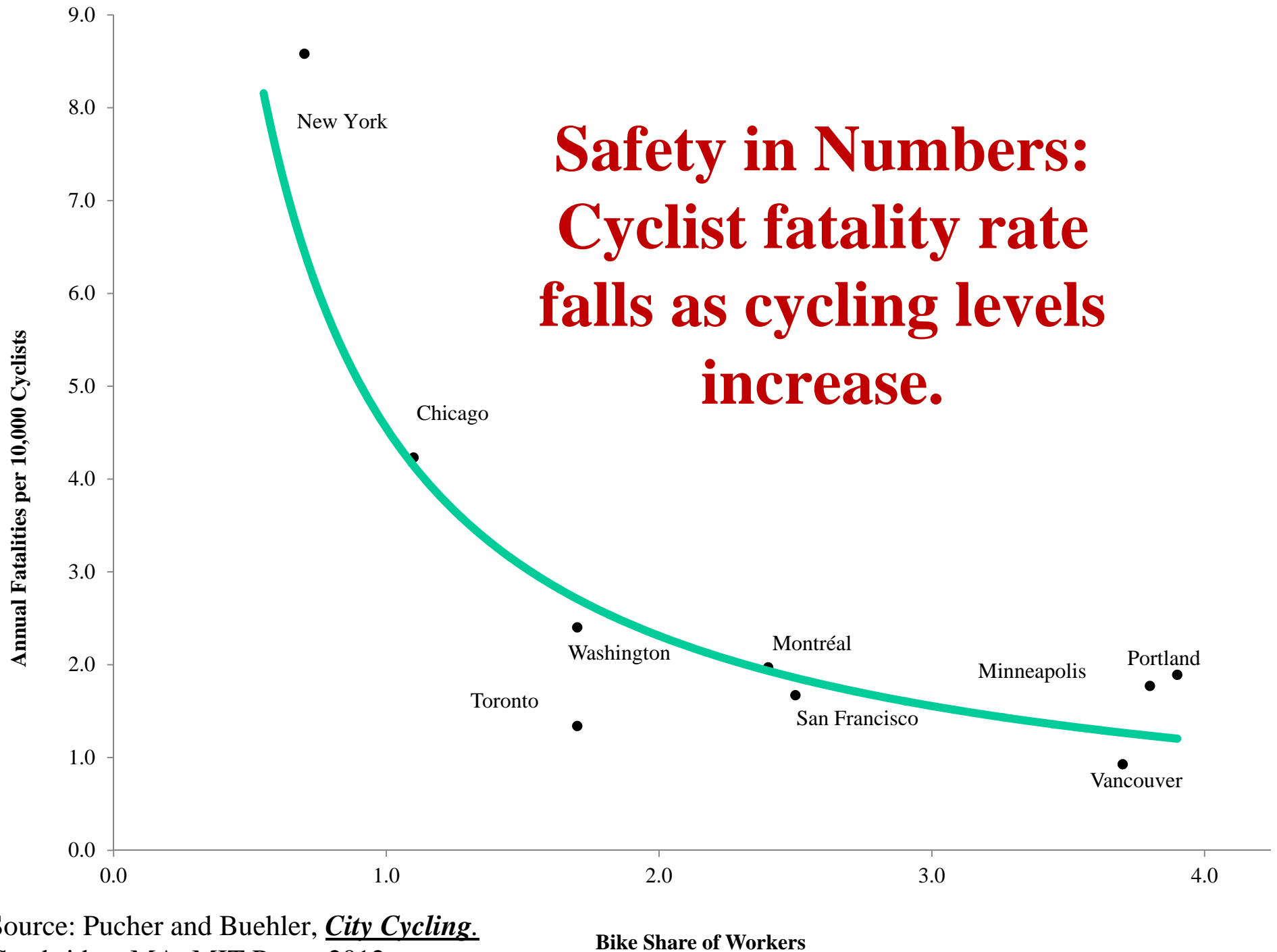


Source: Pucher and Buehler (eds.),  
*City Cycling*. Cambridge, MA: MIT Press, 2012

