Key data concerning traffic and health data relevant for transportation safety of older traffic participants – AGE V3

Ageing and Safe Mobility: International interdisciplinary conference

Nicolas Haverkamp
Center for Evaluation and Methods (CEM)
Zentrum für Evaluation und Methoden (ZEM)

November 28th, 2014
Bundesanstalt für Straßenwesen (BASt)
Bergisch Gladbach
1. Comprehensive **examination** of the **mobility behavior** of older people.

2. Analysis of the possible **coherence** between **health aspects** and **mobility and risk behavior** of the elderly.

3. Development of target group appropriate **recommendations**.
1. Cooperation of the Center for Evaluation and Methods (ZEM) at the University of Bonn with the Leibniz Institute for Employment Research (IfADo) at the University of Dortmund, project group “Ageing and CNS changes”.

2. Representative telephone survey of n=2,000 persons aged 50 years and up; n=1,000 persons between 16-49 years.
AGE-V3 Methodology

The obtained mobility and health data was linked and compared to results of the BASt-projects “Life situation, attitudes and behavior of elderly drivers of both sexes” from 1986 (Hartenstein et al., 1990) as well as “Elderly people in the future safety-system ‘road – vehicle – person’ (AEMEÏS)” from 1998.
The analysis consisted of

1. a **description** of the **mobility behavior** (ZEM), **health data** relevant for traffic safety (IfADo) as well as the **differences** concerning mobility behavior caused by health factors (ZEM)

2. a **comparison** of **older** and **younger** traffic participants to produce **suggestions** for the development of measures of **traffic security**
The examinations concerning state of health as well as medication of the subjects were carried out in consideration and on the basis of the substance-risk classification for pharmaceuticals, taken from the EU research project “Driving under the Influence of Drugs, Alcohol and Medicines” (DRUID).
1. Mobility and traffic participation

Concerning the availability of means of transport, there is a virtually universal coverage of older people with automobiles and bicycles.

The high degree of ownership of cars and driving licenses (92 percent) is also reflected in their use, since about 60 percent of the older survey participants mentioned a daily use. Basically, men are among the most frequent drivers with respect to the car.
1. Mobility and traffic participation

The ability to do activities without a car is rated rather badly among all age groups. In addition to this, it should be noted that a significant proportion of the elderly never uses public transport.

With regard to the number of traffic accidents in the last three years – which concerns a total of 376 people – the older participants were less involved than other age groups.
1. Mobility and traffic participation

These comparisons show:

The holding of a driving license as well as the possession of a car has become more and more natural for the elderly (of both sexes); furthermore, the number of elderly drivers who drive 7500km or less has increased.
2. Health status and medication

a) **Vision:**

only **12 percent** of the respondents aged 50 years or older have vision problems (night/photopic vision or glare sensitivity) or suffer from a disease of the eyes (cataracts, glaucoma or macular degeneration)

**36 percent** of older drivers are on medication for these diseases (reduction of intraocular pressure and corneal dehydration) which can affect **visual performance** and hence **responsiveness**
2. Health status and medication

b) **Equilibrium:**

13 percent of the elderly are affected. Arlevert (against vertigo, may reduce responsiveness as a side effect) is most widely taken.

c) **Walking/bending over:**

more commonly known (23 percent of the elderly) Analgesics (Ibuprofen, Diclofenac and Voltaren) are most common and can also reduce responsiveness.
Results

2. Health status and medication

d) **Cardiovascular diseases:**
45 percent of the elderly affected (36 percent suffer from high blood pressure)

**Antihypertensives** as medication; may also reduce responsiveness

e) **Diabetes:**
12 percent are affected (nearly all on medication)

