Community severance – the barrier effect of busy roads

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www.ucl.ac.uk/street-mobility
@StreetMobility

We thank our funders:
Outline

• What is ‘community severance’?
• Why is it important for health?
• Why is it important for health inequalities?
• Assessing and valuing the barrier effect of busy roads – the Street Mobility Toolkit
WHAT IS COMMUNITY SEVERANCE?
Figure 4: Word cloud of definitions of "barrier effect"
“Separation of people from facilities, services and social networks they wish to use within their community; changes in comfort and attractiveness of areas; and/or people changing travel patterns due to the physical, traffic flow and/or psychological barriers created by transport corridors and their use.”
Our definition of community severance

Transport-related community severance is the variable and cumulative negative impact of the presence of transport infrastructure or motorised traffic on the perceptions, behaviour, and wellbeing of people who use the surrounding areas or need to make trips along or across that infrastructure or traffic.
WHAT ARE THE POTENTIAL IMPACTS OF BUSY ROADS ON HEALTH & WELLBEING?
Community severance

Community severance and health

WHAT ARE THE POTENTIAL IMPACTS OF BUSY ROADS ON HEALTH INEQUALITIES?
“A developed country is not where the poor drive cars, it is where the rich use public transportation.”

Enrique Peñalosa, Mayor, Bogotá, Colombia
Health inequalities from busy roads

Air pollution

- Poorer people:
  - More exposed to air pollution from motor traffic
  - More susceptible to health impacts of pollution

≈ 400 deaths pa in New Zealand
Health inequalities from busy roads
Noise pollution

- Raised blood pressure
- Interference with concentration and with sleep
- Disruption of education
Health inequalities from busy roads

Injuries

- Injury rates higher in more deprived areas
- More deprived people more likely to be killed in road traffic crash (Feleke et al. (2018) J Transp Health)
Road travel injuries in New Zealand

- Major cause of death, disability and health inequity
- High rate of road travel deaths compared with other OECD countries
- Social cost $NZ 4.2bn in 2017
- Particularly high in children & young people

Health inequalities from busy roads
Social isolation

- Poor - worse health – less able to walk or cycle
- Frail, elderly, disabled: less able to cross the road (bus stops)
- Fewer other options for safe spaces to meet and socialise (old, young)
Main objectives of Street Mobility project

• To increase understanding of residents’ perceptions and priorities regarding CS
• To develop questionnaire tools to measure CS at the individual level
• To develop a CS index, based on readily available data
• To obtain estimates of the values of reducing CS
• To test these measures
• To analyse the impact of CS on wellbeing and other social outcomes
The UCL Street Mobility project

- Participatory mapping
- Video surveys
- Household survey
- Street audits
- Stated preference survey
- Spatial analysis

The UCL Street Mobility project focuses on various components such as participatory mapping, video surveys, household surveys, street audits, stated preference surveys, and spatial analysis.
Seven Sisters Road (London)

Finchley Road (London)

Queensway (Southend-on-Sea)

Stratford Road (Birmingham)
Participatory mapping

- Informal mapping sessions
- Informal street mapping
- In-depth interviews & participatory mapping workshops
Household survey:

Health and neighbourhood mobility

My neighbourhood, my streets

Please make sure you have read the information sheet before you complete this questionnaire

Instructions

Please answer all the questions you can

You may leave questions blank if you do not wish to answer

In total, this questionnaire should take around 20 minutes to complete

STREET MOBILITY & NETWORK ACCESSIBILITY PROJECT

UNIQUE ID □ □ □ □ □ □ □ □
Space syntax

- Space syntax network analysis methods measure the centrality of networks based on the geometric simplicity of traversing shortest paths between origins and destinations.
Spatial analysis and walkability model

- **Walkability** – reflects potential for walking
- **Community severance** can occur where high walkability co-exists with high motorised traffic levels
UK Walkability Model
Prototype
# Street Audit