## **SAFETY IN NUMBERS**

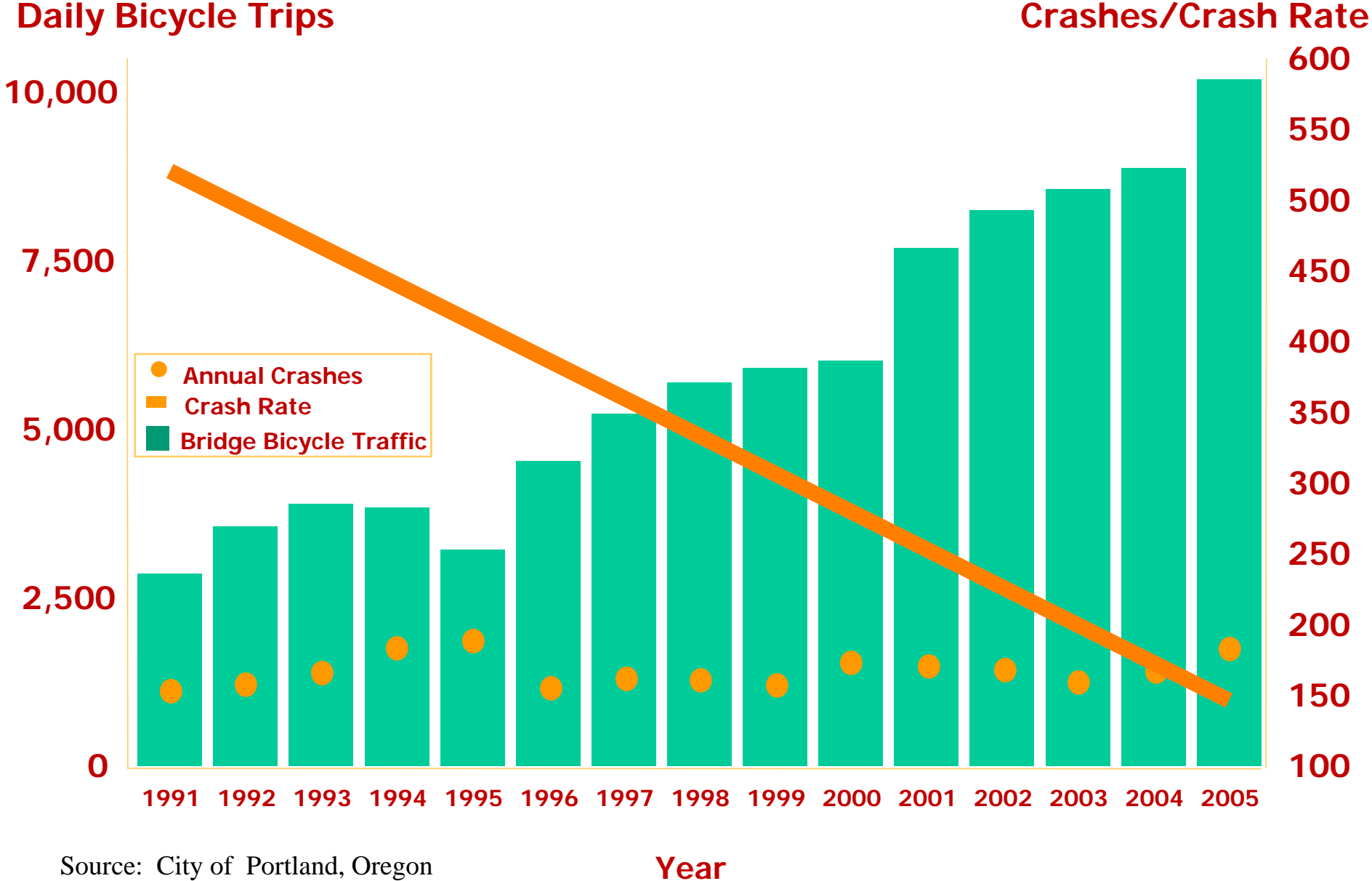
- *As levels of cycling increase, injury and fatality rates per trip and per km traveled fall dramatically*
- *Thus, if we can increase cycling, it will almost inevitably be safer*

# Safety in Numbers: Cyclist fatality rate falls as cycling levels increase.



Source: Pucher and Buehler, *City Cycling*.  
Cambridge, MA: MIT Press, 2012

# Decreasing Crash Rate in Portland



Source: City of Portland, Oregon

# Public Policies Crucial to Walking and Cycling

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- **Pro-car policies in European cities in 1950s and 1960s caused huge decline in walking and cycling**
- **Dramatic policy turn-around since 1970s to limit car use and promote cycling, walking, and public transport in Dutch, Danish, and German cities**

# Bridge in Freiburg BEFORE and AFTER reforms





**Typical residential street in Freiburg BEFORE traffic calming reforms**



**Typical residential street in Freiburg AFTER traffic calming reforms**





**Cathedral Square in Freiburg BEFORE transport and urban planning reforms**

**Cathedral Square in Freiburg AFTER transport and urban planning reforms**



# How to Encourage More Cycling and Walking while Improving Safety

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- **Better cycling and walking facilities**
- **Integration of walk/bike with public transport**
- **Traffic calming of residential neighborhoods**
- **Mixed-use zoning and improved urban design**
- **Restrictions on motor vehicle use**
- **Traffic education and Safe Routes to School**
- **Traffic regulations and enforcement**



**Most  
European  
cities have  
extensive car-  
free districts  
ideal for  
walking and  
cycling**



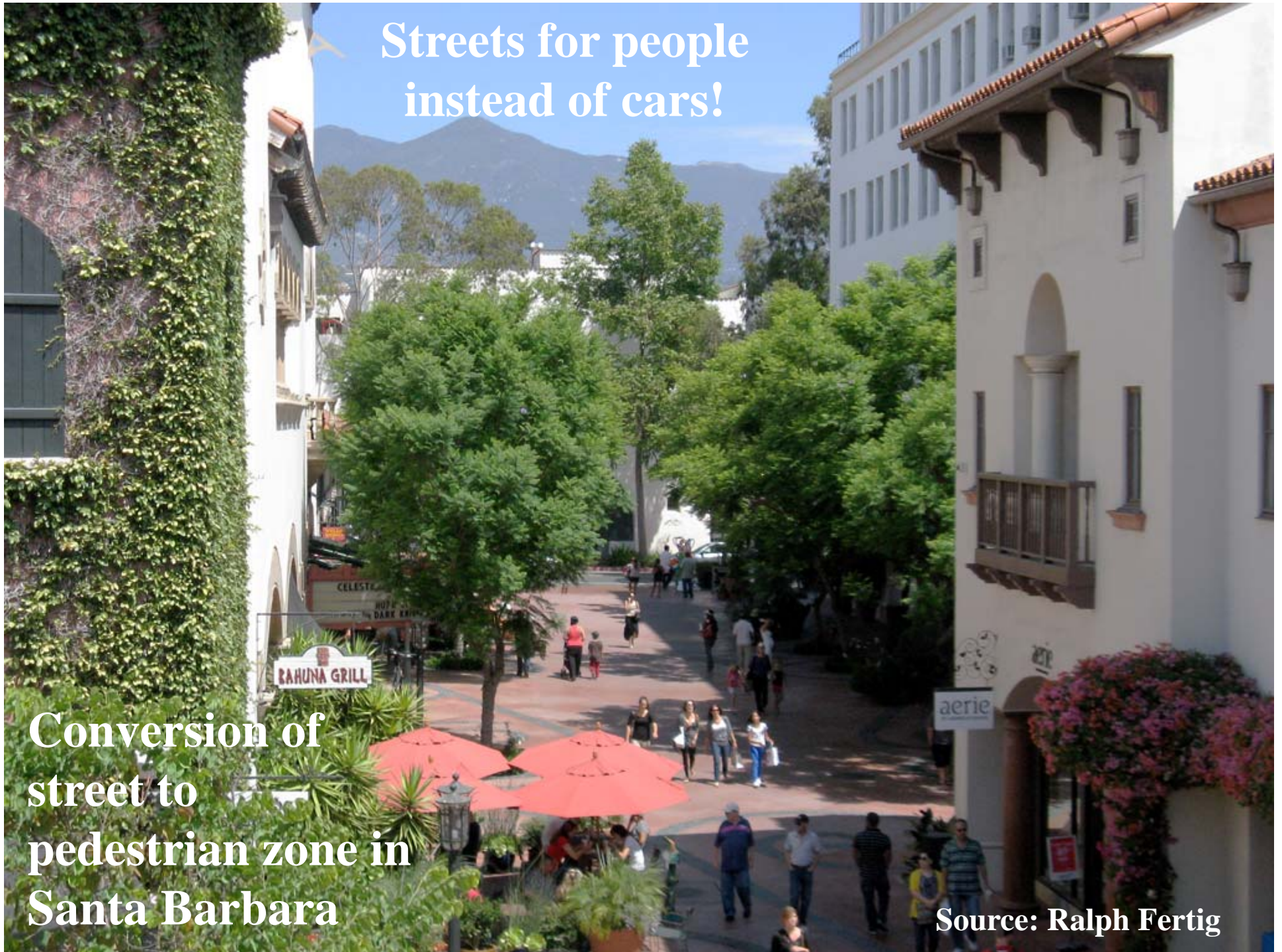
Lively  
pedestrian  
zone in  
Québec  
City

