A City of Cycles: What can stop it happening?

Prof Simon Kingham
Professor of Geography & Director of the GeoHealth Laboratory
University of Canterbury - Te Whare Wananga O Waitaha, Christchurch, NZ

Keynote presentation to CAN-Do 2015, Christchurch
March 28th 2015
Who am I?

• University Professor
  – Teacher and Researcher
• Local Transport involvement
  – Regional Transport Committee
• Christchurch resident for 15 years
• Commuter & utility cyclist
• Husband and father
Talk today

1. Trends and assumptions
2. Impacts of cycling
3. Why don’t people cycle
4. A cycling city
5. Possible barriers to success
6. Summary
TRENDS AND ASSUMPTIONS
Transport mode to work - Christchurch

![Graph showing transportation modes to work in Christchurch over different years. The graph includes data for Car, Cycled, Walked/Ran, and Bus.](image)
Peak car

Passenger-kilometres by private car and light trucks, 1990 – 2009, index (1990 = 100)

Oil price shock and start of crisis
Brian Rudman: End of the road for the sacred car?

9:30 AM Friday Jun 6, 2014

As New Zealand's largest roading project roars ahead, people are using their vehicles less and their legs more
Peak car and age

Annual vehicle miles per driver by age, USA, 1995, 2001, 2009
Congestion isn’t all bad!

• Congestion suppresses latent travel demand
• Congestion encourages less travel or use of alternative modes
  – Strongest when good alternatives
• Congestion-free roads don’t result in pollution as low as the models tell us
Congestion isn’t all bad!

Cheonggyecheon, Seoul, Korea

Congestion isn’t all bad!

Congestion isn’t all bad!
Congestion isn’t all bad!
Congestion isn’t all bad!
Where did the traffic go?

“It just disappeared” - Prof Jeff Kenworthy

Build it and they will come

• Works with cycling too!
• How much do you need to build?
  – Not much
  – Small amount encourages cyclists
  • Portland (Roger Geller, 2012)
  • Brisbane (Michael Langdon, 2013)
  • Many others
Types of people

Roger Geller’s 4 types of cyclist
http://www.portlandoregon.gov/transportation/44597?a=237507
IMPACTS OF CYCLING
Obesity

Flint et al, 2014, Associations between active commuting, body fat, and body mass index: population based, cross sectional study in the United Kingdom. BMJ 349, 4887
Obesity

Global obesity costs $2 trillion p.a.

2.1 billion people (30% of the global population) are overweight

15 % of health care costs in developed economies

*Obesity isn't just a health issue... it's a major economic and business challenge*

McKinsey Global Institute, 2014
Obesity epidemic reaching crisis levels

By Patrice Dougan
7:09 PM Thursday May 29, 2014

"New Zealand is in the grip of a global obesity epidemic, the future costs of which will be enormous, potentially unaffordable for the health system."

• Professor Norman Sharpe, New Zealand Heart Foundation medical director, Sept 2011

www.nzherald.co.nz.nz/news/article.cfm?c_id=1 &objectid=10752121
Obesity rates – OECD
By country
2010 or latest available data

Source: OECD
Obesity costs NZ $622m per year* in health costs alone (+ $98-$222m lost productivity)#

If NZ’s obesity rates dropped from 33% to:

• 11.4% (NL); we’d save over $600m p.a. (Chch $50m p.a.)
• 20% - we’d save over $400m p.a. (Chch $30m p.a.)
• 25% - we’d save over $300m p.a. (Chch $20m p.a.)

