SUSTAINABILITY, TRANSPORT, & HEALTH

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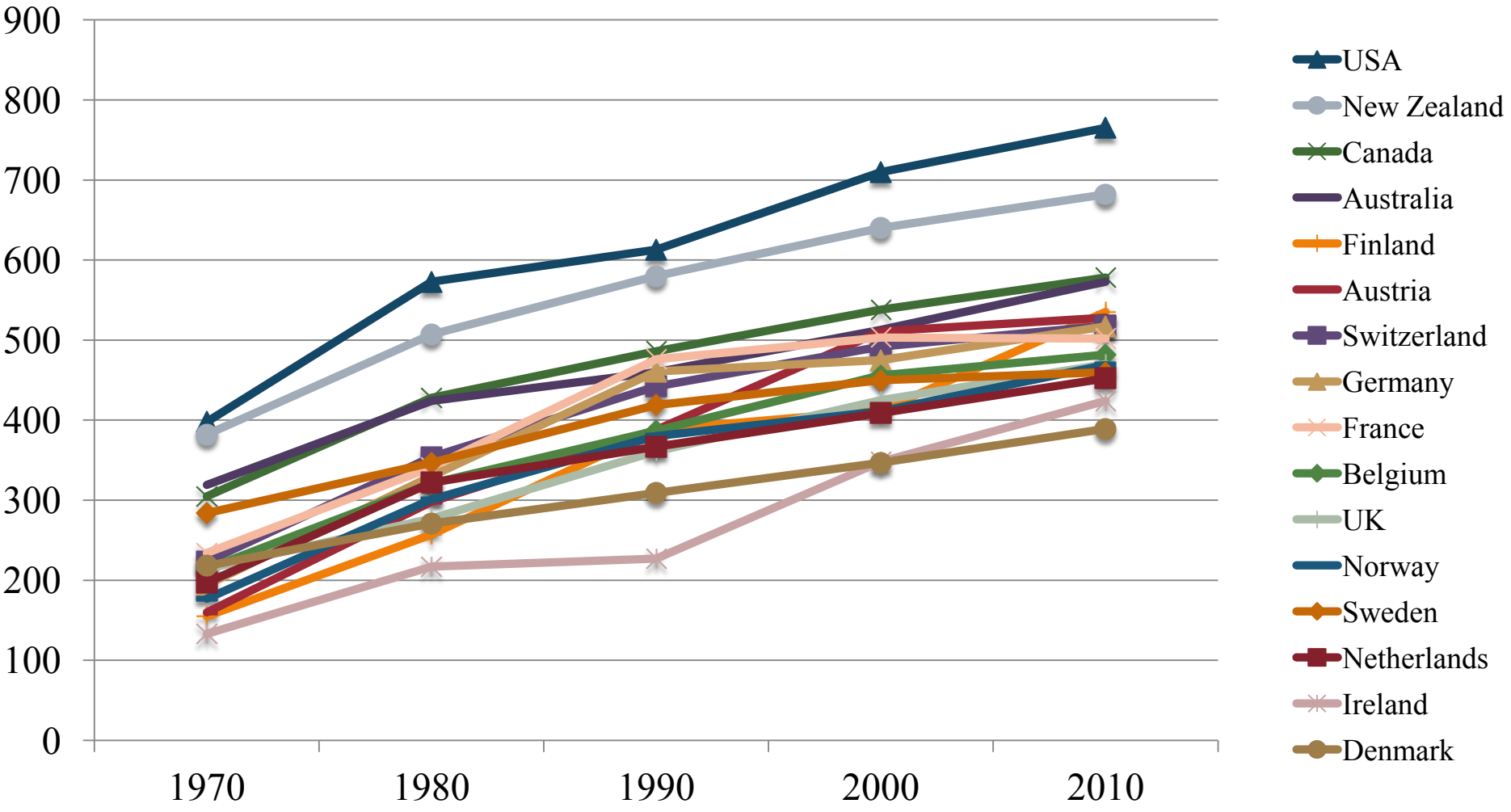
Overview

- Trends in Motorization and Car Use
- Unsustainable Urban Transport
- Urban Travel and Public Health
  - Safety
  - Air Quality
  - Physical Activity
- Policies and barriers to increase sustainable transport and improve public health

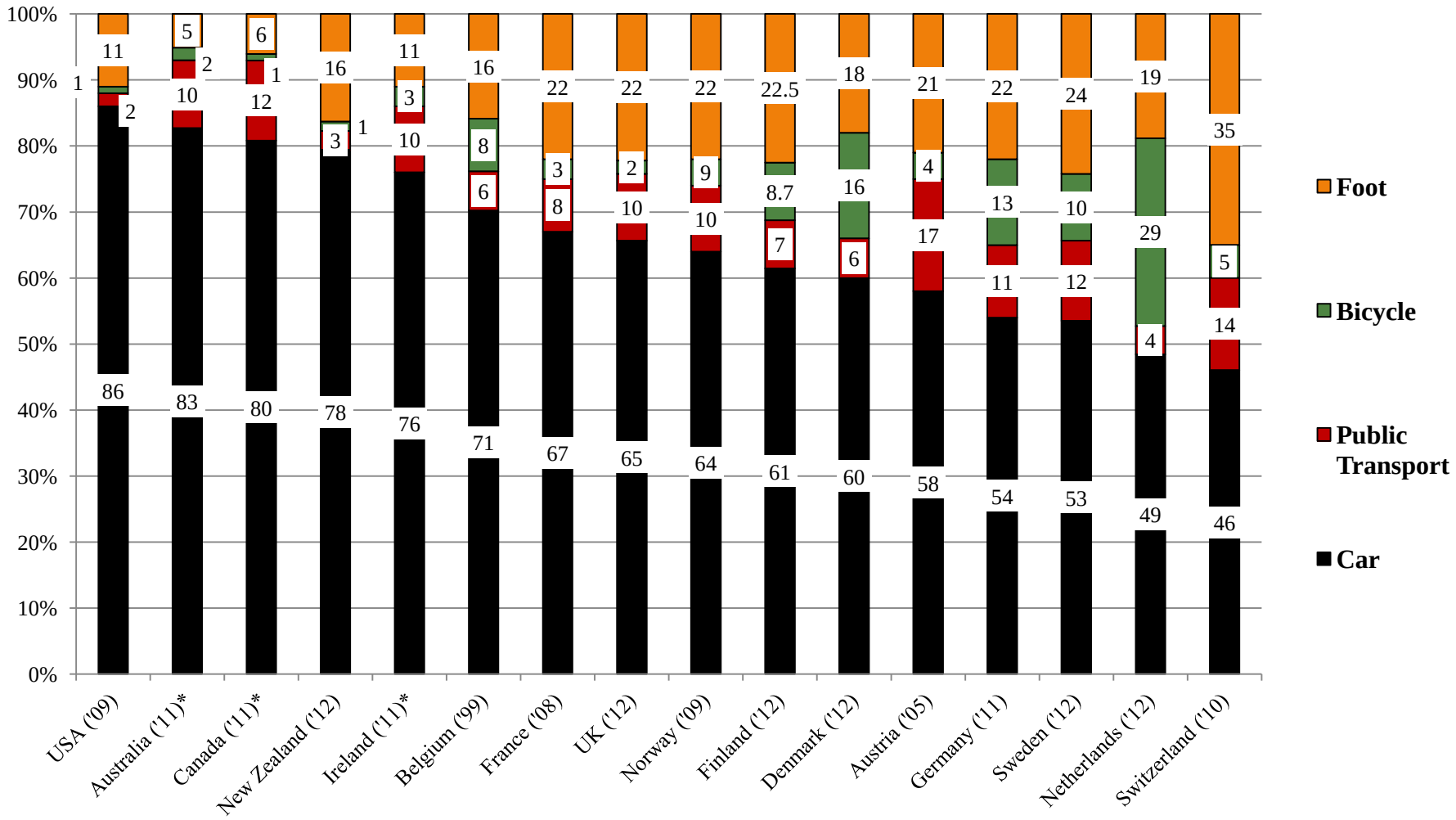
=> International comparison Western Europe and USA

Increasing Motorization in Western Countries, 1970-2008



Source: Buehler, R., Pucher, J. 2011. "Sustainable Transport in Freiburg: Lessons from Germany's Environmental Capital," International Journal of Sustainable Transportation, Vol. 5, pp. 43-70.