## PERS Link Assessment Form

**Page 1 of 2**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Checklist Factors</th>
<th>Checklist</th>
<th>Overall Score</th>
<th>Design Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective width</td>
<td>Width for pedestrian flow, Wheelchair accessibility, All sections acceptable with, Separation from traffic, Allowance for obstructions, Pedestrian congestion</td>
<td>+ve, +/-, -ve</td>
<td>-3 to +3</td>
<td></td>
</tr>
<tr>
<td>Dropped kerbs</td>
<td>Located on desire lines, Adequate capacity, Level dropped/flush, Gradient of drop, Consistency, Frequency of dropped kerbs</td>
<td>+ve, +/-, -ve</td>
<td>-3 to +3</td>
<td></td>
</tr>
<tr>
<td>Gradient</td>
<td>Severity, Stepshamps, Rest points, Undulations, Appropriate handrails, Presence of crossfalls, Presence of obstructions, Location/alignment, Overhead obstructions</td>
<td>+ve, +/-, -ve</td>
<td>-3 to +3</td>
<td></td>
</tr>
</tbody>
</table>
Video surveys

- Placing video cameras to film pedestrian and motor traffic
- Compare actual pedestrian flows with expected (from the walkability model)
- Pedestrian crossing behaviour
  - Formal crossings
  - Informal crossings
  - Waiting times
Video surveys

% OF MOBILITY-IMPAIRED

- Walk along pavement
- Walk along pavement, crossing side streets
- Signalized crossing
- Zebra
- Informal crossing
Stated preference survey

**Scenario:** there is a bus stop on the other side of the road that is in a cheaper travel zone than the bus stop on this side

<table>
<thead>
<tr>
<th>Traffic density: Low</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central reservation with no guard railing</td>
<td></td>
</tr>
</tbody>
</table>

**In this scenario, which of the two options would you choose?**

<table>
<thead>
<tr>
<th>Option A</th>
<th>Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross at this point</td>
<td></td>
</tr>
<tr>
<td>Saving 80p off your one-way ticket cost</td>
<td></td>
</tr>
<tr>
<td>Do not cross the road and pay the higher ticket cost</td>
<td></td>
</tr>
</tbody>
</table>

- 423 respondents across 4 areas
- Each respondent answered 8 questions, each one with different road conditions
- National (GB) online panel survey of 3,038 participants
Severance index (examples)

Disutility of crossing the road compared with disutility of not making the trip

<table>
<thead>
<tr>
<th>Traffic density: Medium</th>
<th>Traffic density: Medium</th>
<th>Traffic density: High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central reservation with no guard railing</td>
<td>No central reservation</td>
<td>No central reservation</td>
</tr>
<tr>
<td>ACTUAL SPEED 10MPH</td>
<td>ACTUAL SPEED 20MPH</td>
<td>ACTUAL SPEED 20MPH</td>
</tr>
</tbody>
</table>

Values: 0, 69, 83, 100
# Benefits of interventions

<table>
<thead>
<tr>
<th>Potential intervention</th>
<th>Benefit per trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 → 2 lanes (each direction)</td>
<td>£1.59</td>
</tr>
<tr>
<td>2 → 1 lane (each direction)</td>
<td>£1.56</td>
</tr>
<tr>
<td>Add central reservation</td>
<td>£0.50</td>
</tr>
<tr>
<td>High → medium traffic density</td>
<td>£1.02</td>
</tr>
<tr>
<td>Medium → low traffic density</td>
<td>£1.34</td>
</tr>
<tr>
<td>Speed below 30mph</td>
<td>£0.18</td>
</tr>
<tr>
<td>Footbridge → straight pelican</td>
<td>£0.07</td>
</tr>
<tr>
<td>Underpass → straight pelican</td>
<td>£0.34</td>
</tr>
</tbody>
</table>
## Tool (under development)

<table>
<thead>
<tr>
<th>ROAD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Green: cells to be edited</td>
<td></td>
</tr>
<tr>
<td>How long is the section of the road?</td>
<td>2000 meters (between 100 to 2000m)</td>
</tr>
</tbody>
</table>

*Use the dropdown menus to select the characteristics of the road, or choose one of the built-in options*

<table>
<thead>
<tr>
<th>CURRENT SCENARIO</th>
<th>FUTURE SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of lanes (in each direction)</td>
<td>3</td>
</tr>
<tr>
<td>Central reservation</td>
<td>no</td>
</tr>
<tr>
<td>Traffic density</td>
<td>high</td>
</tr>
<tr>
<td>Traffic speed</td>
<td>20mph</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>no</td>
<td></td>
</tr>
<tr>
<td>medium</td>
<td></td>
</tr>
<tr>
<td>20mph</td>
<td></td>
</tr>
</tbody>
</table>

**Built-in options**

*Click on buttons*

<table>
<thead>
<tr>
<th>Best possible conditions</th>
<th>Worst possible conditions</th>
<th>Best possible conditions</th>
<th>Worst possible conditions</th>
<th>Same as current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tool (under development)

**PEDESTRIAN CROSSINGS**

The segment below represents the road. Use the dropdown menus in each cell in the segment to choose the approximate locations of the available pedestrian crossings, or choose one of the built-in options.

