Are people who already cycle and walk more responsive to an active travel intervention?

Study team and funder

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Outline

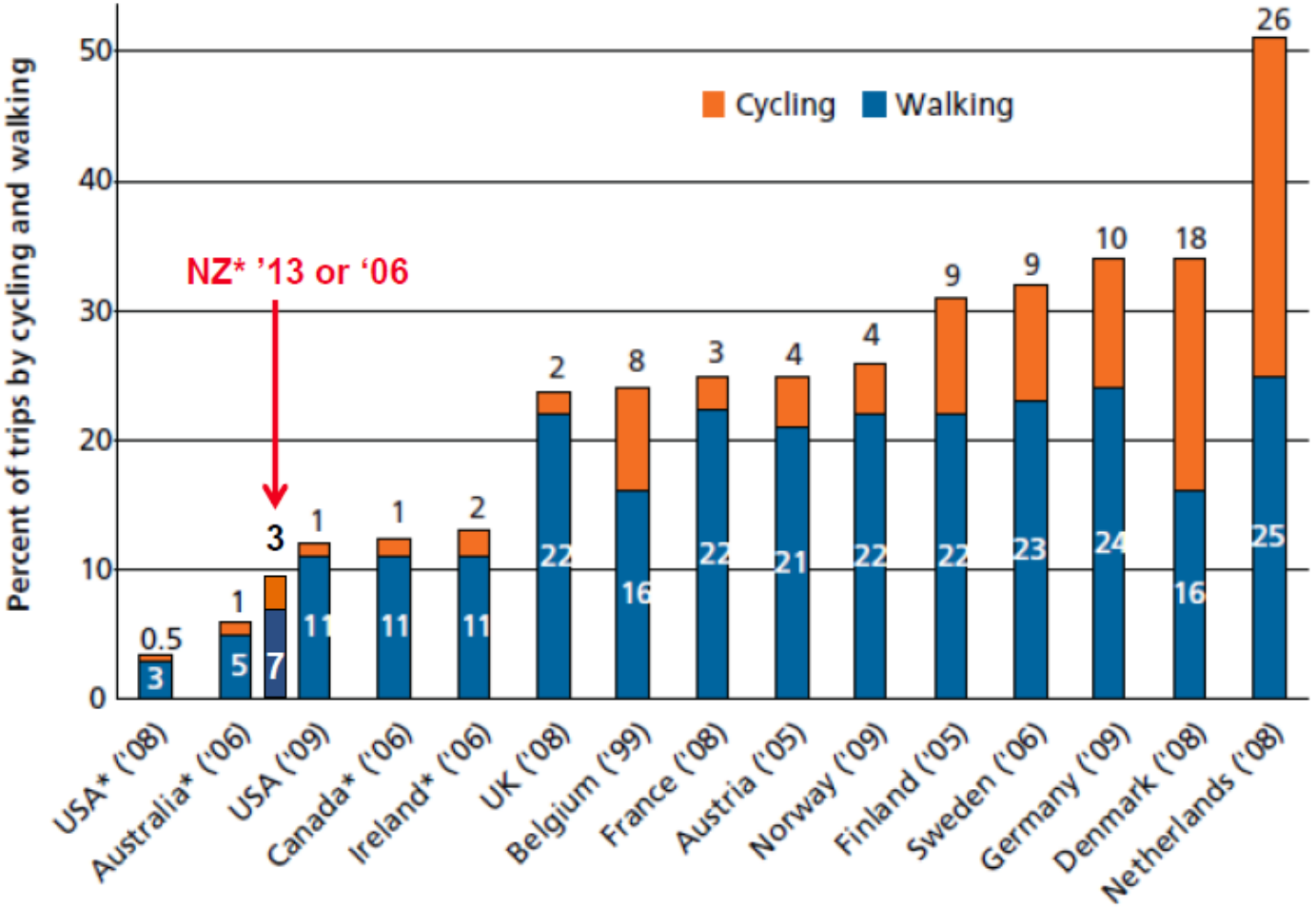
This is a quasi-experimental evaluation of an intervention to install infrastructure and implement encouragement programmes to increase cycling and walking

- Background to the study and setting
- Methods
- Outcomes
  - Increased cycling and walking
  - Lower car use and carbon emissions
  - Inferred benefits for health
  - Differences in uptake (by levels of cycling & walking)