Cycling, Walking, and Public Transport Share of Trips in Europe and USA



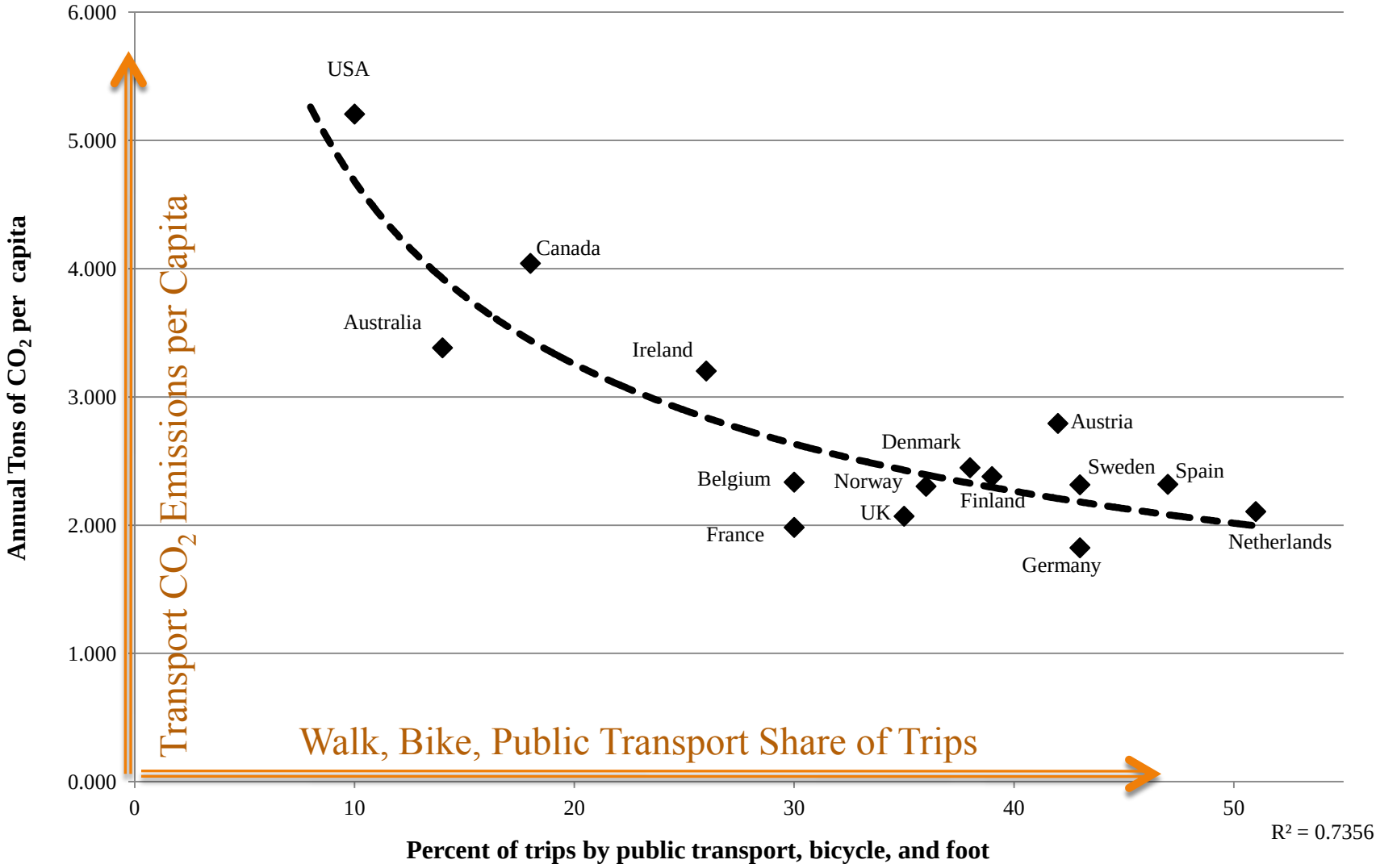
Source: Data collected by author from recent national travel surveys.

Select Indicators for Unsustainable Urban Transport

- **CO_2 emissions and energy use**
- **Household expenditures**
- **Government expenditures**
- **Loss of environmental lands**
- **Loss of public space**
- **Traffic congestion**
- **Public health**

- There are many synergies between making transport more sustainable and promoting public health

Sustainability 1: Walking, Cycling, and Public Transport are Related to Lower CO_2 Emissions per Capita



Source: Buehler, R., Pucher, J. 2011. "Sustainable Transport in Germany: Lessons from Germany's Environmental Capital," International Journal of Sustainable Transportation, Vol. 5, pp. 43-70.

Sustainability 2: Pedestrians, Bikes, and Buses Take up 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

Source: City of Muenster

Three Key Connections Between Sustainable Transport and Public Health

- Safety
- Air-quality
- Physical activity

⇒ *Equity cross-cutting issue*

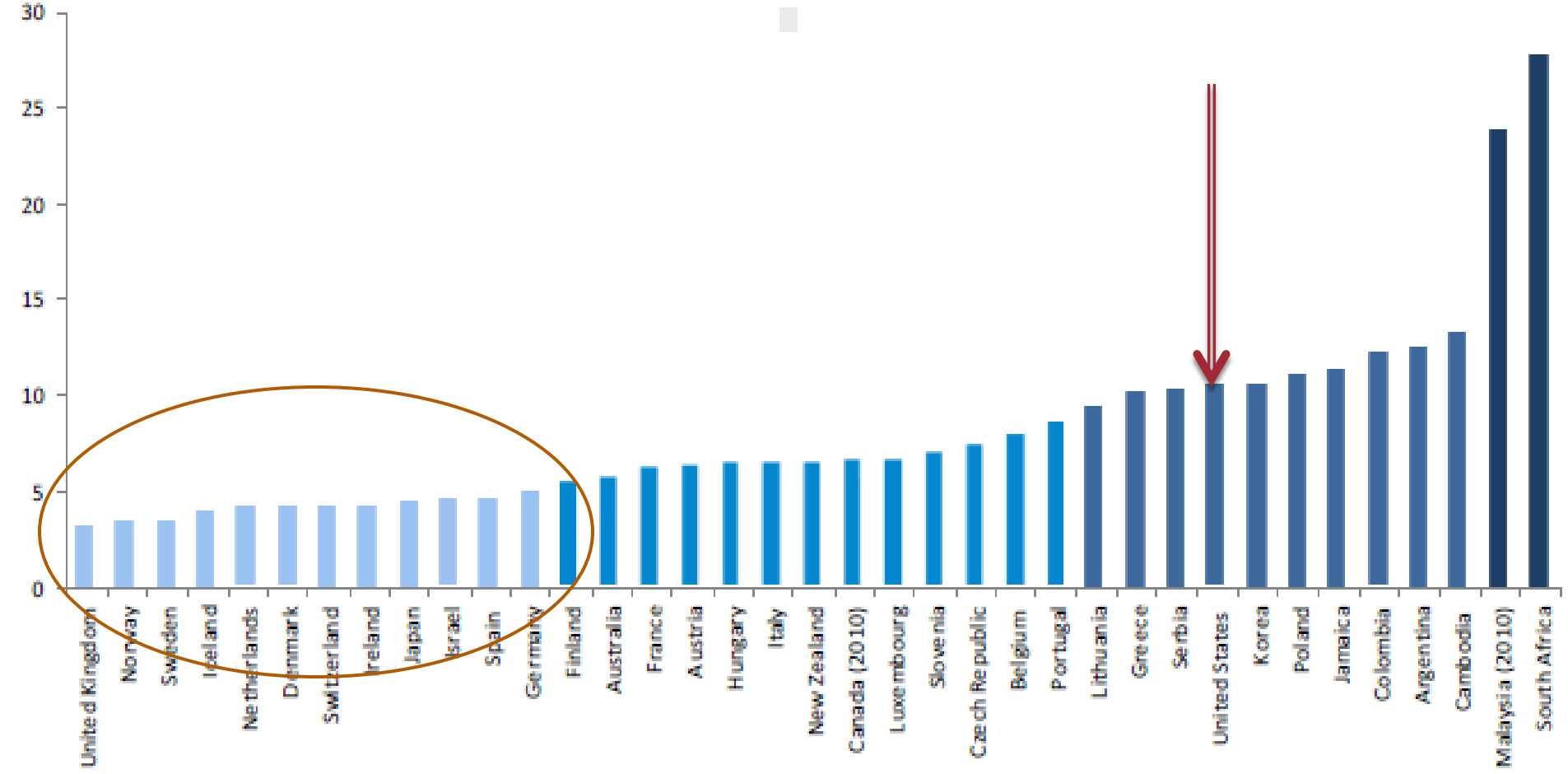
Sources: Handy, S. 2013. Health and Travel. Springer Science; APHA 2013. Intersection of Public Health and Transportation. APHA, Washington, DC.