Source: Marie Demers

Streets for people  
instead of cars!

Conversion of  
street to  
pedestrian zone in  
Santa Barbara

Source: Ralph Fertig





# Safe and pleasant “Shared Street” at Harvard Square

Source: City of Cambridge



**7 km/hr speed  
limit**

Shared streets: Typical  
traffic calming in new  
German suburbs



Source: Ralph Buehler



**Times Square**

**Herald Square**



Source: Ralph Buehler

# Car-free Broadway in New York City



# Car-free college campuses: UNC Chapel Hill



# Car-free college campuses: UC Santa Barbara





**Which crosswalk do YOU think is safer?**



# Lots of walking and cycling at UC Santa Barbara



Crucial separation of pedestrians and cyclists  
with high volumes of walking and cycling

A photograph of a coastal path in Santa Barbara, California. The path is paved and runs parallel to a road on the left and a grassy area on the right. Two cyclists are riding away from the camera on the path. The path is lined with tall palm trees and other vegetation. In the background, there are mountains under a clear blue sky. The path is wide and appears to be a dedicated space for cyclists and pedestrians.

**Santa Barbara coastal path:  
Safe and attractive both for  
cyclists and pedestrians**

**Conversion of two  
car lanes to bike  
path and wider  
sidewalk**

Source: Ralph Fertig

BEFORE

AFTER

# Provision of physically protected cycle track in San Francisco by narrowing excessively wide car lanes



Source: San Francisco  
Bicycle Coalition

CARGO WAY AND JENNING



**Bike paths in Dutch cities  
make it safe and  
comfortable for all to bike:  
including women, children,  
and seniors**

