Potentials and problems arising from integration - A critical view on the safety effect

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Seminar: Shared Space – is the Shared Space strategy adaptable in Norway?
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The problem

→ The biggest safety problem in many cities is accidents with pedestrians and bicyclists

→ (Partly) separation gives more accident
  - Crosswalks (without any other measures): + 44 %
  - Cycle tracks: + 7 % (+24 % in intersections)

→ Integration of cycle and car traffic → less accidents

→ Would integrations of all types of traffic (Shared Space) give less accidents?
The discussion

→ Pro Shared Space: Yes, very positive safety effect

→ Against Shared Space: No, it is dangerous to use pedestrians as speed bumps

→ Scientists and researchers: We do not know, people saying that Shared Space is a safety measure have no good evaluation studies to refer to. They should read the books about how to make evaluation studies
Background for presentation

→ Safety effect of about 130 measures
→ Meta analysis
→ Results from about 3,000 studies
→ Over 1,100 pages
→ Continuous updating
→ 8-10 measures are updated every year
→ Shared space included in 2010 (Norwegian)
→ Online on tsh.toi.no (Norwegian)
→ Norwegian, Finnish, Russian, English, Spanish
Methods

- Literature study (recommendations and effects)
  - ≈ 30 reports, articles and www
  - Meta analysis of 10 studies
  - 24 locations: 7 squares, 5 intersections, 7 road sections, 5 city centres
  - 55 effect estimates
  - Locations rebuild in 1996-2007
  - 6 countries: SE, DK, NL, DE, UK, CH

• Jaredson 2002 (SE)  • Tyréns 2007 (SE)
• Brenner 2006 (SE)  • Gerlach et al. 2008, 2008a (NL)
• Quimby og Castle 2006 (NL, DK, UK)  • Van der Velde og Bos 2008 (NL)
• Swinburne 2006 (UK)  • Gerlach, Ortlepp og Voss 2009 (NL, DE, CH)
• NHL 2007 (NL)  • Reid, Kocak og Hunt 2009 (NL, UK)
Methods (meta analysis)

→ Meta analysis (estimation of total effect)
  - Effects are (if possible) estimated by use of meta analysis
  - Effects are estimated as odds ration = \((A/B) / (C/D)\), where
    - \(A/B\): Number of accidents in test group, after/before
    - \(C/D\): Number of accidents in control group, after/before
  - Effects are weighted statistically according to the size of the study
  - Total effects are calculated as:

\[
\text{Weighted summary effect} = \exp \left( \sum_{i=1}^{g} V_i \cdot \text{LN(effect estimate)}_i \right) / \left( \sum_{i=1}^{g} V_i \right)
\]
## Safety effect

<table>
<thead>
<tr>
<th>Location</th>
<th>Accident severity</th>
<th>Accident types affected</th>
<th>Best estimate</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All</strong></td>
<td>All accidents</td>
<td>All accidents</td>
<td>-17</td>
<td>(-40; +14)</td>
</tr>
<tr>
<td></td>
<td>Injury accidents, not controlled for publication bias</td>
<td>All accidents</td>
<td>-26</td>
<td>(-42; -6)</td>
</tr>
<tr>
<td></td>
<td>Injury accidents, controlled for publication bias</td>
<td>All accidents</td>
<td>-21</td>
<td>(-40; +5)</td>
</tr>
<tr>
<td><strong>Intersection/square</strong></td>
<td>All accidents</td>
<td>All accidents</td>
<td>-14</td>
<td>(-48; +43)</td>
</tr>
<tr>
<td></td>
<td>Injury accidents</td>
<td>All accidents</td>
<td>-46</td>
<td>(-70; -2)</td>
</tr>
<tr>
<td><strong>Section</strong></td>
<td>All accidents</td>
<td>All accidents</td>
<td>-12</td>
<td>(-46; +45)</td>
</tr>
<tr>
<td></td>
<td>Injury accidents</td>
<td>All accidents</td>
<td>-16</td>
<td>(-32; +5)</td>
</tr>
</tbody>
</table>

→ No significant safety effect for whole city centres
→ Effect in the number of accidents and not for the number of injuries
→ **Not possible to estimate the effect for different groups as pedestrians or bicyclists**
Less positive effect