Safety (traffic injuries and fatalities)

- Global problem
  - Worse in low and middle income countries than in high income countries
  - USA about 32,000 fatalities per year
  - USA improvement slower than in other countries
    - e.g. U.S. death rate per 100,000 population declined from 26 in 1970 to 10.4 in 2011, other OECD countries from ~25 to <5)
- Risk varies by mode of travel and population sub-group

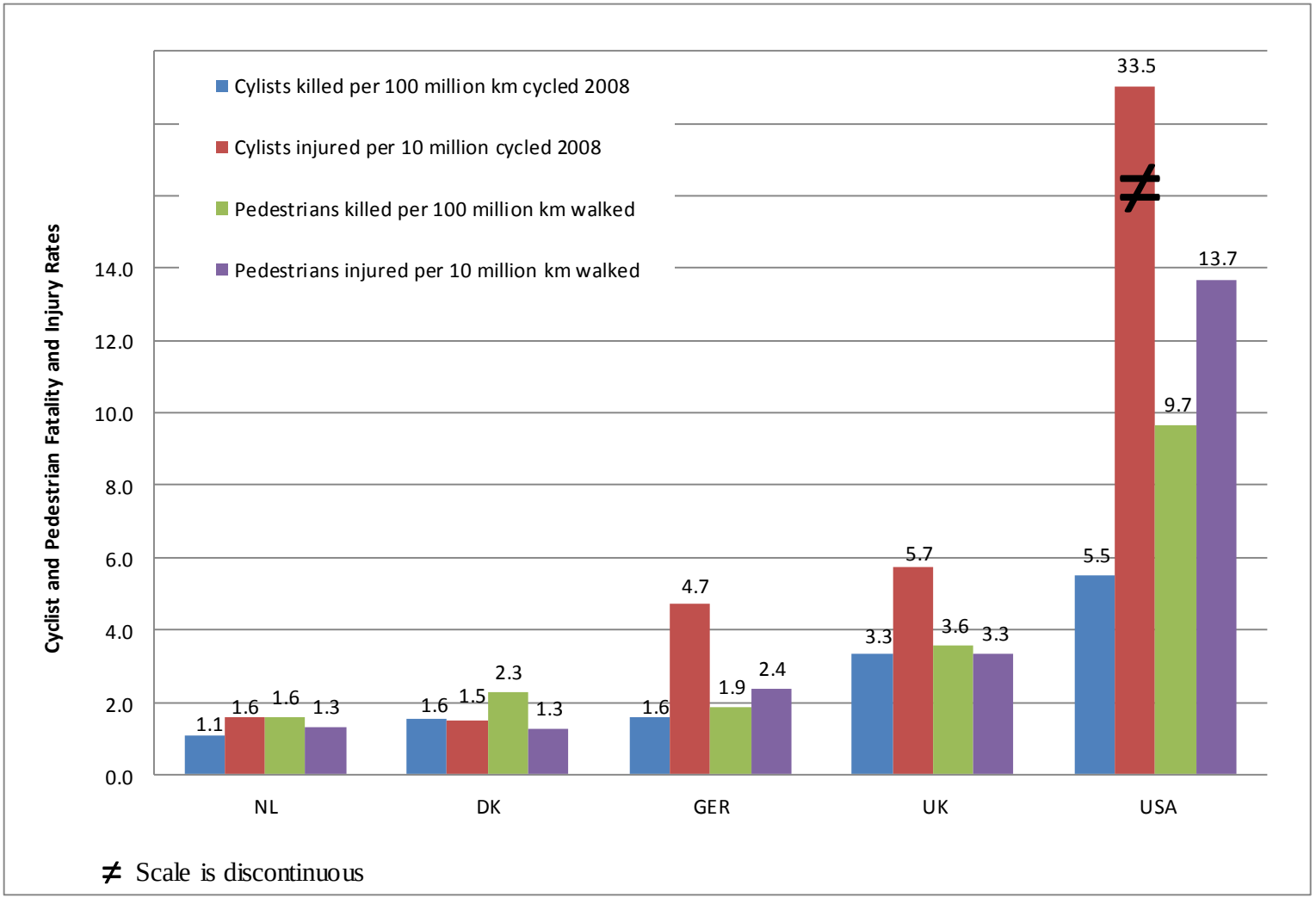
Sources: Handy, S. 2013. Health and Travel. Springer Science; APHA 2013. Intersection of Public Health and Transportation. APHA, Washington, DC.

Roadway Fatalities per 100,000 Population



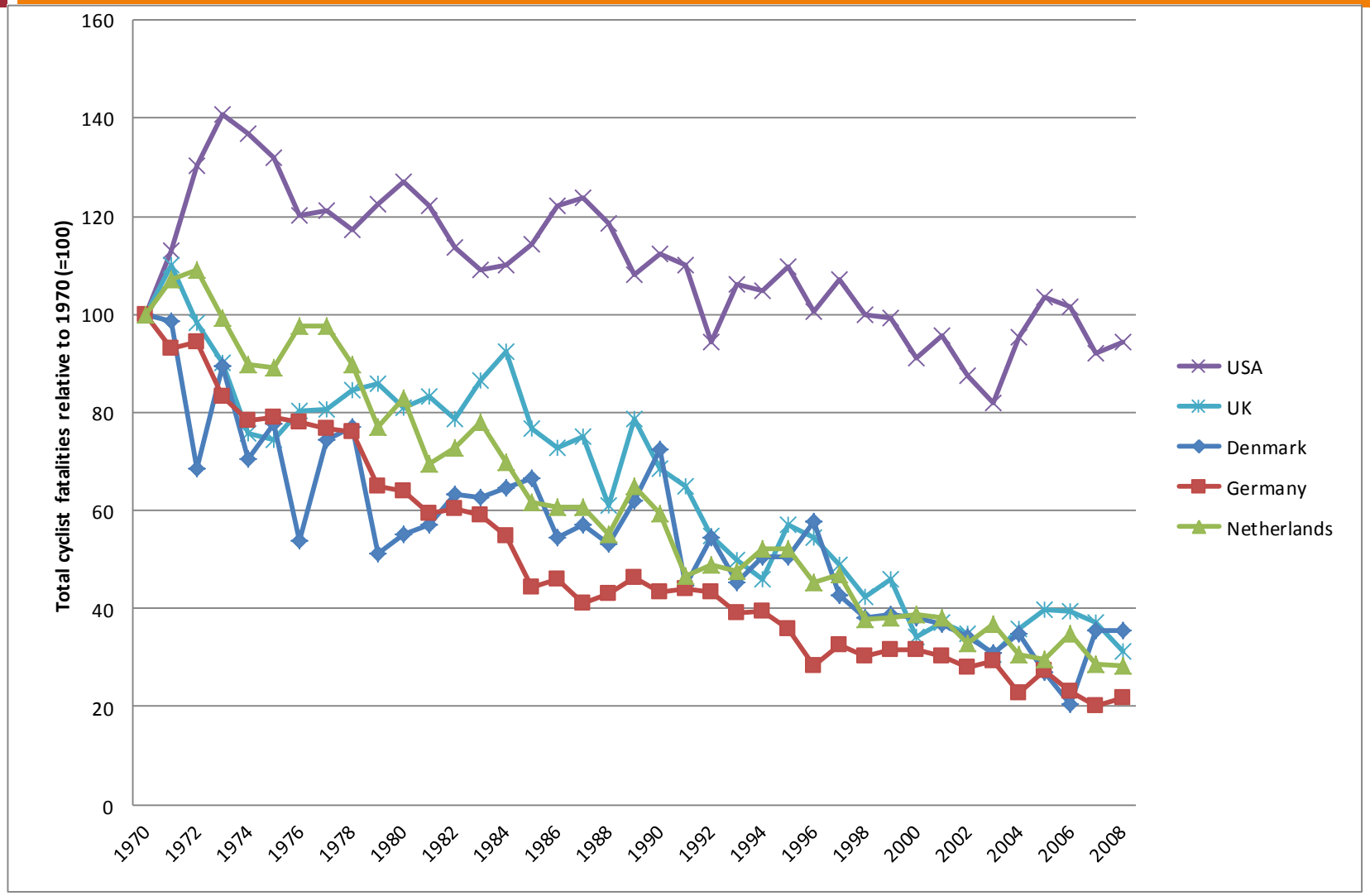
Source: IRTAD, 2013. http://internationaltransportforum.org/irtadpublic/pdf/13IrtadReport.pdf