Source: Warren Salomon

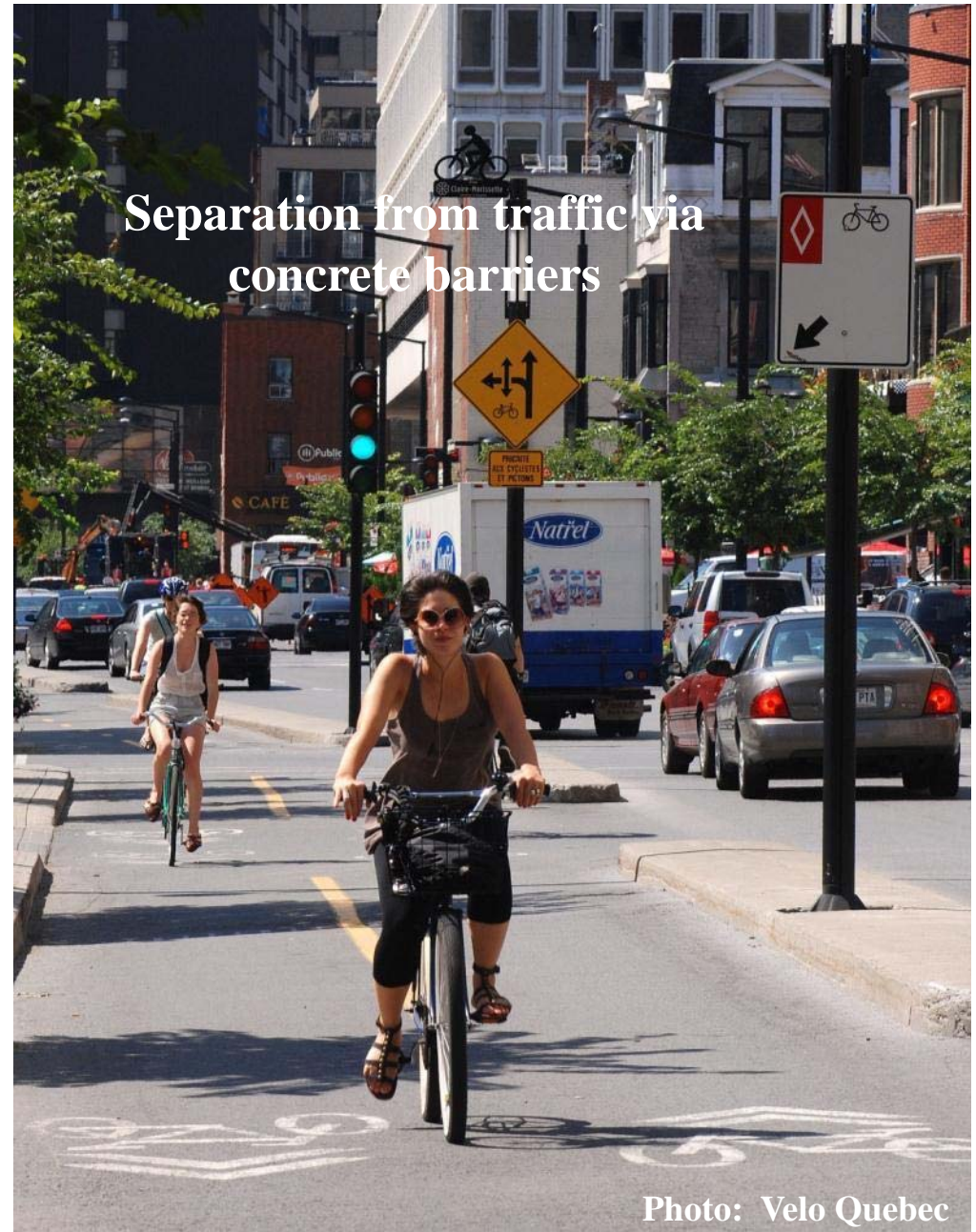
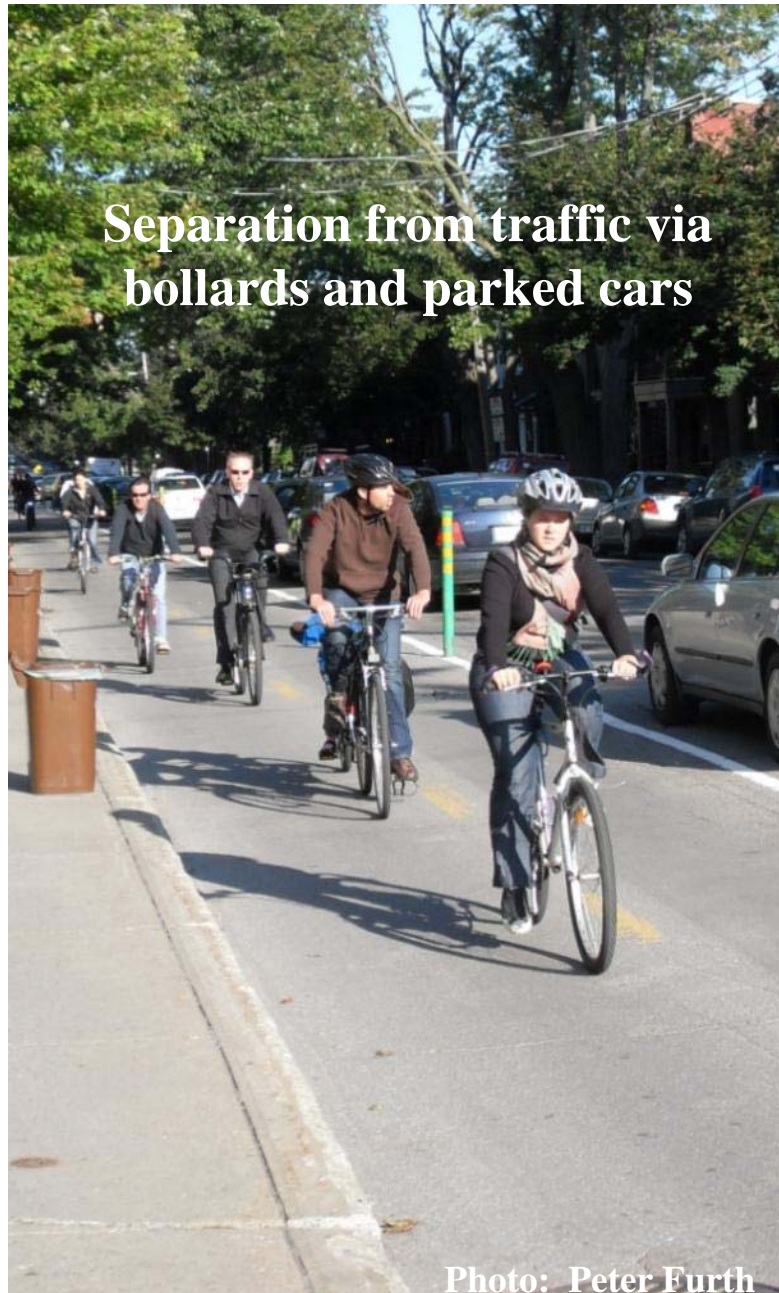
# One-way cycle track in The Hague



Source: Peter Furth



# Almost 100km of 2-way cycle tracks in Montreal





- 250 mi of new bike lanes and paths since 2005
- doubling in bike trips
- halving of cyclist fatalities from 28 to 14