* Based on 2006 figures
Obesity

Declining Walkability Plays a Big Role in China's Obesity Problem

• Over 20% of all overweight or obese people in the world are Chinese
• Walkable urban design tied to walking for commuting, non-commuting and exercise

Source: Alfonzo et al, Walking, obesity and urban design in Chinese neighborhoods. Preventive Medicine, 2014
Obesity

Air pollution

Traffic pollution in NZ per year:

• Kills 259 adults
• Causes 327,800 restricted activity days
• PM$_{10}$ costs $942m

Congestion

Cost effectiveness

• Review of 16 economic evaluations of health effects of transport interventions found benefit-cost ratio of 5:1 (Cavill et al, 2008)

• NZ research: “transforming urban roads over the next 40 years, using best practice physical separation on main roads and bicycle-friendly speed reduction on local streets, would yield benefits 10–25 times greater than costs” (Macmillan et al, 2014)
35% decrease in injuries to all street users (8th Ave)

58% decrease in injuries to all street users (9th Ave)

Up to 49% increase in retail sales (Locally-based businesses on 9th Ave from 23rd to 31st Sts., compared to 3% borough-wide)

Left turn bays and signal phases

Mixing zones for bicycles and left-turning vehicles

Parking-protected bike lane

Pedestrian safety islands

NYC Dept of Transportation, Measuring the Street: New Metrics for 21st Century Streets
### Average Customer Expenditures by Mode of Travel and Type of Establishment

<table>
<thead>
<tr>
<th>Mode</th>
<th>Establishment</th>
<th>Trips per Month</th>
<th>$ per Trip</th>
<th>$ per Month</th>
<th>N</th>
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<tbody>
<tr>
<td>Auto</td>
<td>Bar</td>
<td>1.6</td>
<td>25.55</td>
<td>40.21</td>
<td>88</td>
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<tr>
<td></td>
<td>Convenience</td>
<td>9.9</td>
<td>7.98</td>
<td>79.37</td>
<td>543</td>
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<td></td>
<td>Restaurant</td>
<td>2.2</td>
<td>18.74</td>
<td>41.16</td>
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<tr>
<td></td>
<td>Total</td>
<td>4.5</td>
<td>13.70</td>
<td><strong>61.03</strong></td>
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<tr>
<td>Bike</td>
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<td>4.9</td>
<td>14.08</td>
<td>68.56</td>
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<td></td>
<td>Convenience</td>
<td>14.5</td>
<td>7.30</td>
<td>105.66</td>
<td>63</td>
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<tr>
<td></td>
<td>Restaurant</td>
<td>3.5</td>
<td>12.08</td>
<td>42.52</td>
<td>48</td>
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<tr>
<td></td>
<td>Total</td>
<td>7.1</td>
<td>10.66</td>
<td><strong>75.66</strong></td>
<td>153</td>
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<td>Transit</td>
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<td>1.8</td>
<td>19.54</td>
<td>35.35</td>
<td>13</td>
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<td></td>
<td>Convenience</td>
<td>10.9</td>
<td>6.91</td>
<td>75.62</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Restaurant</td>
<td>3.5</td>
<td>11.52</td>
<td>40.68</td>
<td>36</td>
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<tr>
<td></td>
<td>Total</td>
<td>5.7</td>
<td>10.15</td>
<td>58.16</td>
<td>102</td>
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<tr>
<td>Walk</td>
<td>Bar</td>
<td>3.1</td>
<td>22.17</td>
<td>68.42</td>
<td>53</td>
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<td></td>
<td>Convenience</td>
<td>12.6</td>
<td>6.13</td>
<td>77.34</td>
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<tr>
<td></td>
<td>Restaurant</td>
<td>2.6</td>
<td>16.74</td>
<td>43.77</td>
<td>131</td>
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<tr>
<td></td>
<td>Total</td>
<td>5.9</td>
<td>11.25</td>
<td>66.22</td>
<td>438</td>
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<tr>
<td>Total</td>
<td>Bar</td>
<td>2.5</td>
<td>21.78</td>
<td>53.59</td>
<td>196</td>
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<tr>
<td></td>
<td>Convenience</td>
<td>10.9</td>
<td>7.36</td>
<td>80.40</td>
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<td>2.4</td>
<td>17.39</td>
<td>41.78</td>
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<td>Total</td>
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<td>12.60</td>
<td><strong>63.46</strong></td>
<td>1,733</td>
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</tbody>
</table>

*NOTE: N = number of respondents.*

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Clifton K, 2012, Business Cycles: Catering to the Bicycling Market, TRB 280, 26
CYCLING AND HOUSE SALES

Business owners aren’t the only ones who benefit from bicycling homeowners profit too. A study of house values near the Monon Trail in Indianapolis, IN, measured the impact of the trail on property values. Given two houses of the same size, with the same number of bedrooms and bathrooms, and comparable garages and porches— one within a half mile (800 meters) of the Monon Trail and another farther away— the house closer to the Monon Trail would sell for an average of 11 percent more. A study of property values near trails in Delaware found that properties within 150 meters (500 feet) of bike paths sold for $8,800 more than similar houses.