Cyclist and Pedestrian Fatality and Injury Rates, 2007-2010



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

Trends in Cyclist Fatalities, 1970-2008



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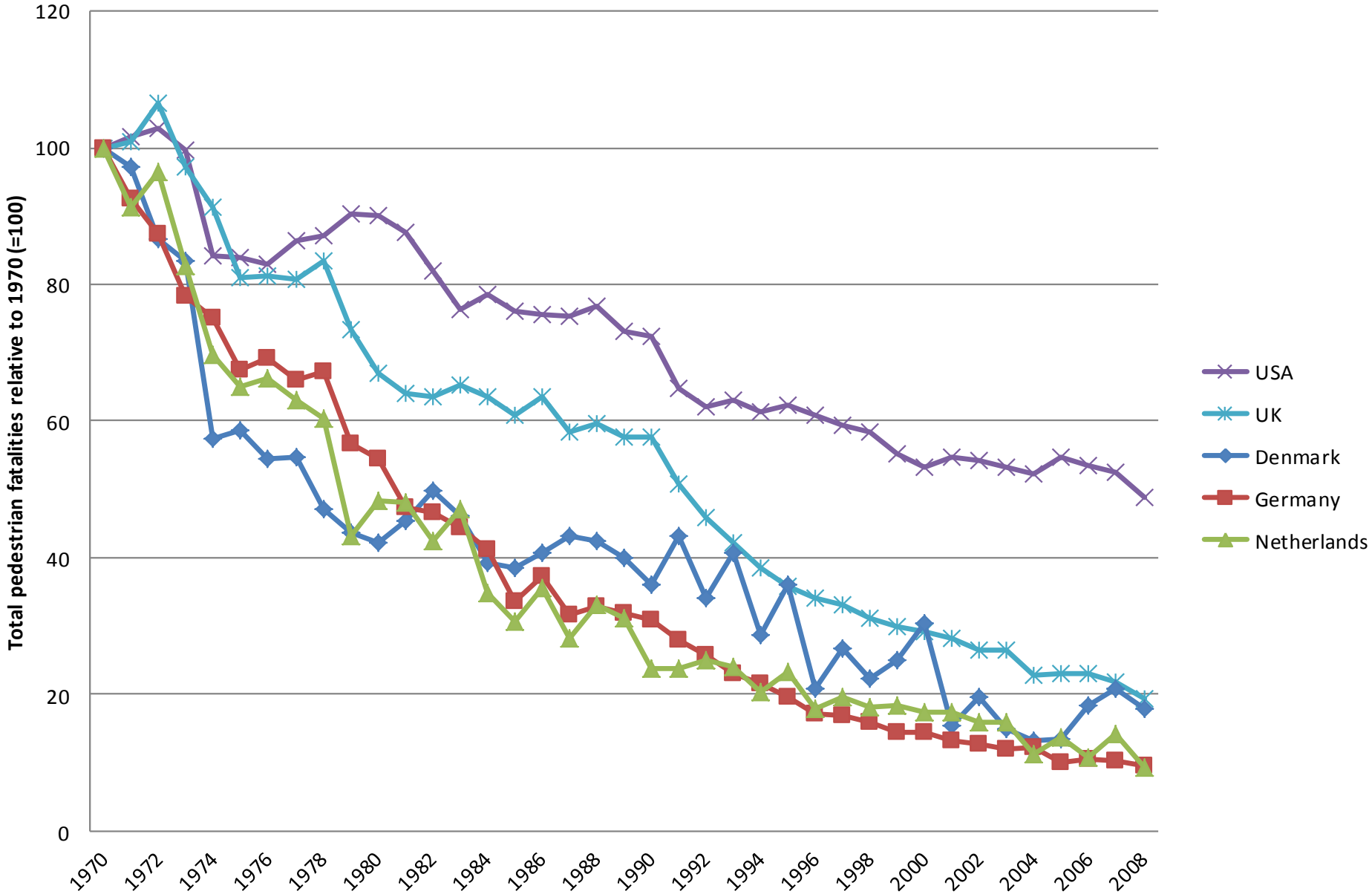
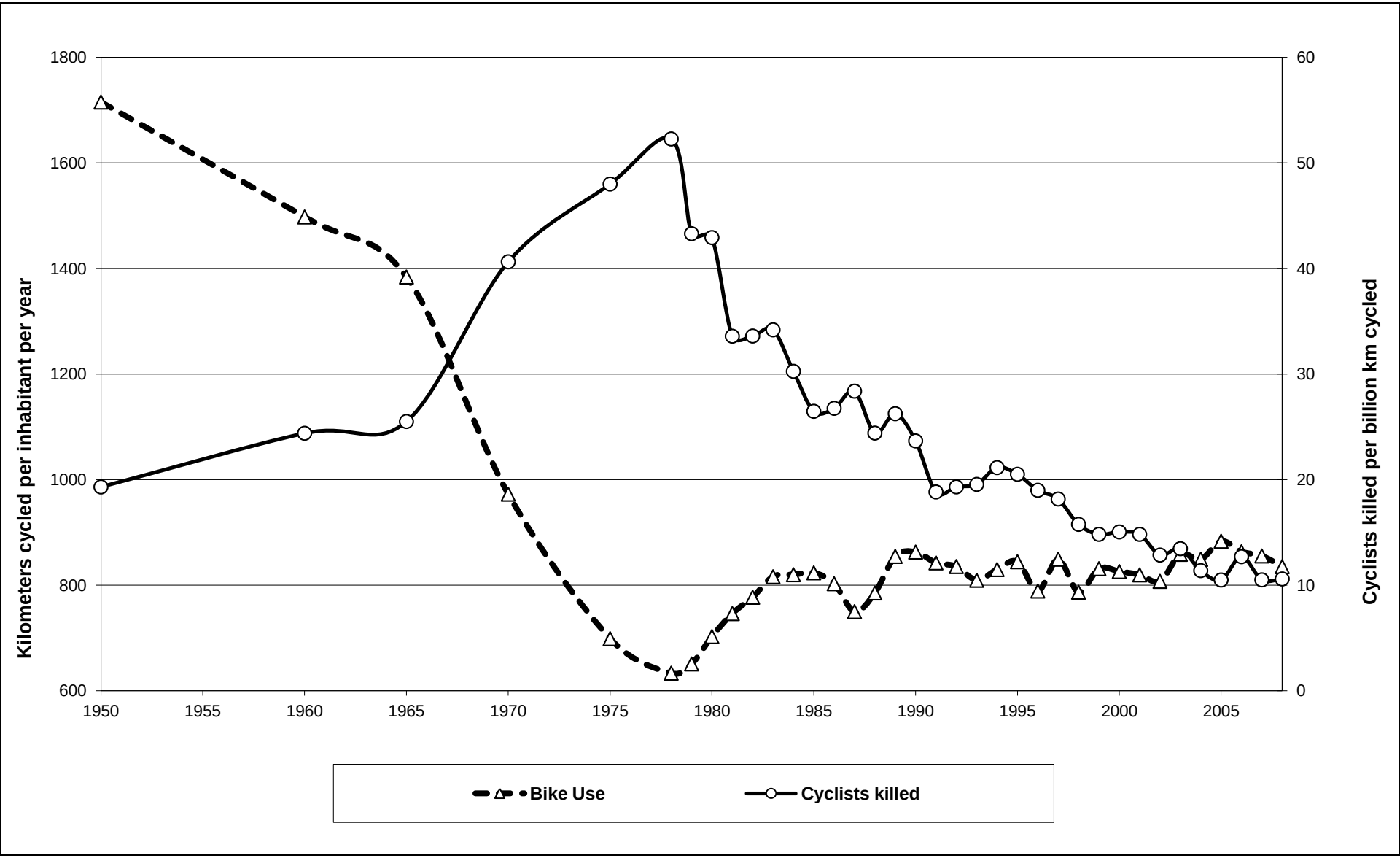
Trends in Pedestrian Fatalities, 1970-2008