Photo: NYC DOT

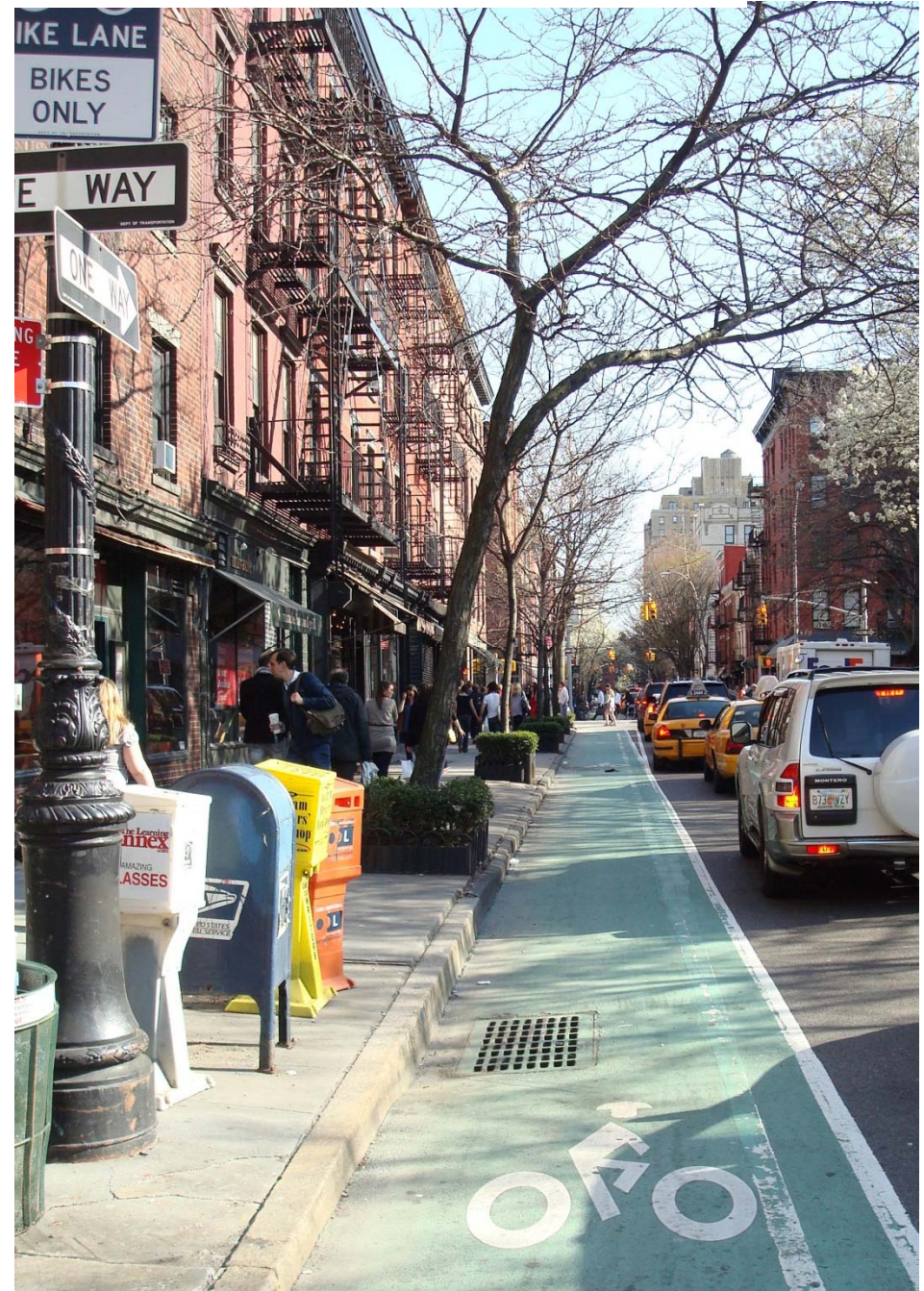
**Traffic-protected cycle track on 9<sup>th</sup> Avenue, NYC**