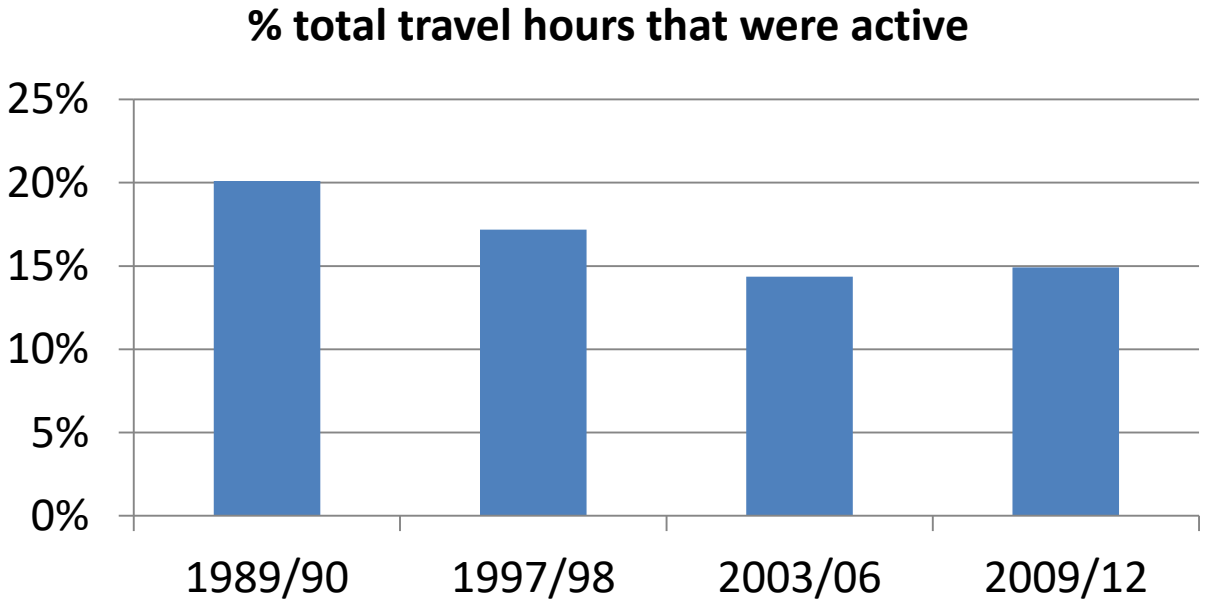
Background

- Of countries with >1 million people, New Zealand has the third highest number of motor vehicles per capita (after US and Australia)
- Our cities, economy and society have developed dependencies on motor vehicles. These are becoming stronger and are resistant to change
- Our increasingly sedentary lifestyle is related to such trends
- The health and environmental consequences are now better understood and the impending epidemic of obesity-related diseases demands action
- To generate societal and political will for change, we need to know what works, what doesn’t work, the costs of policies or interventions and the benefits (social/environmental/health)