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

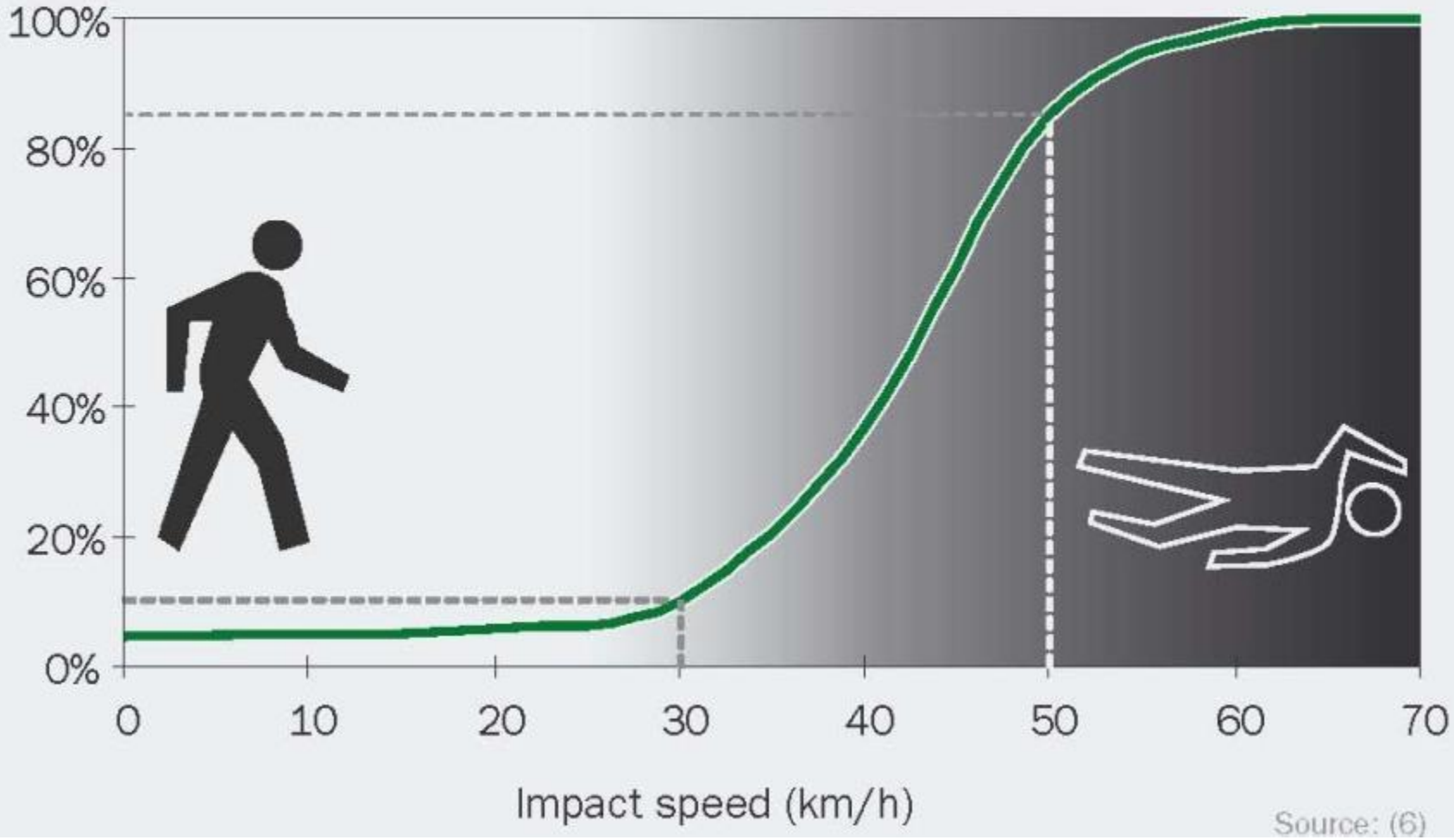
‘Safety in Numbers’ Over Time



Source: Pucher, J., Buehler, R. 2008. “Making Cycling Irresistible: Lessons from the Netherlands, Denmark, and Germany,” Transport Reviews, Vol. 28, No. 4, 2008, pp. 495-528.

Speed Matters

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



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

Air Quality

- Criteria pollutants regulated by EPA
  - Carbon Monoxide, Nitrogenoxide, Ozone, Particulate Matter, Sulphurdioxide, Lead
  - Exposure and risk varies by population sub-group (*especially vulnerable: young, old, and poor*)
  - Planning for air-quality and regional + state transportation planning are formally connected
- CO_2 emissions (31% from transportation sector in the U.S.)

Sources: Handy, S. 2013. Health and Travel. Springer Science

Physical Activity

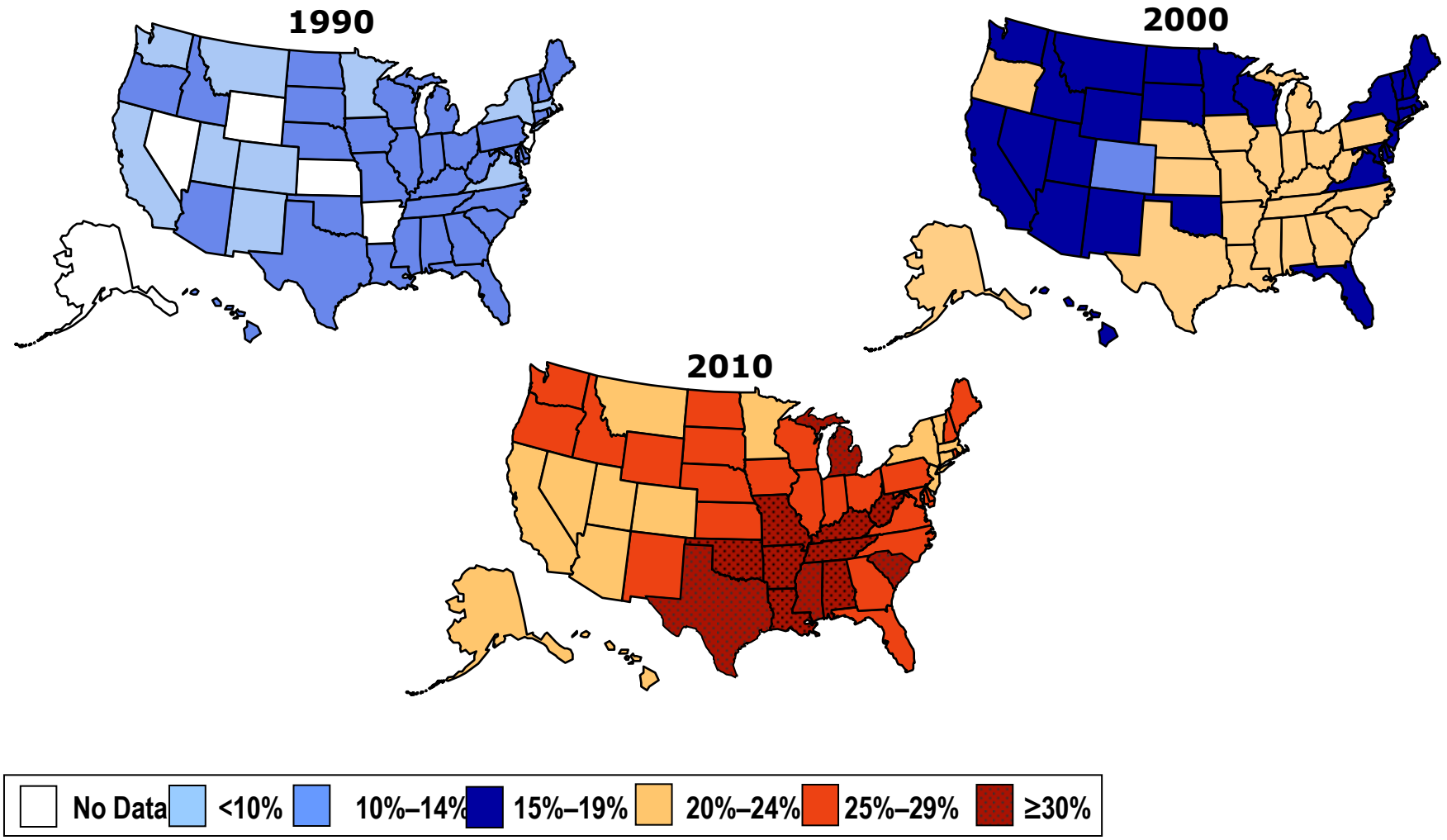
- WHO recommends 150 min. of moderate physical activity per week
- Share of adults in ‘low physical activity’ category increases

