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
Today’s Presentation

- Introduction and housekeeping

- Audio issues?
  Dial into the phone line instead of using “mic & speakers”

- PBIC Trainings and Webinars
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  walkinginfo.org/webinars

- PBIC News and updates on Facebook
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- Questions at the end
Promoting Safe Walking and Cycling: Lessons from Europe and North America

John Pucher, Rutgers University and UNC Chapel Hill
Ralph Buehler, Virginia Tech

PBIC Webinar, 27 February 2013: “Livable Communities” Series
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
WALKING AND CYCLING ARE HEALTHY

• 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 ≥20 years old who are obese

- 0 - 26.2
- 26.3 - 27.7
- 27.8 - 29.1
- 29.2 - 30.8
- > 30.9

Centers for Disease Control and Prevention
Diabetes, 2007

Age-adjusted percent of adults ≥ 20 years old with diabetes

- 0 - 7.0
- 7.1 - 8.1
- 8.2 - 9.0
- 9.1 - 10.5
- ≥ 10.6
Heart Disease

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

*Heart disease death rates are spatially smoothed to enhance the stability of rates in counties with small populations. Deaths defined according to International Classification of Diseases (ICD) codes: ICD-10: 100-I09, I11, I13, I20-I51.*

Smoothed County Stroke Death Rates 1991–1998

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

Total Population
Ages 35 Years and Older

Age-Adjusted Average Annual Deaths per 100,000*

<table>
<thead>
<tr>
<th>Deaths per 100,000</th>
<th>Number of Counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>61–113</td>
<td>638</td>
</tr>
<tr>
<td>114–123</td>
<td>654</td>
</tr>
<tr>
<td>124–133</td>
<td>641</td>
</tr>
<tr>
<td>134–146</td>
<td>610</td>
</tr>
<tr>
<td>147–241</td>
<td>557</td>
</tr>
<tr>
<td>Insufficient Data</td>
<td>2</td>
</tr>
</tbody>
</table>

CDC
Centers for Disease Control and Prevention
Percent of Commuters Who Drive

Price and Godwin, *Planetizen* 2012
Obesity Falls with Increased Walking and Cycling

Obesity among US children has quadrupled as rates of walking and cycling to school have plummeted.
Share of Trips by Cycling and Walking

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

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

Increase in Bike Share of Trips in Cities Around the World

Increase in Bike Share of Trips in Cities Around the World

Trends in Cycling to Work in 9 US and Canadian Cities

Los Angeles (2009): 0.9% (2011): 1.1%

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

Lots of Potential for Increased Walking and Cycling:

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

Europeans cycle for many trip purposes
Women’s Share of Bike and Walk Trips in Europe and North America

<table>
<thead>
<tr>
<th>Country</th>
<th>Cycling</th>
<th>Walking</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>25%</td>
<td>52%</td>
</tr>
<tr>
<td>UK</td>
<td>27%</td>
<td>53%</td>
</tr>
<tr>
<td>Canada</td>
<td>30%</td>
<td>56%</td>
</tr>
<tr>
<td>Denmark</td>
<td>55%</td>
<td>60%</td>
</tr>
<tr>
<td>Germany</td>
<td>49%</td>
<td>49%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>56%</td>
<td>56%</td>
</tr>
</tbody>
</table>

55% of all bike trips in Denmark are by women

Photo Susan Handy
Bicycle share of trips and percentage of female cyclists in large cities

Bike and Walk Share of Trips by Age Group

Cycling for all ages
Parents and kids cycling together in Portland
Make Walking and 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 walking and cycling in the Netherlands, Denmark, and Germany helps explain high levels of walking and cycling there
Cylist and Pedestrian Fatality and Injury Rates

Trends in Cyclist Fatalities

**Trends in Pedestrian Fatalities**

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.

Decreasing Crash Rate in Portland

Source: City of Portland, Oregon
Public Policies *Crucial* to Walking and Cycling

- 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

• 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
Conversion of street to pedestrian zone in Santa Barbara

Streets for people instead of cars!