ROLLING UP REVENUE

At the local level, the economic benefits of bicycling are striking. A study of impact across an entire state and the results can be staggering. Here are just a few recent studies on the economic impact of bicycling at the state and provincial level.

NYC CAR-CENTRIC STREETS VS NYC BIKE-FRIENDLY STREETS

- **Manhattan Wide Average of just 3% Increase in Sales**
  - **Shoppers Arriving By Car in the Last Village Only Spent**
  - **$2,148**
- **5% Increase in Commercial Vacancies Across Manhattan**
- **Bike-Friendly Redesign with Cycle Track Results in 49% Fewer Commercial Vacancies in Union Square**
  - **Bike Businesses Along the 9th Avenue Cycle Track Report Up To 49% Increase in Sales**
  - **$16,485**
  - **Shoppers Arriving By Bikes in the Last Village Spent**
Communities that promote sustainable and active can:

• Reduce disparities between the rich and poor
• Promote good neighbourhood
• Enable poor to gain better access to healthy food
• Lead to decreased crime

Bicycling the 'happiest' form of transport

A study found that people are in the best mood while they are bicycling, compared to any other mode of transportation.

Morris EA and Guerra E, 2014, Mood and mode: does how we travel affect how we feel? Transportation 42, 25-43.
Longer life

The secret of eternal youth: skin-tight Lycra and a bicycle

Gender


*Sources:* German Federal Ministry of Transport (2003); U.S. Department of Transportation (2003); Danish Ministry of Transport (2005); Statistics Netherlands (2005); Australian Bureau of Statistics (2007); Department for Transport (2007) and information provided directly by bike planners in Canadian provinces and cities

**Figure 8.** Women’s share of total bike trips in Australia, the USA, the UK, Canada, Denmark, Germany and the Netherlands (2000–2005).
Woman, children & older people
Safety

[Graph showing accident rates per 100,000 and % active transport (walk, cycle, transit) for various countries such as USA, Australia, Canada, New Zealand, Ireland, France, Denmark, Finland, Germany, Sweden, Spain, Netherlands, Switzerland.]
More Cyclists In A Country Means Fewer Fatal Crashes

Bicycle travel per inhabitant per year (km) and number of cyclists killed per billion km*

- **Bicycle travel per inhabitant per year (km)**
- **Cyclists killed per billion km of bicycle travel**

<table>
<thead>
<tr>
<th>Country</th>
<th>Bicycle Travel (km)</th>
<th>Cyclists Killed</th>
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</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>10.7</td>
<td>88</td>
</tr>
<tr>
<td>Denmark</td>
<td>14.6</td>
<td>75</td>
</tr>
<tr>
<td>Germany</td>
<td>15.2</td>
<td>47</td>
</tr>
<tr>
<td>Switzerland</td>
<td>18.4</td>
<td>47</td>
</tr>
<tr>
<td>Finland</td>
<td>261</td>
<td>47</td>
</tr>
<tr>
<td>France</td>
<td>267</td>
<td>47</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>27.0</td>
<td>47</td>
</tr>
<tr>
<td>South Korea</td>
<td>32.5</td>
<td>47</td>
</tr>
<tr>
<td>United States</td>
<td>44.0</td>
<td>47</td>
</tr>
</tbody>
</table>

Source: OECD  
* (averages 2006-2009)
Safety

Source: Netherlands Ministry of Transport (2007)

Figure 12. Inverse trends in cycling fatality rates and annual kilometres cycled per inhabitant in the Netherlands (1950–2005).