- Walking and cycling can contribute to daily physical activity
- Help to protect against obesity, diabetes, and various other diseases
- Can improve individual health (and also help to reduce air pollution, carbon emissions, congestion, noise, and traffic dangers)

Obesity Trends* Among U.S. Adults

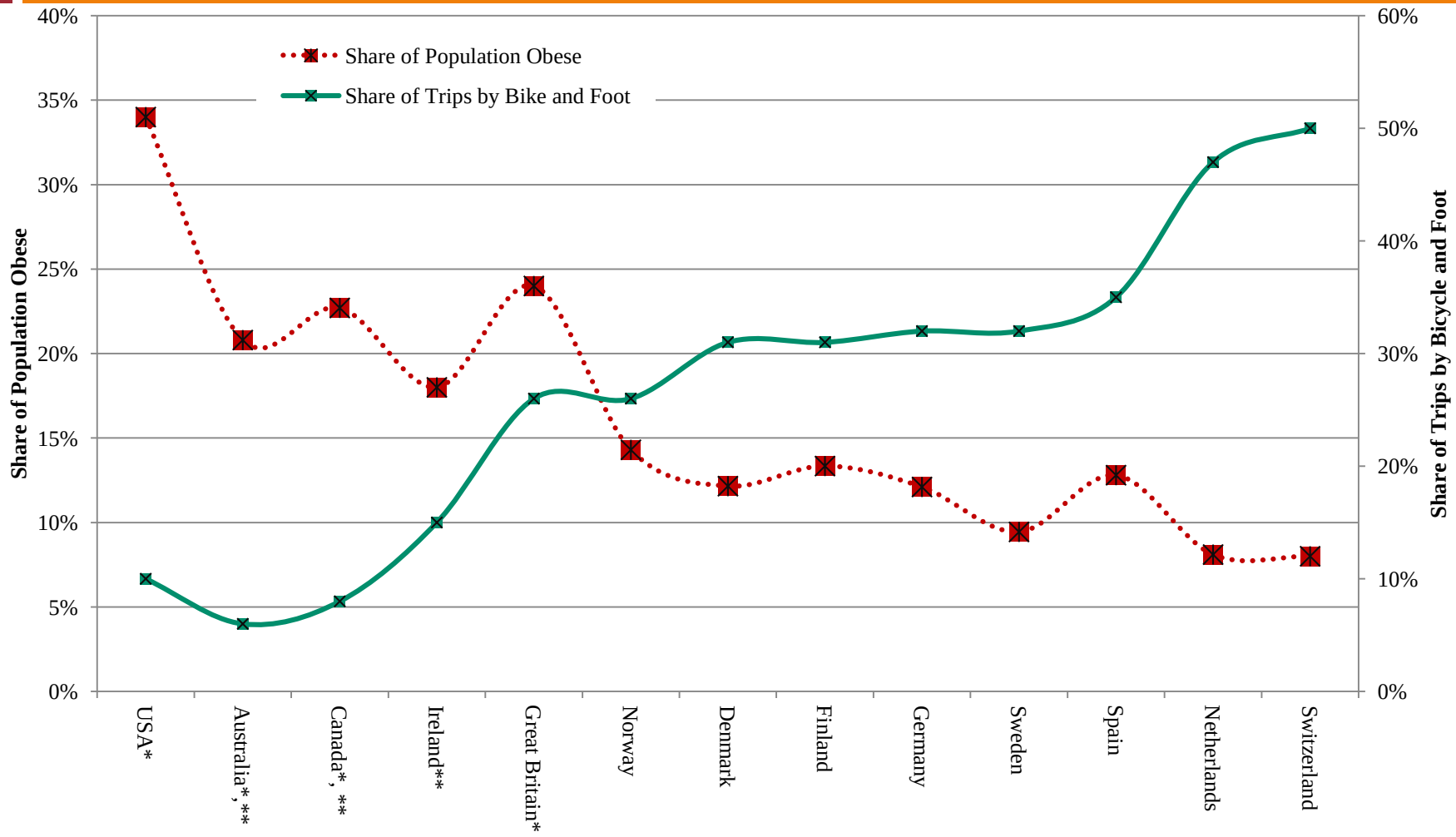
BRFSS, 1990, 2000, 2010

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



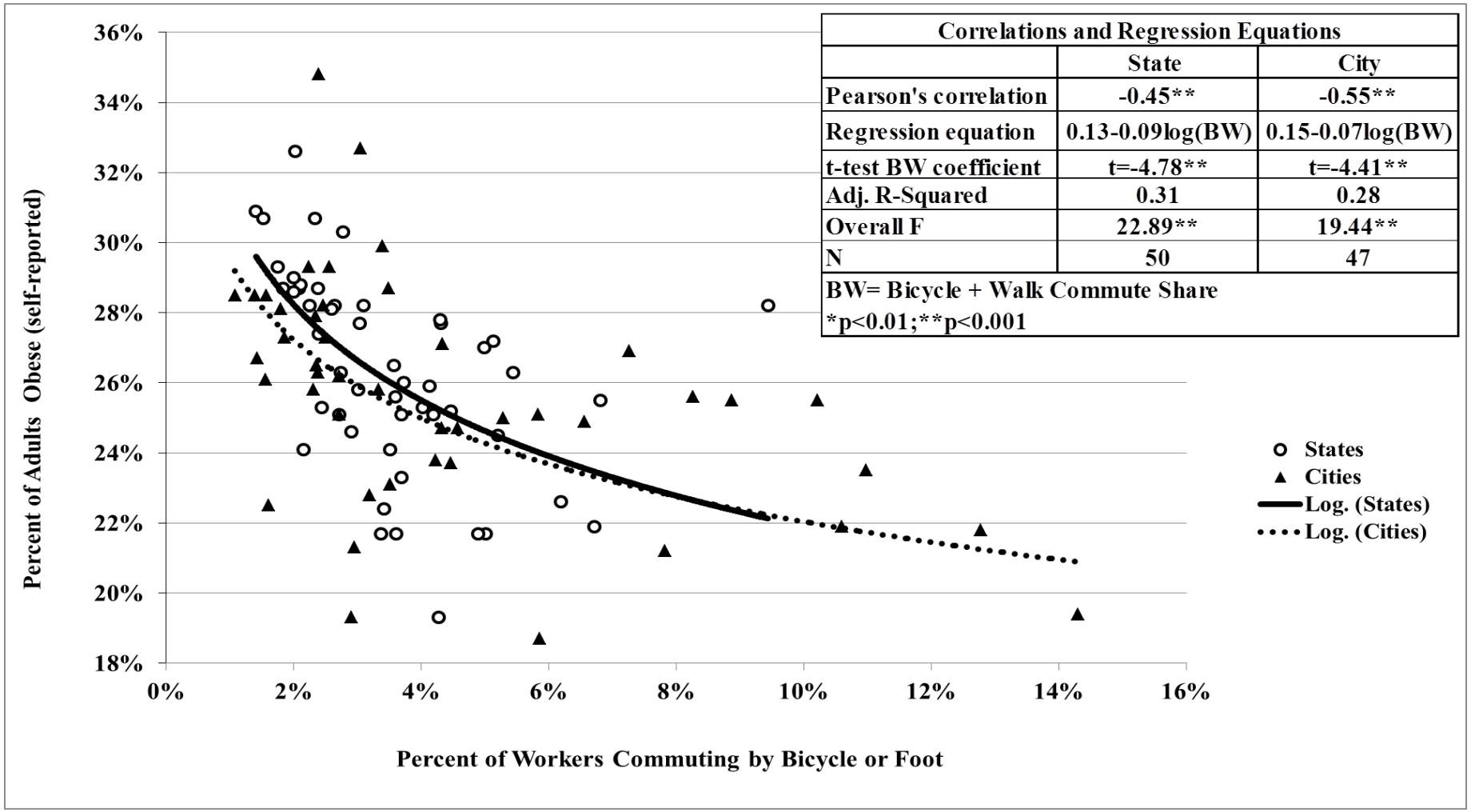
Source: CDC 2013

Obesity Levels Fall with Increased Walking and Cycling



Source: 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.

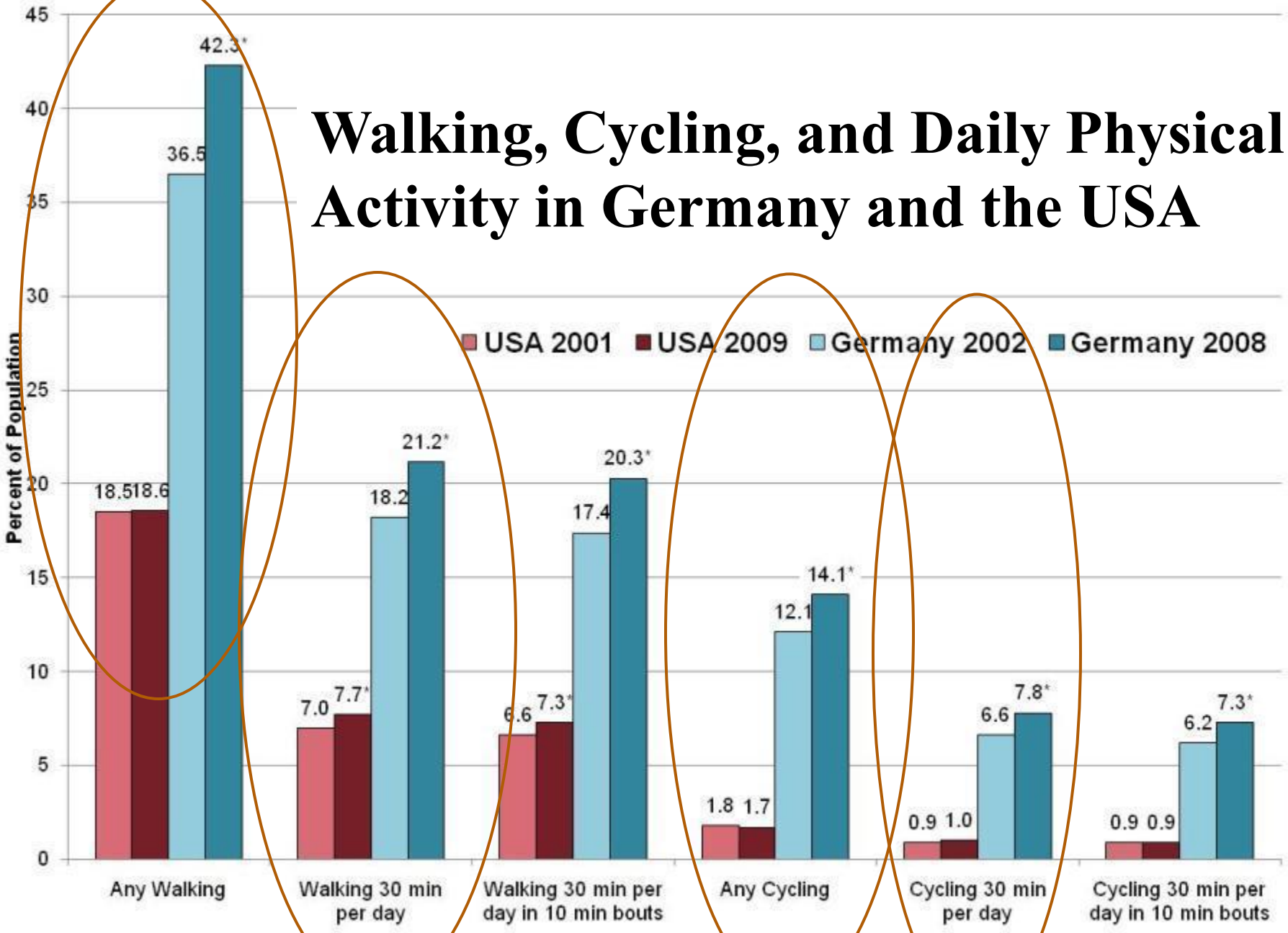
