Transport mobility for older road users, what do we know and what could be done to facilitate participation in Society?

Torbjorn Falkmer
T.Falkmer@curtin.edu.au

Presented at Curtin - Monash Accident Research Centre
June 2011
Transport mobility for older road users, what do we know and what could be done to facilitate participation in Society?

Torbjorn Falkmer
T.Falkmer@curtin.edu.au
War on the roads
Injuries are preventable non-random events.
G-forces frontal crash in 32 km/h corresponds to 1816 kilogram
Risk / speed when hit?

% Risk to be fatally injured as a pedestrian

Speed (km/h)
Killed and severely injured (KSI) rate per 100 million 1994-1998, based on data from Sweden (SIKA & SNRA)

<table>
<thead>
<tr>
<th>Mode of travel</th>
<th>Passenger kilometers</th>
<th>Passenger journeys</th>
<th>Passenger hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>3.1</td>
<td>51.5</td>
<td>155.5</td>
</tr>
<tr>
<td>Motorcycle/Moped</td>
<td>19.2</td>
<td>44.7</td>
<td>224.5</td>
</tr>
<tr>
<td>Cycle</td>
<td>30.9</td>
<td>69.6</td>
<td>352.8</td>
</tr>
<tr>
<td>Foot</td>
<td>21.5</td>
<td>20.9</td>
<td>80.9</td>
</tr>
<tr>
<td><strong>Bus or Coach</strong></td>
<td><strong>0.4</strong></td>
<td><strong>7.6</strong></td>
<td><strong>17.5</strong></td>
</tr>
<tr>
<td>Rail</td>
<td>0.0</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Air Travel*</td>
<td>0.2</td>
<td>147.3</td>
<td>72.9</td>
</tr>
</tbody>
</table>
To summarize the stats….

- i.e. **statistically** you have to drive your car 15,000 km/annum longer than your entire lifetime to be killed or severely injured (~2,000 years…) – if we use the KSI per 100 million passenger kilometre figure

- 99% of all female novice drivers (aged 18-24) have no crashes

- 98% of all male novice drivers (aged 18-24) have no crashes
So what do we want to avoid? i.e. reduced **mobility** vs. reduced **safety**?

<table>
<thead>
<tr>
<th></th>
<th>Licensed</th>
<th>Not licensed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capability to safe driving performance</td>
<td>Correctly licensed drivers</td>
<td>Missed but capable drivers</td>
</tr>
<tr>
<td></td>
<td>Incorrectly licensed drivers</td>
<td>Correctly rejected incapable drivers</td>
</tr>
<tr>
<td>No capability to safe driving performance</td>
<td>Incorrectly licensed drivers</td>
<td></td>
</tr>
</tbody>
</table>
Economical rationale
“The mobility snake” – a model for describing the importance of transport mobility for society, as well, as for the individual.

The model is adopted from Hakamies Blomqvist, Henriksson, & Heikkinen (2000).
The prevalence of licence holders in Sweden 2001 per age group

% of licence holders in Sweden 2001 per age group

Age

25% of the population 65+ in 20 years, 80+ 5%, predominantly female
Are older drivers as bad as we read in the media?

- Focus on elderly driver’s crashes, in combination with the relatively high incidence of impairments inherently related to an ageing population, (3/4 of disabled 65+)
The impact of traffic on fatalities and injuries worldwide by age groups

Deaths and reported injuries by age group

- Male deaths in 12 months to June 2004
- Female deaths in 12 months to June 2004
- Male injuries in 12 months to December 2003
- Female injuries in 12 months to December 2003

Percent of casualties

Age group

0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85+
Avoid crashes (Evans -1997) – “the perceptive and motor ability paradox”
Age or experience?

(Maycock et al. 1991)

→ both
Background - The driver and the task

Driving task

Perceptual
- reaction time
- vision
- hearing
- tactile

Physical measures
- dimensions
- reach
- force
- endurance

Cognitive
- attention
- memory
- decision
Background, cont. - Specification of the target group elderly I

- Variation in functional ability increase with age
- “Normal” degradation
  - Physically (Motor)
  - Perceptually
- Cognitively

“The young driver paradox”
What do we know about older drivers’ crashes

- daylight
- dry roads
- intersection
- weekdays and on roads that are not affected by snow or ice compared to other drivers.

  Crashes reflect exposure and from these examples it is evident that older drivers choose the time and condition when driving is less challenging
What do we know about older drivers’ crashes

### Graph

- **Percentage of all accidents**
- **18-64**
- **65+**

- **Grade separated railroad junction**
- **In connection with private road or area**
- **Intersection with mandatory give-away or stop**
- **Intersection with right-side priority rule**
- **Bridge**
- **Curve**
- **Straight section**
- **Parking lot, square etc**
- **Other area**
What do we know about older drivers’ crashes, cont.

- Request rapid processing of large amounts of simultaneously presented data
- **Crashes:**
  - complex traffic scenarios
  - cross a stream of traffic and yield right of way
  - multiple vehicle crashes turning improperly,
  - ignoring stop signs and red lights and starting up improperly
  - they are more usually than not at fault
What do we know about older drivers’ crashes, cont.

- pose a greater risk to themselves than the threat they pose to other road users
- previous crashes are a better predictor of crash involvement than previous convictions
- “driver inattention” and “observation errors”
  - Visual acuity alone does not seem to be the contributing factor
  - the Useful Field of View (UFOV)
What do we know about older drivers

- It should, however, be noted that there are several kinds of behaviour among older drivers
  - positive effect on traffic safety
    - a lower proportion of alcohol use when driving
    - more frequent use of safety restraints
    - not losing the control over the vehicle in curves and straight sections
    - no particular problem with automatic processes, which place limited demands on their attention capacity and generally occur under highly predictable conditions of traffic and weather.
What have we done?
### Injured per 100,000 STS trips

<table>
<thead>
<tr>
<th>Hospital data</th>
<th>Company data</th>
<th>Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9 – 5.6</td>
<td>1.5 – 5.0</td>
<td>2.8 – 6.0</td>
</tr>
</tbody>
</table>
## Injury severity

<table>
<thead>
<tr>
<th></th>
<th>MAIS 1</th>
<th>MAIS 2+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving vehicle</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>Vehicle at stand still</td>
<td>83%</td>
<td>17%</td>
</tr>
</tbody>
</table>
The costs?

- “true costs”:
  - ~ 400 injured per annum in Sweden
  - ~ $1,000,000 per annum or $7.7 per trip
"A Swedish survey of occupational therapists’ involvement and performance in driving assessments"  SJOT (2007)
Cognitive deficits/dementia group
Conclusions:

contrary to the current practice regarding fitness-to-drive assessments – NorSDSA:

- should not be used at all for persons with cognitive deficits/dementia
- not as a stand-alone test for patients with post stroke conditions.

T.Falkmer@curtin.edu.au
Exceeding speed limit

Change gear

Handling pedals

To the left

Too fast for the situation

Automatic

Manual


