Measuring the outcomes from active transport interventions for children

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The research

Carried out at University College London (UCL)
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Two projects:
Reducing children's car use: the health and potential car dependency impacts: Jan 2001 - Feb 2004
Children’s Activities Perceptions And Behaviour in the Local Environment (CAPABLE): Aug 2004 - Dec 2006
## Issues being addressed in the projects

<table>
<thead>
<tr>
<th>Children’s car use project</th>
<th>CAPABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The contribution of walking to children's health</td>
<td>• The development of research tools to investigate children’s spatial behaviour, perceptions and relationship networks, and parental attitudes</td>
</tr>
<tr>
<td>• The effect of experience and education early in life on attitudes to car use and ownership in later life</td>
<td>• Analysis of how children use open spaces</td>
</tr>
<tr>
<td>• The effectiveness of initiatives which cause a transfer from the car to other modes</td>
<td>• Development of new models of children’s outdoor movement patterns</td>
</tr>
</tbody>
</table>
### The research tools

- Monitoring children’s travel and activity patterns:
  - Motion sensors (RT3s)
  - Diaries
  - GPS monitors
- Body composition measurement
- Questionnaires surveys of children and their parents, carried out through schools
- Interviews with parents and with children, including mapping exercises
- Children’s drawing and mapping exercises
- Cameras
- Spatial reasoning tests
Ethical issues

For the work at UCL:
• Approval by UCL Research Ethics Committee
• Clearance of field researchers by the Criminal Records Bureau
• Project specific rules:
  – Never be alone with a child
  – Work with the door open, if with children indoors, etc
• Written consent of parents and children obtained for all extra-curricular activities
• Compliance with the Data Protection Act
Working with children

UCL projects carried out through schools:

• Initial contact through headteacher
• Primary schools (up to 11) - straightforward
• Secondary schools (11+) - needs to be integrated into the curriculum,
• Children are used to transferring papers between school and home
• Publicity, e.g. in the local newspaper, may help increase response rates
Incentives

• Giving incentives may help increase response rates, but the evidence is not clear

• Incentives for children do not need to cost much:
  – Balloons, ‘furries’, and puzzles given to younger children
  – Certificates given to older children

• Reports of results can be given either to the school or to individuals

• Incentives can be offered to the schools, e.g. money for library books
Physical activity monitors

- Portable electronic measuring devices
- Sophisticated versions of pedometers
- Used to measure energy consumption over time
- Outputs can be converted to calories
- Conversion to calories requires information on height, weight, gender and age
- Identification of the contribution of activities to the total volume of energy consumed requires the use of diaries
The RT3 motion sensor
An example output from an RT3

![Graph showing activity calories (kcal) over time of day from 07:00 to 20:00.](image)
Diaries

• Used extensively in transport studies to record when, where and why trips are made
• Useful to record how often and how far children walk and cycle
• Not usually used with activity monitors, but have been in the UCL work
• Provide useful information on children’s time use, activity patterns over the day, whom they are with, etc
• Require quite a lot of effort by the participants
A child’s travel and activity diary

<table>
<thead>
<tr>
<th>Location</th>
<th>What did you do there?</th>
</tr>
</thead>
<tbody>
<tr>
<td>I began the day at</td>
<td>I woke up at</td>
</tr>
<tr>
<td>Home □</td>
<td></td>
</tr>
<tr>
<td>Somewhere else □</td>
<td></td>
</tr>
<tr>
<td>Please say where</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I left at</th>
</tr>
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<tbody>
<tr>
<td>I put my sensors on</td>
<td></td>
<td>:</td>
</tr>
<tr>
<td>at</td>
<td></td>
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**Morning**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I left at</th>
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<tbody>
<tr>
<td>I got there at</td>
<td></td>
<td>:</td>
</tr>
<tr>
<td>I travelled by</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I left at</th>
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</thead>
<tbody>
<tr>
<td>I travelled:</td>
<td></td>
<td>:</td>
</tr>
<tr>
<td>• by myself</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• with an adult</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• with other children</td>
<td></td>
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</tbody>
</table>

**Then I went to**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I left at</th>
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<tbody>
<tr>
<td>I got there at</td>
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<tr>
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</table>
Energy used in a week in school travel compared with PE/games

- Car
- Bus
- Walk
- PE/games

<table>
<thead>
<tr>
<th>Year</th>
<th>Car</th>
<th>Bus</th>
<th>Walk</th>
<th>PE/games</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 6 boys</td>
<td></td>
<td></td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Year 6 girls</td>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Year 8 boys</td>
<td></td>
<td>300</td>
<td>500</td>
<td>450</td>
</tr>
<tr>
<td>Year 8 girls</td>
<td>200</td>
<td></td>
<td>600</td>
<td>500</td>
</tr>
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Body composition

- Height, weight and body fat can be measured
- Body fat can be measured using an electronic body fat monitor or callipers, or by calculating BMI (Body Mass Index)
  \[ \text{BMI} = \frac{\text{Weight in kg}}{\text{(height in metres)}^2} \]
- Some children, especially older girls, do not like being weighed
Using the Tanita electronic body fat monitor
The Tanita electronic body fat monitor
Measuring heights
GPS (Global Positioning Satellite) monitors

- A satellite-based positioning system
- Can detect locations to within a few metres
- Can be used to identify where people go, when they are there, and how fast they travel
- Hence useful for identifying the areas that children inhabit and the routes that they take when walking
- Can be used with diaries to see what they do where, and with whom
The GPS equipment
Wearing the GPS equipment
GPS plots of a boy aged 10 walking to school
Linking the GPS and activity data

- Playing football
- Walking home
- Playing out
Map annotation exercises

- Children are asked to mark on maps places of significance to them
- These can be interpreted directly or used in an interview
Map annotation exercise
Map drawing

- Used to obtain information from children about their perceptions and interpretation of the world about them
- Differences may arise between children who walk a lot and those who mainly travel by car
- There may be differences in cognitive development between children in these two groups
Analysis of children’s maps

Area maps

Route maps
Comparison of mapping of landmarks

Low element example

High element example
Area maps for children who travel to school by different modes

Walks to school

Driven to school

![Walks to school map]

![Driven to school map]
Using cameras

• Can be used by participants to record the places they visit
• Resulting photographs can be analysed in terms of content or used as the basis of an interview
• Disposable cameras are usually used
Photographic exercise

- All the children were in the final two years at a primary school in London
- Children were given single-use cameras and asked to take pictures of things that were important to them
Interaction with the environment

The photographs from the two girls appear to show differences in the way they experience their local environments.
Putting it all together

• Combining the techniques can be very powerful in showing how children interact with the environment
Physical activity levels walking home from school
The location of unstructured activities