Share of Workers Commuting by Bicycle or Foot and Self-Reported Obesity Levels in 50 U.S. States and 47 Largest Cities, 2007



Correlations and Regression Equations		
	State	City
Pearson's correlation	-0.45**	-0.55**
Regression equation	0.13-0.09log(BW)	0.15-0.07log(BW)
t-test BW coefficient	t=-4.78**	t=-4.41**
Adj. R-Squared	0.31	0.28
Overall F	22.89**	19.44**
N	50	47
BW= Bicycle + Walk Commute Share *p<0.01;**p<0.001		

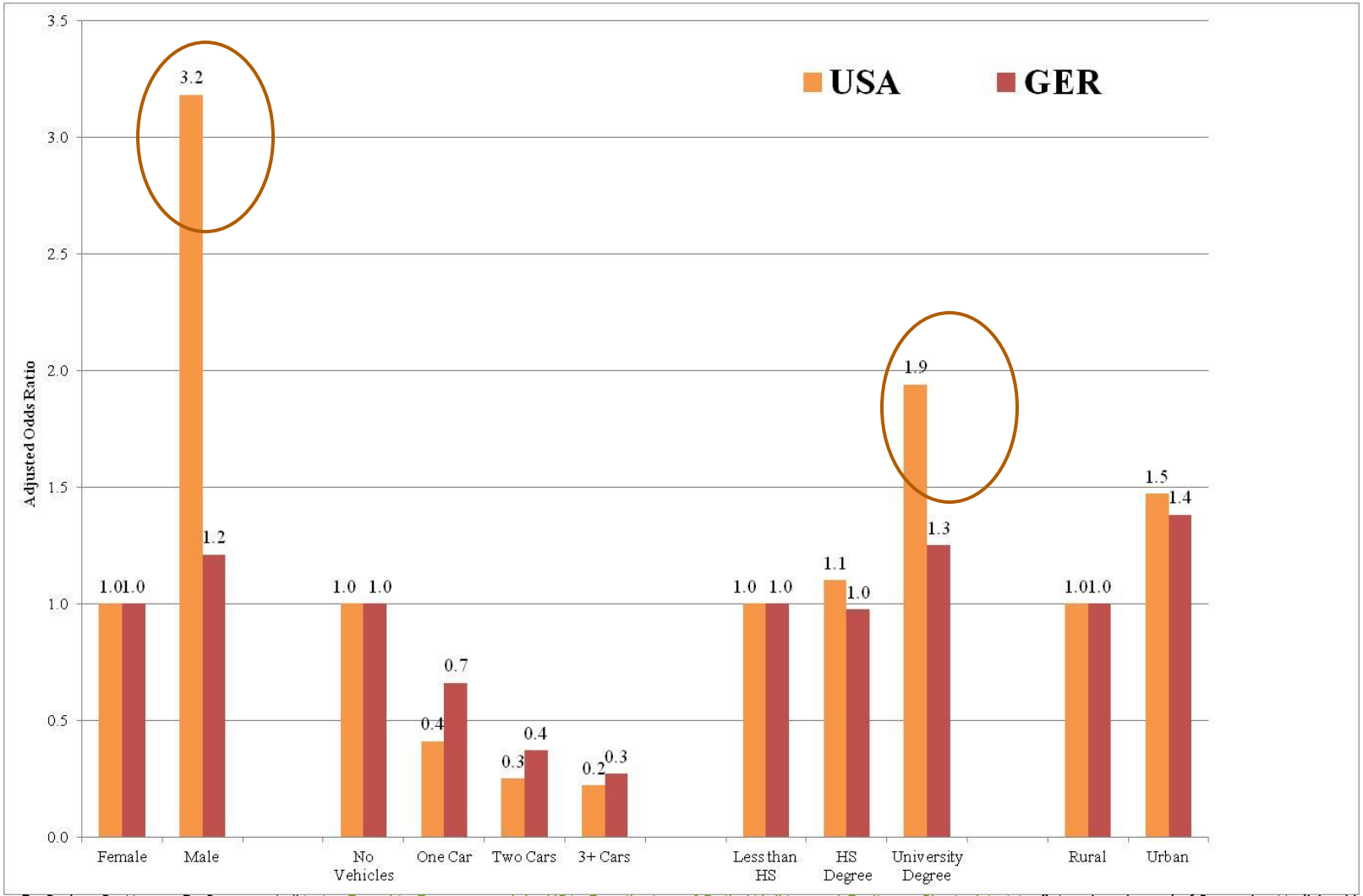
Source: Pucher, J., Buehler, R., Bassett, D., Dannenberg, A. 2010. "Walking and Cycling to Health: Recent Evidence from City, State, and International Comparisons," American Journal of Public Health, Vol. 100, No. 10, pp. 1986-1992.