**Metformin** (not likely to increase accident risk) and **Insulin** (higher risk by hypoglycaemia)
2. Health status and medication

f) Chronic pain disorders: 13 percent, esp. arthritis, rheumatism, back pain
Analgetics (pain killers: Ibuprofen, Diclofenac, Metazimole), may reduce responsiveness

g) Mental health problems: 8 percent (mainly depression)
Antidepressants: often related to drowsiness, dizziness, blurred vision and absent-mindedness
2. Health status and medication

general:

most common diseases for the elderly: high blood pressure, chronic pain and depression

medication: drugs against hypertension (anti-hypertensives), analgetics and antidepressants

side effects: Painkillers and antidepressants are associated with traffic-related side effects
3. Differences concerning mobility behavior caused by health factors

general outcome:

the elderly are more frequently on medication that is relevant to traffic safety as well as affected by respective illnesses than younger traffic participants

a compensation of these effects is carried out by the elderly in terms of an increased use of alternative means of transportation
3. Differences concerning mobility behavior caused by health factors

results for the sufferers from **illnesses:**

for **diseases** of the **eye, heart, vascular** and **metabolic** disorders as well as **mental** and **neurological** disorders, **lower frequencies and intensities of automobile means of transport** were reported
3. Differences concerning mobility behavior caused by health factors

results for medication:

the higher the “highest risk” level – measured via the DRUID classification – of ingested drugs for a person was, the fewer miles were covered by car as a driver and the less likely the use of a motorcycle or bicycle.
### AGE-V3 Results

3. Differences concerning mobility behavior caused by health factors

<table>
<thead>
<tr>
<th>DRUID Classification of medicines</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>III</td>
</tr>
<tr>
<td>Your risk in traffic</td>
<td><img src="image" alt="Your risk in traffic" /></td>
</tr>
</tbody>
</table>

Ageing and Safe Mobility  
November 27/28th 2014  
Nicolas Haverkamp  
Classification of medicines
<table>
<thead>
<tr>
<th>Driving p.a.</th>
<th>Risk cat. 0</th>
<th>Risk cat. I</th>
<th>Risk cat. II</th>
<th>Risk cat. III</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1.000km</td>
<td>127 6 %</td>
<td>62 11 %</td>
<td>2 7 %</td>
<td>4 17 %</td>
</tr>
<tr>
<td>&gt; 3.000km</td>
<td>195 9 %</td>
<td>48 8 %</td>
<td>2 7 %</td>
<td>3 13 %</td>
</tr>
<tr>
<td>&gt; 5.000km</td>
<td>180 9 %</td>
<td>63 11 %</td>
<td>3 10 %</td>
<td>3 13 %</td>
</tr>
<tr>
<td>&gt; 10.000km</td>
<td>456 22 %</td>
<td>146 25 %</td>
<td>7 23 %</td>
<td>9 39 %</td>
</tr>
<tr>
<td>&gt; 20.000km</td>
<td>636 31 %</td>
<td>178 30 %</td>
<td>12 39 %</td>
<td>2 9 %</td>
</tr>
<tr>
<td>&gt; 20.000km</td>
<td>428 21 %</td>
<td>63 11 %</td>
<td>2 7 %</td>
<td>2 9 %</td>
</tr>
<tr>
<td>No driving</td>
<td>60 3 %</td>
<td>26 4 %</td>
<td>3 10 %</td>
<td>0 0 %</td>
</tr>
<tr>
<td>Total</td>
<td>2082 100 %</td>
<td>586 100 %</td>
<td>31 100 %</td>
<td>23 100 %</td>
</tr>
</tbody>
</table>
3. Differences concerning mobility behavior caused by health factors

older participants rate their own general health status as significantly poorer; significantly more frequent multimorbidity and polypharmacy in the older age group

it is significantly more common in the younger age group to drive on medication for insomnia and pain disorders
3. Differences concerning mobility behavior caused by health factors

older participants were affected significantly more often from all traffic safety relevant diseases: visual impairments, hearing problems, equilibrium disorders, knees and joint problems, heart and vascular diseases, diabetes, lung diseases ...
3. Differences concerning mobility behavior caused by health factors

older participants ingested all traffic safety relevant medications significantly more often: for the treatment of blood pressure, diabetes as well as heart medications...
3. Differences concerning mobility behavior caused by health factors

gender effects:

women are increasingly affected by sleep problems, while men rate their hearing ability more negatively in a gender comparison.

women are more frequently in treatment, which applies statistically relevant with vision problems, walking difficulties, diabetes, as well as lung and bronchial diseases.
3. Differences concerning mobility behavior caused by health factors

gender effects:

it is significantly **more common** among **women** to ingest **medication**, especially for the **treatment of pain**

only regarding **vascular diseases**, **men** show a higher value concerning their intake of **medication**
3. Differences concerning mobility behavior caused by health factors

gender effects:

**men** reported significantly **more often** to have **driven** a motor vehicle under the influence of **alcohol** or **medication** (**treatment of heart and vessels, walking difficulties, lung and bronchial diseases, diabetes and pain**) several times
## 3. Differences concerning mobility behavior caused by health factors: gender effects (driving after taking pain killers):

<table>
<thead>
<tr>
<th>Driving Frequency</th>
<th>Female</th>
<th></th>
<th>Male</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Never before</td>
<td>12</td>
<td>50%</td>
<td>6</td>
<td>29%</td>
</tr>
<tr>
<td>Once before</td>
<td>1</td>
<td>4%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>On several occasions</td>
<td>11</td>
<td>46%</td>
<td>15</td>
<td>71%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>24</td>
<td>100%</td>
<td>21</td>
<td>100%</td>
</tr>
</tbody>
</table>
3. Differences concerning mobility behavior caused by health factors

model results:

**self-efficacy** – if **driving practice** was considered – turned out to be a **better predictor** of the **accident risk** in comparison to **multimorbidity** and **polypharmacy** concerning **traffic safety**, as much driving practice as possible might provide an important compensational function
3. Differences concerning mobility behavior caused by health factors

the performed path and model analyses confirmed that the elderly adapt their traffic behavior to their disease and medication status no statistically significant effect of polypharmacy or multimorbidity on the number of accidents
3. Differences concerning mobility behavior caused by health factors

model results:

**model** calculations based on the **BASt scales** for action competence expectancy, driving experience and accident figures point to an age-specific model for young drivers (16-40)

the data showed a much better fit of a model for this age group in which **current driving practice** acts as a **mediator of road safety**
AGE-V3 Results

3. Differences concerning mobility behavior caused by health factors: model results:

- Competence expectancy (0.30*)
- Driving performance p.a.
- Number of accidents (0.18*)

Comparative fit index: 0.971 / Tucker-Lewis index: 0.962
* Effect size is significant (p < 0.001)
3. Differences concerning mobility behavior caused by health factors

model results: as action **competence expectancy** is related to **driving experience**, a starting point to improve subjective experience of road users and **road safety** in general consists in specific **training** of the driving task (compensatory behavior in particular) given the significant direct influence of competence expectancy on annual mileage, road users should have a **comprehensive driving experience**
survey results:

older respondents are ingesting traffic safety-related medication much more often

particularly (older) men are driving more frequently under the influence of these drugs
model results:

**self-efficacy** or **competence expectations** (in relation to specific traffic situations) provided a more appropriate **predictor of accident risk** in comparison with multimorbidity and polypharmacy. An important **compensation** function for **traffic safety** could be identified in a **sufficient driving experience**.
Multimorbidity and polypharmacy:

The results argue for an expansion of the perspective: in the representative survey of older people, an essential influence of multimorbidity and polypharmacy on traffic safety could not be detected. This could be a result of individual adaptation of the mobility behavior to the respective health constitution.
Self efficacy, compensation and driving practice:

A central conclusion from these results is to ensure a **sufficient driving experience** of older people boasting a classic performance improvement through practice, a **feedback** effect may be achieved as repeated successful management of the driving task could increase self-efficacy expectations. A further recommendation in this context relates to a compensation of age-related performance degradation by regular **exercise** of relevant skills.
Risk medication and self-control:

Especially older men often drive under the influence of drugs which are critical for road safety. Since this group is frequently affected by the respective diseases, it must be specifically sensitized to the risks of driving under these conditions.

A major recommendation in this case relates to the awareness of (older) men to the effects of ingested medications on their driving ability to provide improved possibilities of self-control.
The GP as a “consultant for older road users”:

The fact of higher medical-care (see survey results) within the elderly by their respective family doctor should be used productively.

The family doctor should act as a “consultant” concerning their individual mobility and road safety.

This results in the need for adequate training and qualification programs for family doctors.
Follow-up studies:

further investigation of the influences of individual diseases and medications that could be identified as relevant for traffic safety to illuminate the compensating effect of the driving experience on road safety

development of age-specific competence trainings of skills which are of relevance for the task of driving
Thank you!