New technologies to measure non-health topics in longitudinal studies

CLOSER workshop

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Acknowledgements

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University of Eindhoven (TU/e: Prof Harry Timmermans, Anastasia Moiseeva, Tao Feng and Joran Jessurun).
Contents

- Background to the National Travel Survey
- GPS Pilot approach
- Comparison with existing method
- Conclusions
The National Travel Survey

Designed to measure long-term trends in personal travel
Commissioned by the Department for Transport (DfT)
Primary measure of personal travel in England…

- How?
- Why?
- When?
- Where?
The National Travel Survey

Cross-sectional survey
Produces national statistics
Random probability sample of households in England
12,852 addresses selected from the PAF each year
Continuous fieldwork throughout the year
c.7,500 households interviewed
All household members take part
CAPI interview
Paper 7-day travel diary
Incentive strategy designed to maximise full household participation (all completing diaries)
Fieldwork sequence

- Placement interview
- Reminder call
- Mid-week check
- Pick-up interview

Travel week:
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Travel record – key points

The key part of the survey

Lasts for 7 days

All members of household need to complete
The travel diary

Covers a random 7-day period
Collected for all household members including infants
All journeys except walks less than a mile (days 1 – 6)
Short walks under a mile on day 7
Checked by interviewer
Extensive in office editing
## JOURNEYS
Please record each journey on a new row. Include very short ones and return journeys. Include walks if 1 mile or more.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What was the purpose of your journey? See Note A</td>
<td>What time did you leave? See Note B</td>
<td>What time did you arrive? See Note C</td>
<td>Where did you start your journey? (Tick Home or give the name of the village, town or area) See Note D</td>
<td>Where did you go to? (Tick Home or give the name of the village, town or area) See Note E</td>
<td>What method of travel did you use for each stage of your journey? (Miles) See Note F</td>
<td>How far did you travel? (Miles) See Note G</td>
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<td>Time:</td>
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<td>No Home</td>
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<td>Time:</td>
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<td>No Home</td>
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</tbody>
</table>

**STAGES** These columns are for help with filling in please unfold side flap for notes.
Data collected in the travel diary

- **Purpose**
- Time left
- Time arrived
- Origin
- Destination
- **Mode of travel**
- Distance
- Time spent travelling
- Number in party
- Vehicle used
- Whether driver or passenger
- Parking costs
- Ticket type
- Ticket cost
- Number of boardings
The GPS Pilot
Potential benefits

Reduced respondent burden
Reduced costs
Improved data quality
Modernised approach
GPS pilot – summary of methodology

Sub-sample of February and March 2011 NTS sample

- C. 900 individuals aged 12+

Household members given GPS monitors instead of diaries
GPS Monitors

- MGEData MobiTest GSL:
  - Accelerometer-enabled GPS Monitor
  - Extra location data recorded in interview
  - Mapping to GIS data
- Data not recorded by GPS
  - Cost
  - Tickets
  - Number in party
- Practical issues
  - Software not compatible with laptops
  - Devices not set to record correct information
  - Returning devices, downloading data and recycling back into field
Data processing

Used an enhanced version of the *Trace Annotator* Bayesian Belief Network model with accelerometer data
Data processing

Purpose
- GPS traces
- Accelerometer traces
- Land use data
- Questionnaire data

Mode
Example of accelerometer trace:
walk – bus - walk
Comparison with diary data
GPS compared with diary

<table>
<thead>
<tr>
<th></th>
<th>GPS</th>
<th>Diary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response rate</td>
<td>52%</td>
<td>59%</td>
</tr>
<tr>
<td>Average journeys per person per year</td>
<td>645</td>
<td>934</td>
</tr>
<tr>
<td>Average journey distance</td>
<td>24</td>
<td>6</td>
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<tr>
<td>Average journey time</td>
<td>51</td>
<td>21</td>
</tr>
</tbody>
</table>
Journeys by days of the week

Day 1: Diary 14, GPS 18
Day 2: Diary 14, GPS 18
Day 3: Diary 14, GPS 17
Day 4: Diary 14, GPS 16
Day 5: Diary 14, GPS 14
Day 6: Diary 14, GPS 11
Day 7: Diary 14, GPS 7

Base: All respondents
Trip stages by mode

- Car/van/taxi/minicab (Diary: 60, GPS: 63)
- Walking (Diary: 10, GPS: 28)
- Bus (Diary: 7, GPS: 8)
- Train (Diary: 2, GPS: 14)
- Cycling (Diary: 1, GPS: 0)
- Light rail (Diary: 1, GPS: 4)
- Motorcycle (Diary: 0, GPS: 1)

Base: All respondents
Journey purpose

- Home: Diary 43, GPS 55
- Work: Diary 14, GPS 7
- Personal other: Diary 7, GPS 7
- Shopping other: Diary 1, GPS 1
- Shopping groceries: Diary 6, GPS 6
- Friend: Diary 3, GPS 5
- Holiday: Diary 0, GPS 0
- Education: Diary 4, GPS 0
- Entertainment: Diary 3, GPS 3
- Eating/drinking: Diary 2, GPS 3
- Personal medical: Diary 1, GPS 3
- Sports: Diary 1, GPS 0
- Unknown: Diary 14, GPS 14

Base: All respondents
Journeys by start time

- GPS (11,090)
- Diary (30,547)
Conclusions

GPS produced different results to traditional diary data collection

Data processing of GPS and accelerometer data were not sufficiently advanced for NTS requirements
Further information

*National Travel Survey 2011 GPS pilot: summary analysis*, by Abby Sneade at DfT


*Processing of National Travel Survey GPS Pilot Data*, a technical report prepared on behalf of the Department for Transport by Tao Feng, Anastasia Moiseeva and Professor Harry Timmermans at TU/e.


*National Travel Survey 2011 GPS Pilot*, a technical report on the pilot survey management and data collection, by Josi Rofique, Alun Humphrey and Caroline Killpack of NatCen,

Thank you

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