Source: Ralph Fertig
Safe and pleasant
“Shared Street” at
Harvard Square

Source: City of Cambridge
Shared streets: Typical traffic calming in new German suburbs

7 km/hr speed limit
Car-free Broadway in New York City

Source: Ralph Buehler
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
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
Provision of physically protected cycle track in San Francisco by narrowing excessively wide car lanes

Source: San Francisco Bicycle Coalition
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

Separation from traffic via bollards and parked cars

Separation from traffic via concrete barriers

Photo: Peter Furth

Photo: Velo Quebec
Traffic-protected cycle track on 9th Avenue, NYC

- 250 mi of new bike lanes and paths since 2005
- Doubling in bike trips
- Halving of cyclist fatalities from 28 to 14
Cycle track on Pennsylvania Avenue in Washington

Source: Ralph Buehler
Bike lanes are much more typical in US cities.
## Dutch bicycle facility selection matrix

<table>
<thead>
<tr>
<th>Lane Configuration</th>
<th>Average daily traffic (vehicles / day)</th>
<th>Street type and speed limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Urban local street</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 km/h (19 mph)</td>
</tr>
<tr>
<td>2-way traffic with no centerline</td>
<td>≤ 2500</td>
<td>mixed traffic&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>2000 to 3000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3000 to 5000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 4000</td>
<td>bike lane or cycle track</td>
</tr>
<tr>
<td>2 lanes (1+1)</td>
<td>any</td>
<td>bike lane or cycle track</td>
</tr>
<tr>
<td>4 lanes (2 + 2) or more</td>
<td>any</td>
<td>(does not exist)</td>
</tr>
</tbody>
</table>

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

Kilometers of Lanes and Paths per 100,000 Population

- San Francisco (2000: 10, 2010: 15)
- Minneapolis (2000: 39, 2010: 70)
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

Photo: Velo Quebec
Special traffic signals and signs give priority to cyclists.
Four-way all-green signal for cyclists in Portland

How to Use the New Bicycle Signal

1. TO GET A GREEN LIGHT
   Place your bicycle on the marking on the sidewalk, with your wheels directly on the lines.

2. When the bicycle signal here is green...

3. ...cyclists can cross the intersection as shown here.

Bike sensor in pavement
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
Advanced stop line for cyclists in Berlin

Advanced stop line **and** bike box in Portland

Photo by Ralph Buehler

Photo by Jennifer Dill
Bike boxes in Vancouver

Foto: Gord Price
Foto: Rich Drdul
Green wave for *cyclists* in Odense, Denmark

Troels Andersen, “Cycling in Odense, Denmark”
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
Why Traffic Calming Saves Lives

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

Convenient bike cut-thru for cyclists, dead-end for cars
Traffic calming in Quebec City and Montreal

Cheap, easy, and very effective traffic diverters
Traffic diverter in Berkeley which provides a through connection for two bike boulevards

Source: Eric Anderson
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
Bike Boulevards in Portland

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

Source: Vélo Québec
Nice Ride in Minneapolis

Hubway Bikeshare in Cambridge, Boston, Somerville, and Brookline

Over 20 bike sharing systems in North America
Bike Station next to Union Station in Washington, D.C.

Photo: Ralph Buehler
Bike-transit integration at Alewife Station on Red Line in Boston

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

Photo: David Loutzenheiser
Conversion of Car Parking to Bike Parking

27 bike corrals in San Francisco

95 bike corrals in Portland
Traffic Education

• 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 3rd or 4th 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!

- 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)
Bike Training for Children in New Jersey

Source: NJ Bike Walk Coalition
Cycling training course for adults
Police are friendlier and more effective on bikes
Summer Streets in New York City attracts 200,000 participants on Saturdays in August.
CicLAvia: Safe and fun cycling and walking on 9 miles of car-free streets in Los Angeles

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

Source: Ryan Snyder
Somerstreets in Somerville, MA

Source: City of Somerville
These kids are actually having fun and getting good exercise, too!
Bike to School Day in San Francisco

Source: San Francisco Bicycle Coalition
Bike to Work Day in San Francisco

Source: San Francisco Bicycle Coalition
GIVE EMPLOYEES FREE BIKES!

The perfect zero emissions vehicles!
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

• 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!

⇒ Archive at www.walkinginfo.org/webinars
  ▪ Downloadable and streaming recording, transcript, presentation slides

⇒ Questions?
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