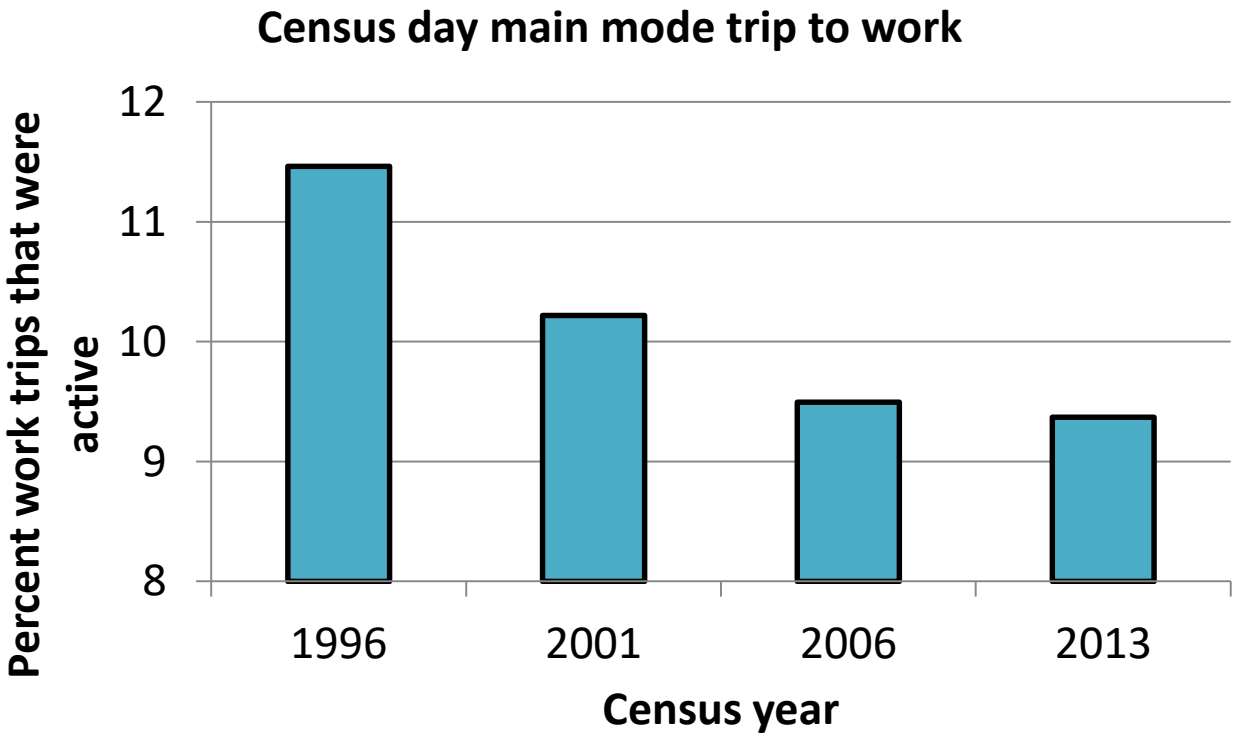
International comparisons

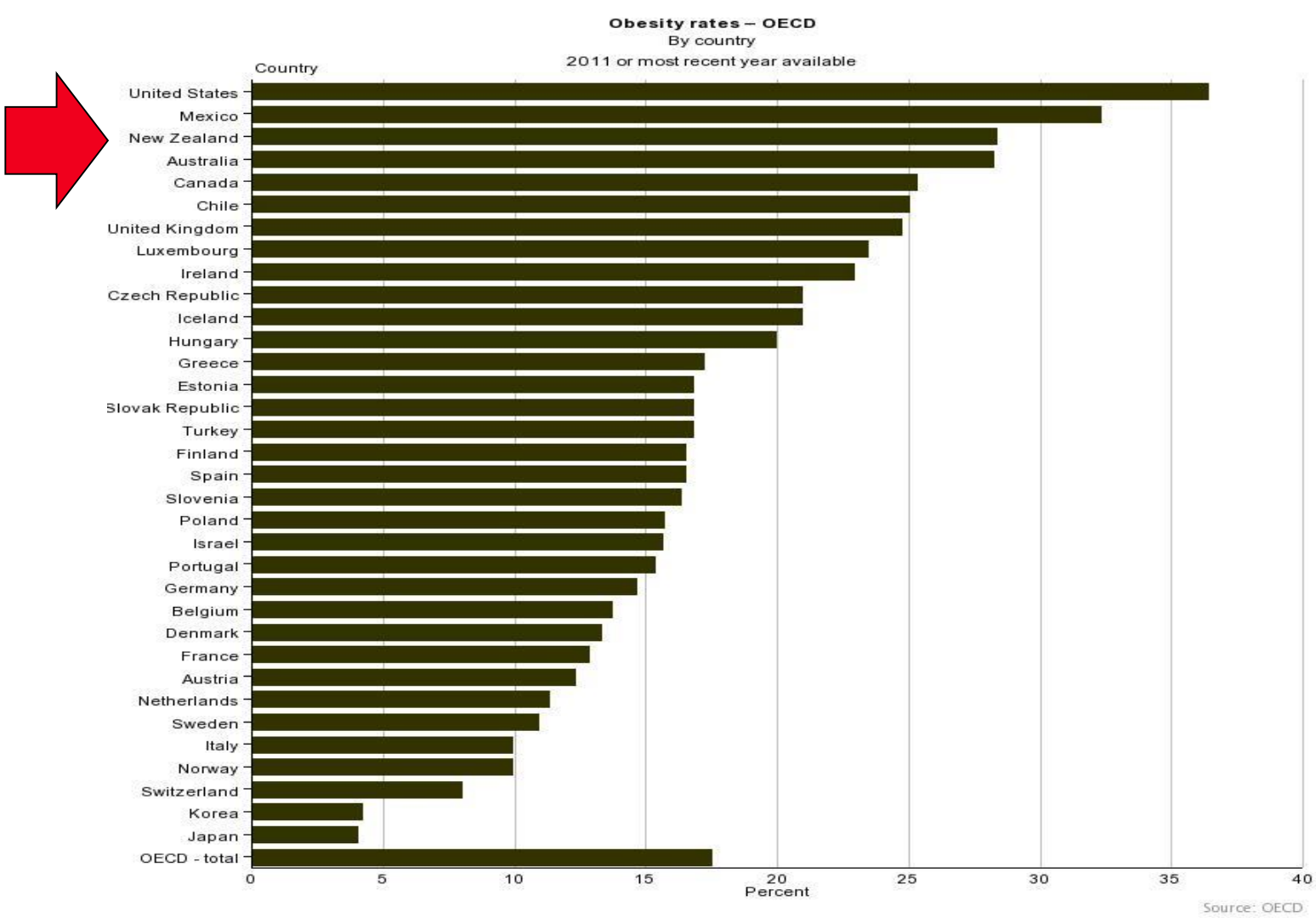


NZ household travel survey (active travel = walking and cycling for transport)



Census day trip to work % active modes




Obesity rates – OECD
By country
2011 or most recent year available
Country
United States
Mexico
New Zealand
Australia
Canada
Chile
United Kingdom
Luxembourg
Ireland
Czech Republic
Iceland
Hungary
Greece
Estonia
Slovak Republic
Turkey
Finland
Spain
Slovenia
Poland
Israel
Portugal
Germany
Belgium
Denmark
France
Austria
Netherlands
Sweden
Italy
Norway
Switzerland
Korea
Japan
OECD - total
0
5
10
15
20
25
30
35
40
Percent
Source: OECD

What is known about programmes to increase active travel in relation to baseline levels?

- The benefits to health of increasing physical activity and reducing sedentary behaviour are a major rationale for promoting active transport (Saunders et al., 2013)
- Largest benefits arise for groups who are largely sedentary (Kyu et al., 2016)
- When only physically active people increase active transport levels, the population health benefits are lower than if inactive people were to make the same change
- Inequalities between population groups may also be exacerbated if there are pre-existing inequalities in physical activity levels

What is known about programmes to increase active travel in relation to baseline levels?

- Goodman et al (2013), found that people who already had high levels of walking/cycling were more likely to use new infrastructure
- However, Panter et al (2016) found a significant increase in active commuting to work only among those with the lowest baseline levels
- Another study of the same intervention identified a strong association between baseline variability in commuting mode choice and increases in active mode share (Heinen and Ogilvie, 2016)
- Perhaps commuters were more willing to increase share of active modes already being used rather than to adopt a new unfamiliar mode

The Activating Communities To Improve Vitality and Equality (ACTIVE) study

- The Model Communities programme involved considerable investment in two New Zealand cities
- $ 1.5 million for publicity and awareness campaigns and $ 7.3 million for infrastructure
- This was supplemented by further local investment, energy and commitment by the local authorities
- A proper evaluation needs to have control areas to measure what might have happened in the absence of the programme

Model Communities programme: New Plymouth

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New Zealand Government

New Plymouth

- Shared pathway projects
- Complementary local and state highway on-road cycle improvements
- Ongoing opportunities for expanding the network – outer suburbs
- An active transport hub
- The New Plymouth 'Dream street' concept and shared space within the city centre
- A complementary education programme, including cyclist skills training, kids involved in driving down speed, Share the road, Pathways and Captain Car Door campaigns, Wild West Bike Fest, car-free days, school gateway projects, travel planning, surveys, modal mapping and a new movement website