Pollution exposure

- Car drivers are consistently exposed to the highest CO levels
  - >50% higher than cyclists

- Car drivers & bus passengers are exposed to higher average levels of UFP than cyclists

- However for very short acute exposures (few secs) on-road cyclists can be exposed to higher peaks

- On-road cyclists are exposed to higher levels than off-road cyclists
  - CO (60%), PM1 (20%) & UFP (over 100%)

Kingham, Longley, Salmond, Pattinson and Shrestha, 2013, Variations in exposure to traffic pollution while travelling by different modes in a low density, less congested city. Environmental Pollution 181, 211
Pollution exposure

Source: Simon Kingham and Woodrow Pattinson
Cyclist exposure

Figure 4. Box plots showing exposure differences between cyclist positions: road, sidewalk (7 m) and path (19 m). The central line represents the median, the boxes the 25$^{th}$ to 75$^{th}$ percentile and the whiskers represent 1.5 times the interquartile range.

Pattinson, Kingham, Longley and Salmond, 2015, Potential pollution exposure reductions from small-distance bicycle lane separations. Atmospheric Environment submitted
Here's a summary of all the ideas we've received and analysed relating to market. Keep checking back as we continue to analyse all the ideas.

Want to view the original ideas? Click here to see what people said.

Pedestrian focused Central City; make walking an enjoyable experience with integrated green walkway networks with wider footpaths, good lighting, street crossings, footbridges and covered walkways. ■ Integrated and separated off-road, cycle lane network with safety a major focus. ■ Cycle network connecting the Central City to the suburbs. ■ Good facilities for cyclists with safe/plentiful cycle parking; cycle hire for locals. ■ Car-free Central City or restricted access and slow speed zones; must consider accessibility for people with mobility issues. ■ Tram (or light rail) extended as part of the public transport network to suburbs; not just a tourist tram; must be affordable. ■ Central City free of big buses; smaller shuttles that are less polluting, quieter and take up less space. ■ Integrated, affordable public transport network with central hub for buses and trams/light rail (e.g. Moorhouse Ave railway station). ■ Rethink location of bus exchange. ■ One-way versus two-way roading network. ■ Free or affordable park-and-ride system on periphery of Central City. ■ No parking buildings in the heart of the Central City. ■ Different parking options depending on day/night, weekday/weekends.
“If you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places.”

Fred Kent
WHY DON’T PEOPLE CYCLE
Assessment of the type of cycle infrastructure required to attract new cyclists

• Type of infrastructure needed to attract ‘new’ cyclists

• Investigate the barriers and motivations for cycling
  – Perceived danger is main barrier!
  – Physical separation was key

Other barriers
A CYCLING CITY
Opportunity
We’re Not Starting from Zero...

Matai Street

Southern Motorway

Burnside Cycleway

Railway Cycleway
Ilam Rd

- Finished mid 2013
Open Streets

• September 2013
Transition Initiatives

- Recycle a Dunger
- ICE cycles
- Christchurch Otautahi Cargo Bike Annual Rally (CHOCBAR)
Christchurch Transport Strategic Plan 2012-42

Cycle network

» Creating exemplary cycle routes that are separated from vehicles.
» Making Christchurch the cycling city.

Public Transport

» See More

» Supporting Our Economy
» Connecting Our Centres
» Creating Vibrant Centres
» Getting There
Cycling will be encouraged in the central city. Routes for both commuter and recreational cyclists will offer good connections from the wider city into the central city and the Core.
Christchurch Central Recovery Plan: An Accessible City - Oct 2013
Major Cycleways
Christchurch Major Cycleways

Benefit cost ratio of 8!