→ All studies are very simple before and after studies
  - (1 study had data that made it possible to made some corrections)

→ No control for confounding factors
  1. General trend
  2. Regression to the mean
  3. Traffic volume
  4. Accident migration

→ No estimate of risk
  - Reduction in the number of accidents ≠ smaller risk, if less traffic
More criticism

1. Discrepancy between idea and actual design
   - Only 6 of 24 location may to some extent be defined as “real” Shared Space
   - Example: Kensington High Street (London) are often described as shared space, but the road has still a lot of regulations
   - Not possible to estimate the effect of “real” Shared Space (big heterogeneity)

2. The evaluations cover at a package of measures
   - Effect estimate for the whole package and not the Shared Space idea
   - Example: Laweiplein (Drachten) seems to have a good safety effect, but a lot of this effect is probably the effect of rebuilding the intersection to a roundabout

3. Small accident numbers
   - The estimates are based on small numbers and usually short after periods
   - Difficult to show significant effects
   - Effect estimate short after the implementation is not the same as the effect long time after the implementation
Probably positive effect after all

→ Speed reduction
  - 5 Swedish locations: Speed reduction: 19-39 % (18-28 → 13-22 km/h)
  - Projects in Nederland: Speed reduction: Up to 40 %

→ People feeling more unsafe = more attention
  - More integration, less distance, uncertainty about the traffic rules
  - (The feeling of unsafety become less over time for the average road user)

→ The effect short and long time after implementation (sections)
  - Short < long: The effect becomes better over time
  - Road users makes mistakes in the beginning but learn how to use it

→ The effect short and long time after (Intersection/squares)
  - Short > long: The effect becomes smaller over time
  - Road user are feeling insecure in the beginning but are getting more familiar with it (less attention and higher speed)
Other effects - mobility

→ Car traffic
  - Objective: lower speed level
    • Critical speed: 30 km/h (energy)
    • Time to “negotiation”: 15-20 km/h
  - Speed reduction 20-40 % → reduction mobility
  - Less stops → constant speed → shorter travelling time → better mobility

→ Public transport
  - No stops for red light: shorter time (Laweiplein, - 24-48 %)
  - Yielding for vulnerable road user: longer time (Skvallertorget, + 75-100 %)

→ Vulnerable road user:
  - Pedestrian: Direct route and car drivers are yielding (50-90 %)
  - Bicyclist: Direct route, but car drivers are yielding to a lesser extent (35-86 %)
Other effects

→ Accessibility
  - Car traffic: Better than normal pedestrian streets
  - Visually impaired: Worsening (no guidelines and colours)
  - Physically handicapped: Worsening (some types of surface)
  - Physically handicapped: Improvement (uniform surface, same level)

→ Subjective safety
  - Objective safety through subjective unsafety
  - Average road user: Feeling more safe after having got used to the design
  - Children, elderly, Visually impaired, Physically and mental handicapped are feeling unsafe (difficult to negotiate) → safe space

→ Environment
  - Lower/more constant speed and less car traffic (9-34 %) → less noise/pollution
  - Other surface → more noise and vibrations

→ Aesthetic and life (main objective): Fulfilled
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>(+)</td>
</tr>
<tr>
<td>Mobility, car and buss</td>
<td>+ / -</td>
</tr>
<tr>
<td>Mobility, pedestrian and bicyclist</td>
<td>+ / (+)</td>
</tr>
<tr>
<td>Accessibility, car and buss</td>
<td>+</td>
</tr>
<tr>
<td>Accessibility, vulnerable road users</td>
<td>+ / -</td>
</tr>
<tr>
<td>Subjective safety, ”average” and ”weak”</td>
<td>(-) / -</td>
</tr>
<tr>
<td>Environment</td>
<td>+</td>
</tr>
<tr>
<td>Aesthetic and life</td>
<td>+</td>
</tr>
</tbody>
</table>
Conclusions

→ Potentials
  – Maybe a good safety effect (low speed level)
  – 100 % separation or 100 % integration – the problems arise when the solutions is neither (pedestrian crossings, cycle tracks)

→ Problems
  – No good evaluation in Norway or other countries that document this maybe positive effect

→ Not a criticism of Shared Space, but more a criticism of the evaluations and the presentation of these studies
The 10 studies in the meta analysis


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...Questions and comments