Hastings

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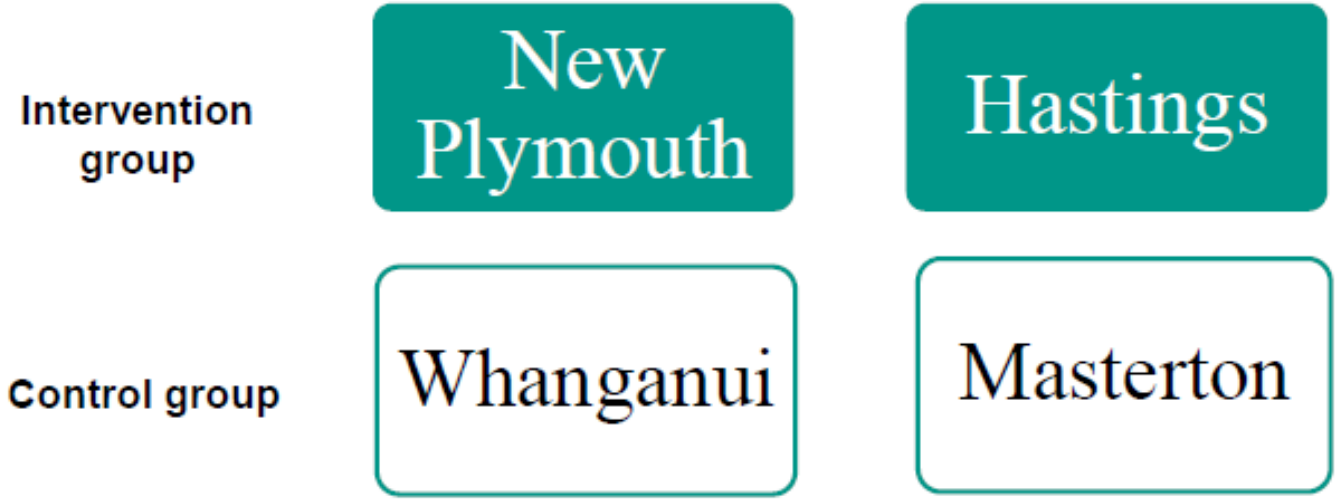
Hastings

- A focus on four key arterial routes into the city centre, completing routes and linking communities and modes
- Complementary on-road cycle improvements on key collector routes
- Shared pathway projects
- Footpath renewal, connectivity and lighting
- A network of information signs, bike stands and seats
- An education programme, including cyclist skills training, Share the road, campaigns, promotional campaigns for ‘Walk and cycle to school’, ‘Walk and cycle to work’, ‘Walk and cycle to the shop’ and ‘Walk and cycle for fun’, and safety programmes

Methods – quasi experimental



Measurements	Baseline 2011	Early intervention 2012	Late intervention 2013

Treatment and control cities were reasonably well-matched

Table 3 Baseline information for the intervention and control cities

	New Plymouth	Hastings	*Intervention cities total*	Whanganui	Masterton	*Control cities total*
Individual socio-demographic factors at baseline (2011 sample + 2012 additions)						
No. of persons responding (2011 plus new in 2012)	209	195	*404*	222	137	*359*
Age (% < 20)	11%(22/202)	19%(36/190)	*15%(58/392)*	16%(31/200)	11%(14/125)	*14%(45/325)*
(% 60+)	33%66/202)	22%(42/190)	*28%(108/392)*	33%(66/200)	33%(41/125)	*33%(107/325)*
Sex (% female)	60%(125/208)	63%(122/195)	*61%(247/403)*	61%(136/222)	64%(86/135)	*62%(222/357)*
Ethnicity (% Maori)	15%(24/165)	21%(39/182)	*18% (63/347)*	20%(33/168)	19%(20/104)	*19%(53/272)*
(% European)	75%(123/165)	69%(126/182)	*72%(249/347)*	76%(127/168)	79%(82/104)	*77%(209/272)*
Personal income (% up to $10,000/y)	18%(33/186)	18%(29/158)	*18%(62/344)*	16%(31/191)	19%(20/103)	*17%(51/294)*
(% $10,001-$20,000/y)	22%(40/186)	21%(33/158)	*21%(73/344)*	27%(51/191)	24%(25/103)	*26%(76/294)*
(% > $40,000/y)	32%(60/186)	35%(55/158)	*33%(115/344)*	28%(54/191)	30%(31/103)	*29%(85/294)*
Transport behaviours at baseline (2011 sample only)						
% trips to work (last 7 days) - walked or ran	11%(35/310))	4%(11/274))	*8%(46/584)*	10%(32/316)	13%(29/232))	*11%(61/548)*
- cycled	0%(0/310)	8%(21/274)	*4%(21/584)*	4%(12/316)	8%(18/232)	*5%(30/548)*
- bus	0%(0/310)	2%(5/274)	*1%(5/584)*	0%(0/316)	0%(0/232)	*0%(0/548)*
- car or other	90%(278/310)	86% (237/274)	*88%(515/584)*	86%(271/316)	80%(185/232)	*83%(456/548)*
Access to modes% access to a bicycle	53%(69/131)	59%(76/128)	*56%(145/259)*	43%(65/152)	60%(62/104)	*50%(127/256)*
% access to a car	91%(119/131)	94%(120/128)	*92%(239/259)*	79%(120/152)	92%(96/104)	*84%(216/256)*
% with physical disability	15%(19/131)	14%(18/128)	*14%(37/259)*	16%(24/152)	11%(11/104)	*14%(35/256)*
Physical activity behaviours at baseline (2011 sample only)						
Hrs walking (mod + vigorous) last 7 days	3.6	4.4	*4.0*	3.2	3.5	*3.4*
Hrs cycling (reg + vigorous) last 7 days	0.25	0.80	*0.53*	0.20	0.64	*0.42*