**LEGEND**
- P: Straight pelican crossing
- S: Staggered pelican crossing
- F: Footbridge
- U: Underpass

<table>
<thead>
<tr>
<th>CURRENT SCENARIO</th>
<th>FUTURE SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>U</td>
</tr>
</tbody>
</table>

Built-in options  
*Click on buttons*

- **No crossings**
- One in the middle
- One in each extreme

<table>
<thead>
<tr>
<th>No crossings</th>
<th>One in the middle</th>
<th>One in each extreme</th>
<th>Same as current scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>P S F U</td>
<td>P S F U</td>
<td>P S F U</td>
<td>P S F U</td>
</tr>
</tbody>
</table>
### Tool (under development)

#### Outputs

<table>
<thead>
<tr>
<th>Utility and Travel Behaviour</th>
<th>Current Scenario</th>
<th>Future Scenario</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severance index (disutility of crossing the road)</td>
<td>100%</td>
<td>74%</td>
<td>-26%</td>
</tr>
<tr>
<td>Willingness to walk to avoid crossing the road (mins.)</td>
<td>22.6</td>
<td>15.7</td>
<td>-6.9</td>
</tr>
<tr>
<td>Probability of crossing the road (no facilities)</td>
<td>0.2%</td>
<td>1.0%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Probability of crossing the road (using facilities)</td>
<td>95.0%</td>
<td>99.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Probability of not making the trip</td>
<td>5.0%</td>
<td>0.5%</td>
<td>-4.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits, per person</th>
<th>Benefit of improving crossing conditions, per trip</th>
<th>£0.94</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total Number of Walking Trips, per year</th>
<th>Current Scenario</th>
<th>Future Scenario</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of trips crossing the road (no facilities)</td>
<td>5,200</td>
<td>26,000</td>
<td>20,800</td>
</tr>
<tr>
<td>Number of trips crossing the road (using facilities)</td>
<td>2,470,000</td>
<td>2,574,000</td>
<td>104,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Benefits, per year</th>
<th>Total benefit of improving crossing conditions</th>
<th>£2,586,189</th>
</tr>
</thead>
</table>

Disaggregation by age, gender, and trip purpose
Valuing the wider costs of severance
(on social capital, wellbeing, social exclusion, environmental effects and local businesses)

Estimated cost of £56.6 bn pa (2.8% of Great Britain’s GDP) = £1,119 per person pa
[provisional figures, work in progress]
Street Mobility Toolkit

• Designed to assist local authorities, consultants and local communities to better understand CS and what to do about it

• Provides advice on how to measure CS, and to assess impacts on local communities

• Some tools aimed at local communities, others at transport professionals
Contents of the Toolkit

- **Introduction**: overview of the toolkit
- **What we know**: summary of the evidence on the effects of busy roads on local people and key project findings
- **Participatory mapping**: approach and case study
- **Health and Neighbourhood Mobility Survey**: survey instrument and case study
  - ‘How to’ guides
- **Video surveys**: what to do and case study
- **Walkability models**: overview and case studies
- **Valuation tool**: summary of the interactive tool
- **Other useful tools**: street audits and space syntax
## Introduction

### Summary of tools and applicability

<table>
<thead>
<tr>
<th>Tool</th>
<th>Why use it</th>
<th>What resources are needed?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>People</td>
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</table>
Community severance measurement toolkit

www.ucl.ac.uk/street-mobility/toolkit

Most of the toolkit is now available to download. The valuation tool will follow soon.

For more information about the project, see:
www.ucl.ac.uk/street-mobility/project

For more details, see eg
www.ucl.ac.uk/street-mobility/finalconference
www.ucl.ac.uk/street-mobility/publications
Street Mobility project team

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• Rebecca Payne

• Barbara Bonney
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