Walking, Cycling, and Daily Physical Activity in Germany and the USA



Source: Buehler, R., Pucher, R., Merom, D., Bauman, A. "Active Travel in Germany and the USA: Contributions of Daily Walking and Cycling to Physical Activity," *American Journal of Preventive Medicine*, Vol. 40, No. 9, September 2011, pp. 241-250.

Equity: Adjusted Odds Ratios for Achieving 30+ Minutes Cycling per Day



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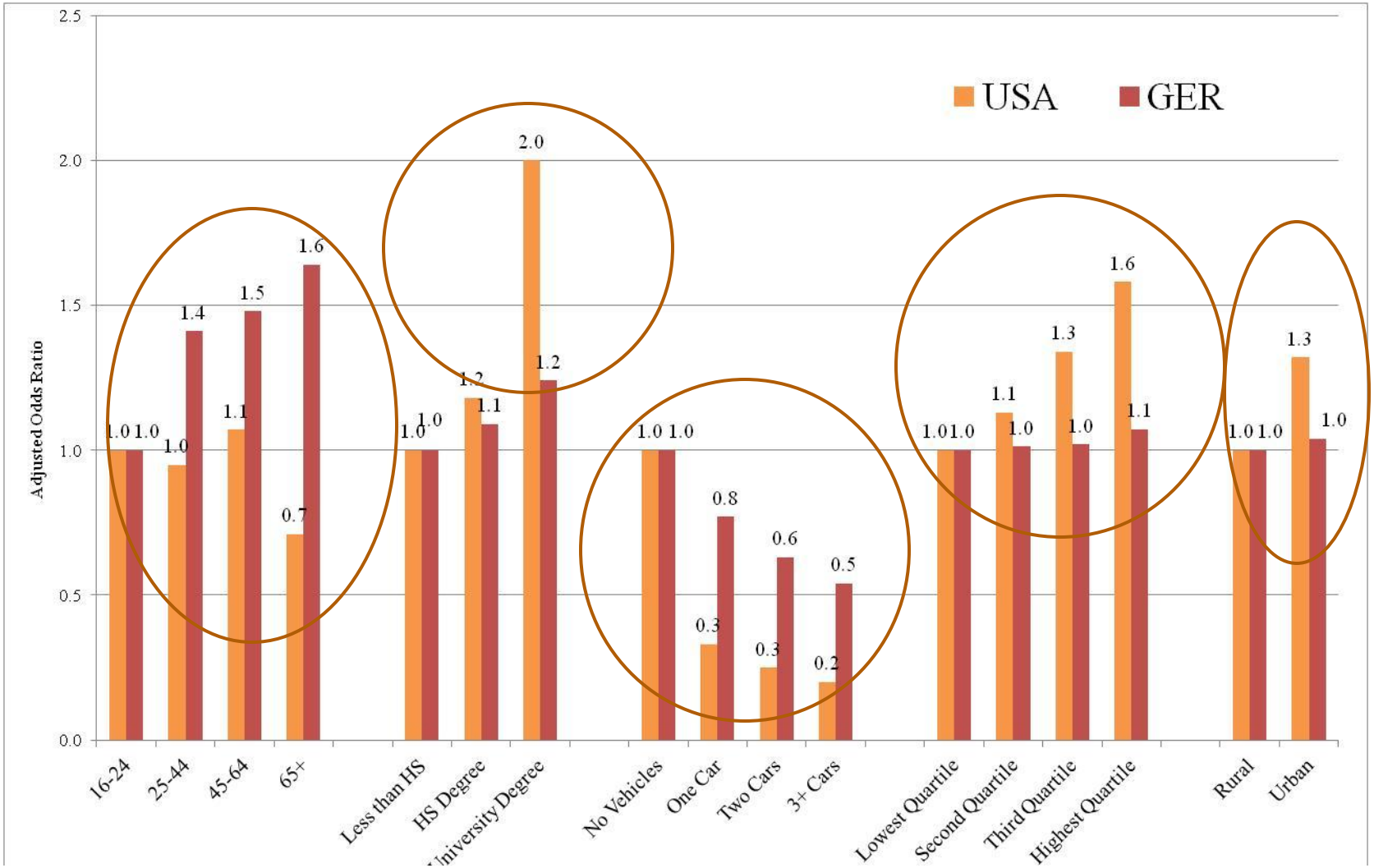

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Active Travel and Physical Activity

- Daily walking and cycling can help a large proportion of the population to meet recommended physical activity levels.
- Active travel is much higher for all socioeconomic groups in Germany than in the U.S.
- Inequitable distribution of active travel in the U.S. suggests the need for targeted policies to increase walking and cycling among seniors, children, and women, in particular
- Germany's experience with such measures since the 1970s may help guide U.S. initiatives.

Source: Buehler, R., Pucher, R., Merom, D., Bauman, A. "Active Travel in Germany and the USA: Contributions of Daily Walking and Cycling to Physical Activity," *American Journal of Preventive Medicine*, Vol. 40, No. 9, September 2011, pp. 241-250.

Policies to Increase Sustainability and Improve Public Health

- **Safety:**
  - Roadway design, vehicle design, driver behavior, speed limits
- **Air quality:**
  - Fuel formulation, vehicle technology, speed limits, 'eco-driving'
- **Active travel:**
  - Land-use policies (keep trip distances short and densities high enough)
  - Infrastructure (bike paths, lanes, traffic calming, sidewalks, crosswalks)
  - Encouragement and events (Safe Routes to School, Ciclovias, etc.)
  - Deterrents to driving (speed limits, parking restrictions, increased cost, etc.)
  - Policy packages that integrate walk, bike, and transit as viable alternatives

- **Overall:**
  - Less driving and more trips by foot, bicycle, and public transport can increase the sustainability of the transport system and promote public health

Sources: Handy 2013; Dill et al. 2013, Buehler et al. 2011

Barriers to Promoting Sustainable Transport and Health in the U.S.

- Land use / spatial development patterns
- History of comparatively low cost of driving and subsidies for car use in the U.S.
- Car as status symbol
- Poor infrastructure for walking and cycling
- Poor traffic safety for walking and cycling
- Transit concentrated in large urban areas and during peak travel times
- Traditional focus on technological change (only some behavior change, such as seat belt laws)
- Poor data availability on walking and cycling

Thanks to….

- David Bassett, University of Tennessee
- Adrian Bauman, University of Sydney
- Susan Handy, UC Davis
- John Pucher, Rutgers University
- Eloisa Reynault, APHA
- Daniel Rodriguez, UNC

Thank you!

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