Data collected: ACTIVE home interviews

- 521 interviews in 2011
- 458 in 2012
- 283 in 2013
- Response rate 38%; 49%; 55% respectively
- All those interviewed in 2013 had been surveyed in 2011 and/or 2012
- We only analysed data for people who had responded in more than one year to get good estimates of change
- Number of trips in past week by different modes for main purposes (to work; education; shopping; leisure; accompanying someone else)
- Habitual transport choice and norms
- International Physical Activity Questionnaire: last seven days; activity at least 10 minutes duration at moderate intensity or vigorous intensity

Objective of this sub-analysis

- To see whether people with low baseline levels of walking and cycling were more or less likely than people with higher baseline levels of walking and cycling to shift from motorised to active travel modes in response to an intervention

Models fitted to weighted travel data per person

- Binary outcome variable defined to be 1 when a person increased active travel mode share (on foot or by bicycle) and 0 otherwise
- Logistic models therefore estimated the population-level odds of the choice of an active mode of travel
- The SAS procedure GLIMMIX was used to fit the models. This procedure uses generalized linear mixed models with pseudo-likelihood estimation for weighted multilevel models
- This suited clustered data as the clustering structure for the random effects could be specified in the model

Explanatory variables

- respondent **age** group
- **sex**
- a **treatment/control** area identifier
- a **matching** variable (to identify respondents from each treatment city to its matched control with values “east” and “west”)
- Any cycling/walking **episodes** of >10 minutes in previous week reported at baseline (0 if none; 1 otherwise)
- time of year surveyed (to account for **seasons**)
- an interaction between **episodes** and the **treatment/control** identifier

Adjusted odds of increasing active travel: pre-intervention to post-intervention

- Compared to similar people in matched control areas, people already reporting some physical activity in terms of walking and cycling had 24 times (95%CI 2 to 356) the odds of increasing active travel mode share

Integrated Transport and Health Impact Modelling Tool (ITHIM)

- Developed by Dr James Woodcock *et al* at the Centre for Diet and Activity Research at the University of Cambridge
- Models the health effects of transport scenarios by taking into account changes in
  - physical activity
  - road traffic injury risk
  - exposure to air pollution (PM2.5)
- Health effects measured by changes in Disability Adjusted Life Years (DALYs) and deaths
- We have adapted the model for New Zealand, particularly for use by the Ministry of Transport

Results of economic evaluation

- Annual benefits for health in the intervention cities were estimated at 34.4 disability-adjusted life years (DALYS) and two lives saved due to reductions in cardiac disease, diabetes, cancer, and respiratory disease.
- Reductions in transport-related carbon emissions were also estimated and valued.
- Using a discount rate of 3.5%, the estimated benefit/cost ratio was 11:1 and was robust to sensitivity testing.

Summary – results of ACTIVE study

- The ACTIVE study sought to evaluate the impact of local government initiatives with central government investment to create new cycling infrastructure, to encourage active travel, making it an easy and attractive option
- The design of the study was quasi-experimental, with two intervention cities (Hastings and New Plymouth) matched to two control cities (Masterton and Whanganui)
- Analysing household travel behaviour data from three consecutive years, the intervention was associated with a 37% increase in the odds of active travel mode choice, with a 95% confidence interval of 8% to 73%
- The Model Communities programme can be regarded as successful in arresting a strong trend towards ever-decreasing levels of active travel

Some remaining questions

- How did the programme increase active travel behaviours relative to the control cities?
  - perceptions of convenience and access to walking and cycle-ways
  - habitual behaviour, awareness of informational and media campaigns
  - perceived norms regarding cycling/walking
- Will these (relative) gains in active travel be sustained? Will they increase (as found in the iConnect study - UK)? We have repeated the travel measurements in 2016 and are currently analysing these….
- Did all groups benefit equally?

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