# Cycle track on Pennsylvania Avenue in Washington



**Source:  
Ralph Buehler**

# Bike lanes are much more typical in US cities

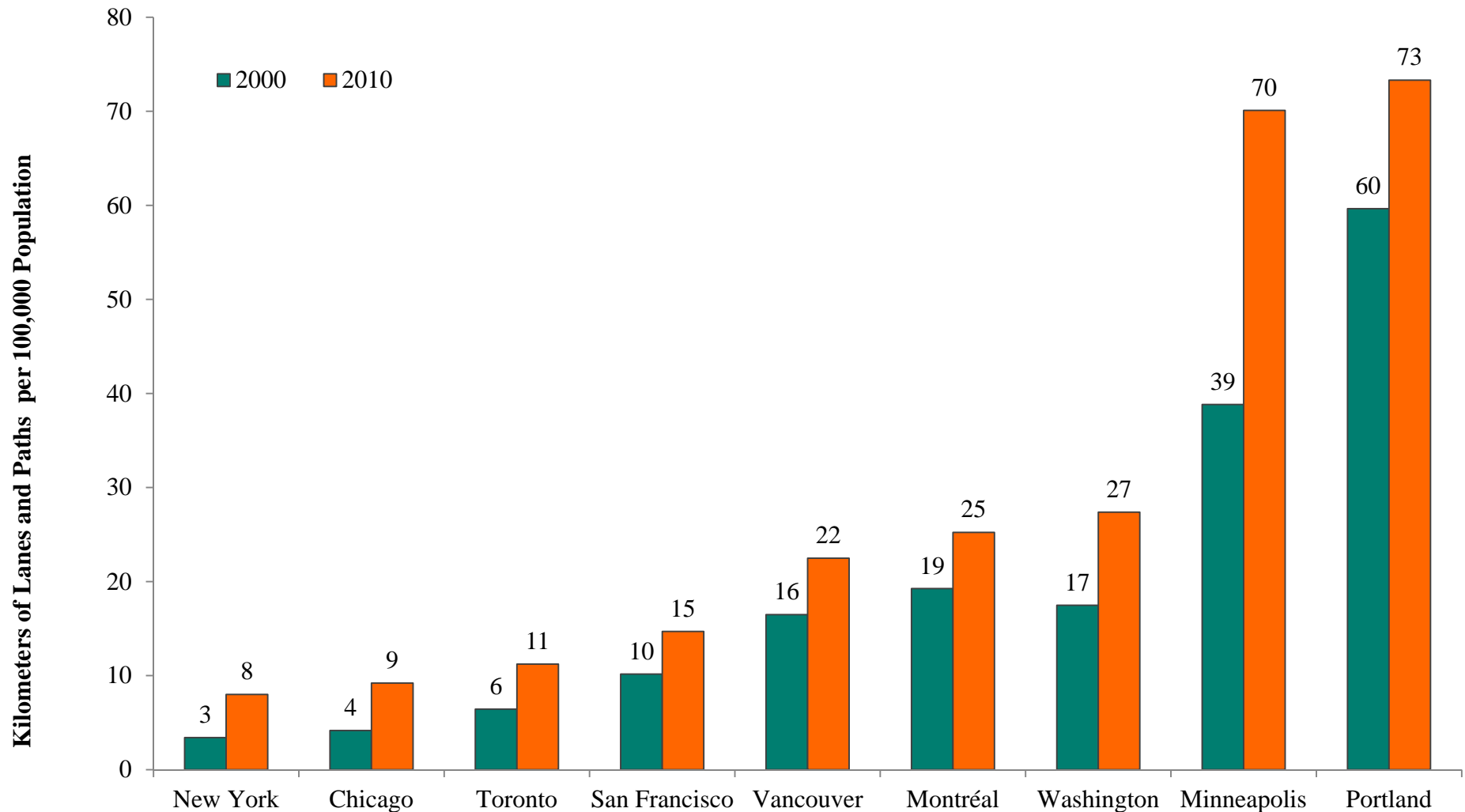


# Dutch bicycle facility selection matrix

Lane Configuration	Average daily traffic (vehicles / day)	Street type and speed limit			
		Urban local street 30 km/h (19 mph)	Urban through street 50 km/h (31 mph)	Rural local road 60 km/h (37 mph)	Fast traffic road 70+ km/h (44+ mph)
2-way traffic with no centerline	≤ 2500	mixed traffic <sup>1</sup>	bike lane <sup>2</sup> or cycletrack <sup>3</sup>	advisory bike lane <sup>4</sup>	cycle track or low-speed service road
	2000 to 3000			bike lane <sup>2</sup> or cycle track <sup>5</sup>	
	3000 to 5000				
	> 4000	bike lane or cycle track <sup>3</sup>			
2 lanes (1+1)	any	bike lane or cycle track	bike lane or cycle track <sup>3</sup>		
4 lanes (2 + 2) or more	any	(does not exist)	cycle track or low speed service road		

**Source: Peter Furth, "Cycling Infrastructure," in Pucher and Buehler, eds. *City Cycling*, MIT Press, 2012.**

# Trend in Bike Paths and Lanes per 100,000 Population in Nine Large North American Cities, 2000-2010





About 20,000  
daily bike trips  
over Portland  
bridges

Photo: Greg Raisman

# Safe and convenient bridge crossings crucial for cycling



Foto by Peter Berkeley



# Provision of cycle track at this key underpass in Montreal

4,10 m  
↓



Photo: Velo Quebec



**Special traffic signals and signs give priority to cyclists**



# Four-way all-green signal for cyclists in Portland





Pedestrian Scramble in Toronto

Photo by Ralph Buehler

# Red bike lanes for intersection crossings, connected with red brick sidepaths on both sides of every road



Source: City of Muenster, Germany

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

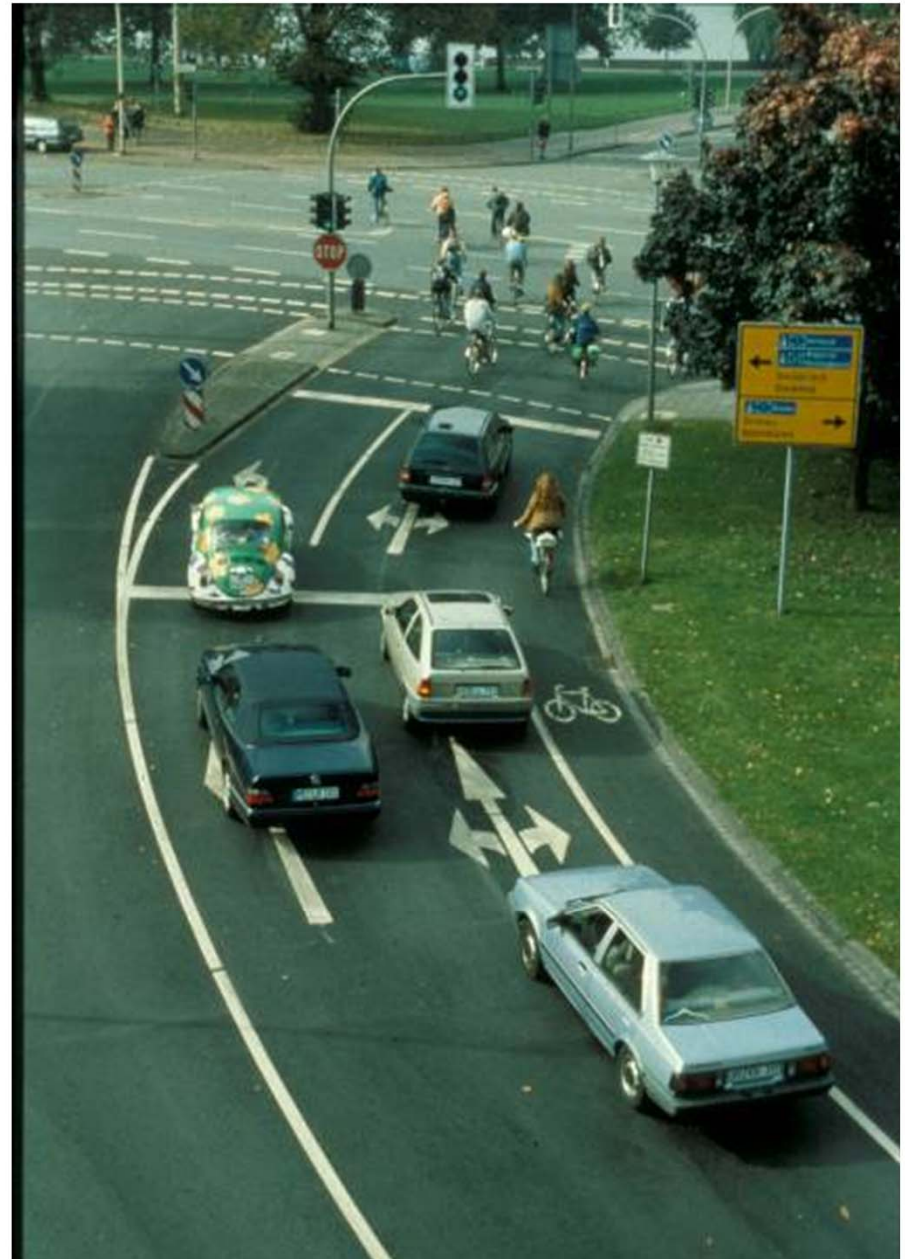




Photo by Ralph Buehler

Advanced stop line for cyclists in Berlin



Photo by  
Jennifer Dill

Advanced stop line and bike box in Portland



Foto: Gord Price



Foto: Gord Price

## Bike boxes in Vancouver



Foto: Rich Drdul



**Raised curb  
protects  
bike path  
from cars**

**Green wave  
for *cyclists* in  
Odense,  
Denmark**

Troels Andersen, "Cycling in Odense, Denmark"