Source of Estimated Net Benefits (nb Present Value)

- Decongestion: $341.9m, 28%
- Users: $53.8m, 4%
- Health & Environment (EEM): $806.5m, 66%
- Safety (EEM): $26.8m, 2%

Christchurch Major Cycleway Routes Updated Funding Assessment. February 2015
### Table 3: BCRs of the roads of national significance, 2011

<table>
<thead>
<tr>
<th>Project</th>
<th>BCR</th>
<th>BCR plus WEBs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Puhoi to Wellsford</td>
<td>0.8</td>
<td>1.1</td>
</tr>
<tr>
<td>2. Auckland Western Ring route</td>
<td>2.1</td>
<td>2.7</td>
</tr>
<tr>
<td>3. Victoria Park Tunnel</td>
<td>3.2</td>
<td>n/a</td>
</tr>
<tr>
<td>4. Waikato Expressway</td>
<td>1.4</td>
<td>1.8</td>
</tr>
<tr>
<td>5. Tauranga Eastern Link</td>
<td>1.4</td>
<td>1.8</td>
</tr>
<tr>
<td>6. Wellington Northern Corridor</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>7. Christchurch Motorways</td>
<td>2.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Simple average (all)</td>
<td>1.7</td>
<td>n/a</td>
</tr>
<tr>
<td>Simple average (all except 3.)</td>
<td>1.5</td>
<td>1.9</td>
</tr>
</tbody>
</table>

* wider economic benefits

POSSIBLE BARRIERS TO SUCCESS
Lack of role models

...France
UK and friends
Russia
Hollywood
Money!


- Regional improvement, $70,000,000
- Road policing, $300,000,000
- Road safety promotion, $33,000,000
- Infrastructure management, $56,000,000
- State highway improvements, $1,200,000,000
- State highway maintenance, $515,000,000
- Public transport, $332,000,000
- Local road maintenance, $485,000,000
- Local road improvements, $190,000,000
- Walking & Cycling improvements, $24,000,000
Money!

GPS on Land Transport 2015/16-2024/25

- Roads especially new state highways (Roads of National Significance)
- 0.4% for walking & cycling
- National’s extra $100m adds extra 0.7%
- little except roads - Christchurch Transport Plan states “this means the funding available for public transport, cycling and walking networks as outlined in this Plan will be heavily constrained for much of the early recovery period”.
The bike revolution and its backlash gains momentum

From bike lanes to Citi Bike and beyond, how the two other social uprisings
BY LIONEL BECHTNER / NEW YORK DAILY NEWS / Friday, May 10, 2013.

The New York Times

Expansion of Bike Lanes

TIM WILLIAM CITY EDITOR + 14 NEWS

THE parent killed on the street are praise for the City Council for growing popularity bike lane. The Council will push for the way to be ripped of a back lane and traders over specific lanes and plans.

A backflip would be a moment for the extraordinary bike in the national cycle.
Mary Safe, Anne Calcutt.

Transportation Commission York City’s bike share program grows

Over the last four years, the streets of New York have been transformed: More than 250 miles of bike lanes have been created, and several laws to protect cyclists have been passed.

Taking the bicycle lane on Ninth Avenue, New York has added everyone is pleased.
By J. DAVID GOODMAN
Published: November 22, 2010

Sea search for swimmer

POLICE will resume an underwater search for a man who went missing while swimming at Encounter Bay yesterday.
The man was spotted by swimmers. The Bluff just before 4pm. He was reportedly wearing a red shirt and blue shorts.

WHAT WOULD YOU DO TO END THE WAR BETWEEN CARS AND BIKES?

As the war between cars and bikes escalates, some are calling for a truce.

Mr. Hase said traffic lights would help prevent accidents, while bike lanes would reduce congestion.

The project is causing major delays, while traders have objected to a loss of parking spaces because of the concrete blocks.

Bike SA chief executive Christian Haug said Cr Moran’s idea “feasibly could function” but would mean scraping the new trees and landscaping that were an important part of the project.

MC Asa said traffic light installations would cause major delays, reducing traffic and increasing congestion.

He said the project was causing major delays, while traders have objected to a loss of parking spaces due to the concrete blocks.
Total focus on smart solutions
Final Conclusions

• Investing in cycling is very cost effective
  – Blindingly obvious
• We know what to do
  – Make ‘potential’ people on bikes feel safe
• Opportunity for a Cycling City
  – Plans and Major Cycleways
• Barriers
  – Money, leadership, political will and guts