Effectiveness and equity impacts of town-wide cycling initiatives in England: a longitudinal, controlled natural experimental study

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Social Science & Medicine, 2013, 97, pp 228–237
Cycling towns programme

CDT = ‘Cycling Demonstration Towns’, funded 2005-2011
CCT = ‘Cycling Cities and Towns’, funded 2008-2011
Cycling towns programme

- Town-level initiatives aiming to ‘get more people cycling, more safely, more often’.

- 18 towns increased cycling spending to an average of around £15 per person per year, for three to six years
  - Much higher than the average of £1 per person per year for England as a whole, and comparable to many high-cycling European cities.
Cycling towns programme

• Each town designed a tailored programme of interventions, involving mixtures of capital investment (e.g. cycle lanes) and revenue investment (e.g. cycle training). Average capital:revenue ratio of 3:1.

• Tried to take a ‘whole town’ approach. Emphasis often on one of 5 themes:
  1. General infrastructure improvements
  2. Cycling to work
  3. Cycling to schools/colleges
  4. Cycling to stations
  5. Targeting specific areas/groups (e.g. deprived areas).
Analysis and synthesis of evidence on the effects of investment in six Cycling Demonstration Towns
November 2009

Sloman et al., DfT and Cycling England 2009
Figure 6: Proportion reporting cycling for at least 30 minutes, once or more per month (CDT local authorities compared to all other local authority areas).

Source: Active People Survey. 2006 total n= approximately 1,000 per local authority; 2008 total n=approximately 500 per local authority.
Aims

• To examine whether the prevalence of cycling to work increased in intervention towns relative to matched comparison towns.

• And to examine:
  1. Whether effects differed by deprivation.
  2. Changes in walking and driving to work.
  3. Whether effects differed between towns.
CDT = ‘Cycling Demonstration Towns’, funded 2005-2011
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Selection of controls

- **Primary comparator**
  Matched towns (‘most similar local authority’)

- **Secondary comparators**
  1. Unfunded towns
  2. National (all towns in England except London)
Outcomes derived from Census data

Prevalence of cycling as usual mode of travel to work among all adults aged 16-74 with a current job and not working at home.
Approach to analysis

• Before-and-after controlled design, 2001-2011

• ‘Difference in differences’ (absolute)

\[
\text{Change in intervention towns} - \text{Change in comparison towns}
\]

• ‘Ratio of ratios’ (relative)

\[
\frac{\text{Change in intervention towns}}{\text{Change in comparison towns}}
\]

• Random-effects meta-analysis
Cycling

Diff-in-differences relative to matched group: 0.69 (0.60, 0.77)
Ratio-of-ratios relative to matched group: 1.09 (1.06, 1.11)
Deprivation

Absolute percentage-point change
2011 vs. 2001

Results were similar using relative change

Intervention towns
Matched comparison
Unfunded comparison
National comparison

Percentage-point change,
2011 vs. 2001 (95% CI)

Fifth of small-area deprivation
(Indices of Multiple Deprivation 2010)

1 (most deprived) 2 3 4 5 (most affluent)
Walking and driving

Walking and Driving (car, van & motorcycle)

Walking

Driving

Prevalence (%; 95% CI)

Intervention towns
Matched comparison
Unfunded comparison
National comparison
Town by town

Difference-in-differences, intervention vs. matched towns

<table>
<thead>
<tr>
<th>Town</th>
<th>City</th>
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<tbody>
<tr>
<td>A1</td>
<td>Darlington</td>
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<td>A2</td>
<td>Derby</td>
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<tr>
<td>A3</td>
<td>Brighton &amp; Hove</td>
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<td>A4</td>
<td>Aylesbury</td>
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<td>A5</td>
<td>Exeter</td>
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<td>A6</td>
<td>Lancaster</td>
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<td>B1</td>
<td>York</td>
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<td>B2</td>
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<td>B3</td>
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<td>Southend</td>
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<td>B11</td>
<td>Southport</td>
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<tr>
<td>B12</td>
<td>Blackpool</td>
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</tbody>
</table>

0.23 (-0.31, 0.81)

NB partly explained by fact that towns varied in how much they focussed on cycling to work
Discussion

• Positive effects overall
  • Cycling to work increased relative to comparison towns
  • Larger benefits in those living in more deprived areas
  • Cycling rose at the expense of driving, not walking

• Comparison with previous European studies
  • Smaller effects in absolute terms
  • Similar effects in relative terms

• Contributes to the evidence for interventions
Limitations

• Are the effects generalisable?
  • Intervention towns were self-selected
  • Positive overall effect was driven by a few large towns
  • Average town-level effect was not significant
  • What about non-commuter cycling?

• How did the effects come about?
  • Infrastructure vs. soft measures?
Anna Goodman and Jenna Panter are supported by NIHR Postdoctoral Fellowships. David Ogilvie and Stephen Sharp are supported by the Medical Research Council.

This work was carried out under the auspices of the Centre for Diet and Activity Research (CEDAR), a UKCRC Public Health Research Centre of Excellence funded by the British Heart Foundation, Economic and Social Research Council, Medical Research Council, National Institute for Health Research and Wellcome Trust under the auspices of the UK Clinical Research Collaboration.

We thank the Department for Transport for information on the Cycling Demonstration Towns and Cycling Cities and Towns programmes.

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Intervention towns

Towns in national comparison group

Absolute change in cycling prevalence (2001 to 2011) (%)

Prevalence of cycling 2001 (%)
Using natural experiments to evaluate population health interventions: new Medical Research Council guidance

Peter Craig,¹ Cyrus Cooper,² David Gunnell,³ Sally Haw,⁴ Kenny Lawson,⁵ Sally Macintyre,⁶ David Ogilvie,⁷ Mark Petticrew,⁸ Barney Reeves,⁹ Matt Sutton,¹⁰ Simon Thompson¹¹

Craig et al., *J Epidemiol Community Health*, 2012

Interventions to promote cycling: systematic review

Lin Yang, PhD student Shannon Sahlqvist, career development fellow Alison McMinn, career development fellow Simon J Griffin, assistant director David Ogilvie, clinical investigator scientist

Yang et al., *British Medical Journal*, 2010