**Express  
bikeways  
for  
commuters**



**Bike speed  
indicators**



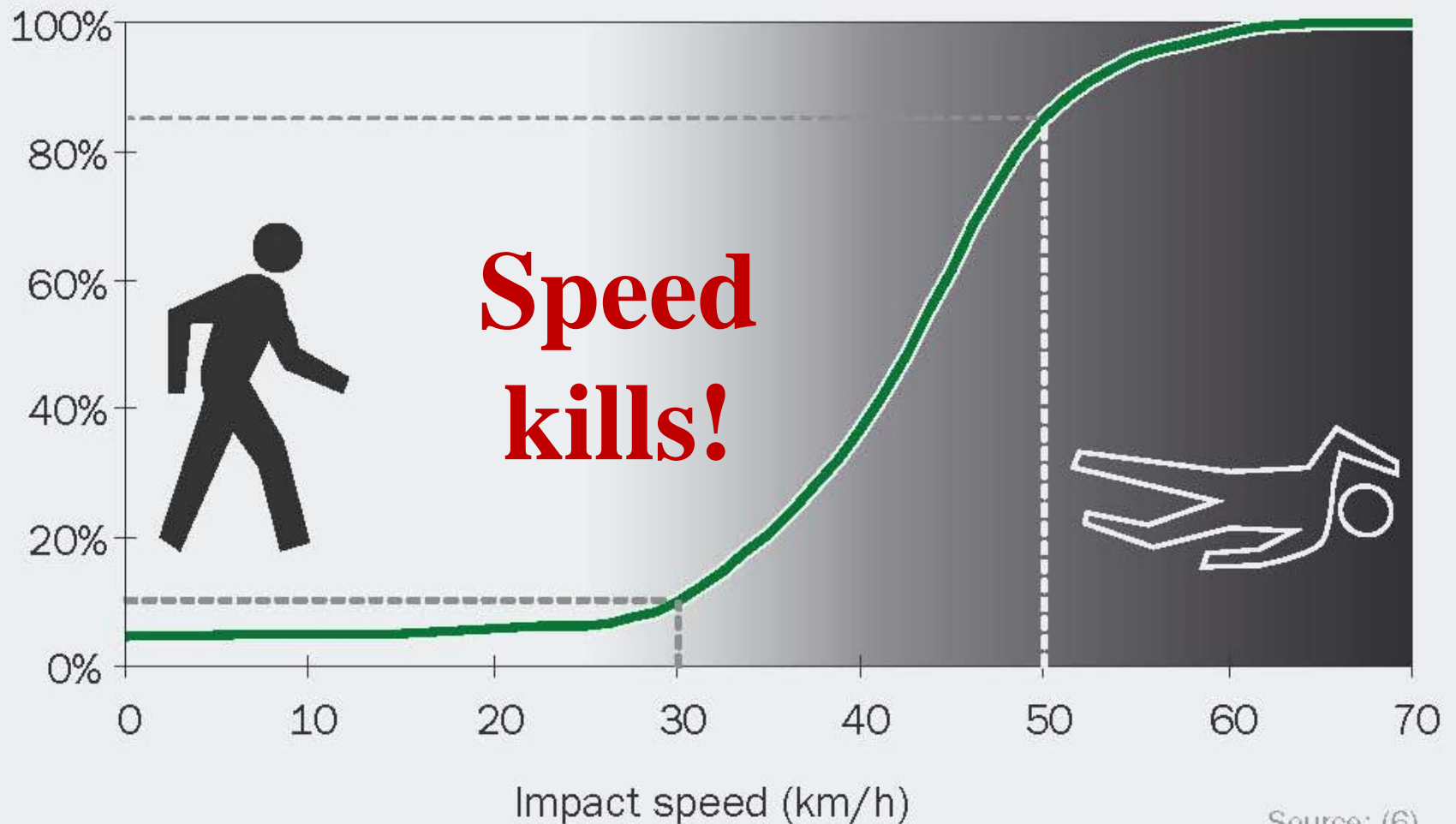
# **Traffic Calming of Residential Neighborhoods**

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- **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

# Why Traffic Calming Saves Lives

**Figure 1.1** Probability of fatal injury for a pedestrian colliding with a vehicle



Source: (6)

Source: World Health Organization (2008) and OECD Transport Research Centre (2006)



Foto by Peter Berkeley

**Convenient bike cut-thru for cyclists, dead-end for cars**

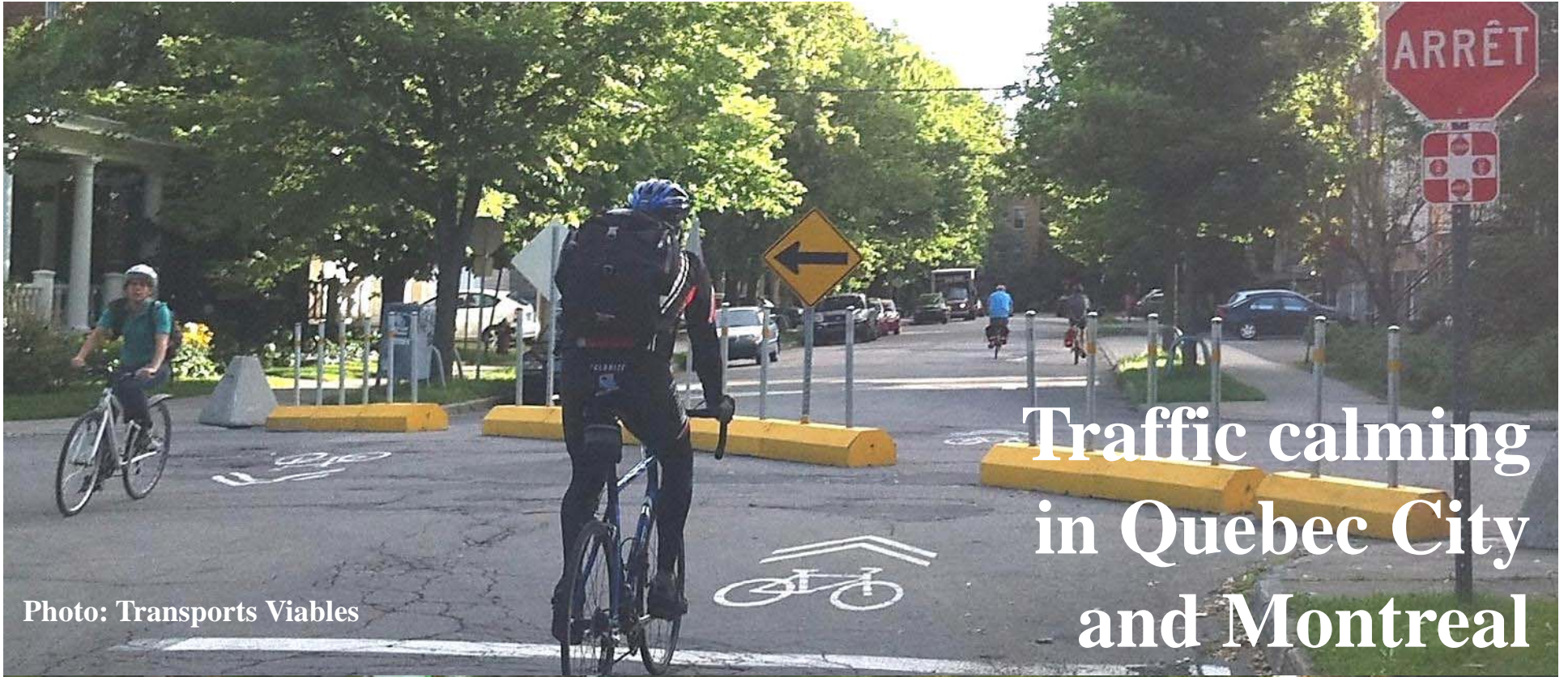


Photo: Transports Viables

# Traffic calming in Quebec City and Montreal



Cheap, easy, and very  
effective traffic diverters

Photo: Velo Quebec

Source: Eric Anderson

**Barrier island  
to block cars**



Traffic diverter in  
Berkeley which  
provides a through  
connection for two bike  
boulevards



**Dozens of dead-ends for motor vehicles in Sydney, Australia to prevent through traffic in residential neighborhoods, but facilitating permeability and route flexibility for pedestrians and cyclists**



# Traffic Calming in Freiburg, Germany

Cheap, easy, fast, and effective improvement in cycling and walking safety





Fotos: Jonathan Maus



Traffic  
calming  
turns  
these  
streets  
into  
bikeways



**Bike Boulevards  
in Portland  
(in 15 US cities in 2012)**



# BIKE TRANSIT INTEGRATION



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



Source: Ralph Fertig

# Bikes on Caltrain in San Francisco



*Photo: San Francisco Bicycling Coalition*

# Bi-directional cycle track and bike sharing near metro station in Montréal



Metro station

BIXI bike docking station

Cycle track

Source: Vélo Québec





Hubway Bikeshare in Cambridge, Boston, Somerville, and Brookline



Nice Ride in Minneapolis



Capital Bikeshare in Washington, DC

**Over 20 bike sharing systems in North America**



# Bike Station next to Union Station in Washington, D.C.

*Photo: Ralph Buehler*

**T** Commuter Bike Parking  
WEST CAGE

300-bike parking spaces in two bike cages at northern terminus of subway line in Boston



Bike-transit integration at Alewife Station on Red Line in Boston

Photo: David Loutzenheiser





27 bike corrals in San Francisco



# Conversion of Car Parking to Bike Parking



95 bike corrals in Portland



# Traffic Education

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- **Improved motorist training, with *much* more emphasis on how to avoid endangering pedestrians and cyclists**
- **Compulsory traffic safety lessons for all school children by the age of 10, with testing by traffic police on actual traffic test courses, to ensure safe and defensive walking and cycling by an early age (as in the Netherlands and Germany)**



**German traffic laws generally favor cyclists and pedestrians over motorists**





## **Cycling training and testing course in Berlin**

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





**Bike path leads directly to school in NL**

# **Children who bike or walk to school learn better than those who are driven!**

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- **Study of over 20,000 Danish school children**
- **Children who walked or biked to school were more attentive and able to concentrate**
- *Mental alertness advanced to the equivalent of someone half a year further in their studies!!*
- *Walking and cycling to school had more of an impact on improving school performance than having breakfast and lunch!!!*

**Source: Egelund et al. (2012)**

Source: NJ Bike Walk Coalition



## **Bike Training for Children in New Jersey**



# Cycling training course for adults





# Police are friendlier and more effective on bikes

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**Summer Streets in  
New York City  
attracts 200,000  
participants on  
Saturdays in  
August**

Over 100,000 participants at LA's fourth annual CicLAvia in October 2012



**CicLAvia: Safe and fun cycling and walking on 9 miles of car-free streets in Los Angeles**

# Somerstreets in Somerville, MA



Source: City of Somerville

# Walking School Bus in Newark, NJ





Source: San Francisco  
Bicycle Coalition

## **Bike to School Day in San Francisco**

# Bike to Work Day in San Francisco



Source: San Francisco  
Bicycle Coalition

# **GIVE EMPLOYEES FREE BIKES!**

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**The perfect zero emissions vehicles!**





Source: Troels Andersen

# Guided Bicycle Tours for Seniors

# New book with MIT Press

<http://citycyclingbook.wordpress.com>

About the authors:

<http://policy.rutgers.edu/faculty/pucher/>

<http://ralphbu.wordpress.com>



# CONCLUSIONS

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- *Walking and cycling are the most sustainable means of getting around our cities*
- *Broad range of environmental, social, economic, and health benefits*
- *Many ways to increase walking and cycling while making them safer*
- *Lots of daily trips in American cities are short enough to cover by walking or cycling*
- *Many cities in Europe and some in North America show what is possible and offer superb examples to follow*

# Thank You!

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⇒ **Archive at [www.walkinginfo.org/webinars](http://www.walkinginfo.org/webinars)**

- Downloadable and streaming recording, transcript, presentation slides

⇒ **Questions?**

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