PSYCHOLOGICAL ASPECTS OF THE RISK OF ACCIDENTS FOR MOTORCYCLISTS

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Young Researchers Seminar 2015
Introduction - Motorcycle accidents

- More than 27,000 injured motorcyclists
  - 568 fatally and
  - 8,974 seriously injured

- Registered vehicles: 14 killed /100,000 motorcycles
  → but only 4 killed /100,000 cars

- Age group: 134 injured /100,000 inhabitants 15 - 18 years
  → highest injury risk

(Source: German accident statistics, 2013)
Introduction - Motorcycle accidents

Trend in number of injured motorcyclists by age group starting from 2000 (100%)
Introduction - Personality traits and traffic behaviour

- Correlations between personality traits and road safety relevant aspects (Elander et al., 1993)

→ What is personality
Excurs - What is Personality

A fairly stable disposition that describes and predicts specific behavioural aspects of one person in a specific class of situation.

- Big Five Personality Model assessed by NEO-PI-R (Costa & McCrea, 2003)
- Neuroticism, Extraversion, Openness, Agreeableness, Conscientiousness
- Six sub facets for each of the dimensions
Introduction - Personality traits and traffic behaviour

• Sensation seeking is a good predictor for safety relevant behaviour
  ▫ (Herzberg & Schlag, 2003; Iversen & Rundmo, 2002; Schulze, 1999; Watson et al., 2007; Wong et al., 2010)

• Altruism, anxiety, hostility and normlessness have an impact on attitudes and risky traffic behaviour
  ▫ (Ulleberg, 2002; Machin & Sankey, 2008)
Introduction - Subtypes based on personality traits

- Personality used to build subtypes of road user groups
- e.g. Ulleberg (2002), Brandau et al. (2011)
  - **First group:**
    - tend to search for new or exciting experiences,
    - have problems to control their emotion in context with driving
    - and do not care for social norms and the wellbeing of others
  - **Second group:**
    - characterized by higher scores of anxiety
    - and aggression
Research topics

- Gain detailed information about motorcyclists in Germany
  - Who is using the motorcycle how often, for what purpose etc.

- Identify subgroups based on personality traits
  - Allows the development of safety measures that are directly targeting these groups
Method

1. Telephone survey with 10,000 people 16 years and above
   - 1,000 hold a motorcycle driving license (A1, A2 or A) and use a motorcycle with an engine size above 50ccm
   - sample structure build the base for the survey quotation plan

2. Face-to-face-interviews with 1,039 motorcyclists
   - Representative for German motorcyclists in respect to gender, age, level of education, federal state, size of town and engine size of used motorcycle
Method - Sample

- Motorcyclists: 1,039
- Age: 16-76 years (ø 43.7 years)
- Gender: 85% male, 15% female
- Level of education:
- Size of town:
- Engine size:
Method - Analyses

1. Factor analyses of psychological scales

2. Descriptive analyses (ANOVA or Chi-Square-Tests)

3. Cluster analysis with personality traits

4. Group comparisons (ANOVA or Chi-Square-Tests)
## Results - Factor analyses

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>Min</th>
<th>Max</th>
<th>Number of items</th>
<th>Cronbach’s Alpha</th>
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</thead>
<tbody>
<tr>
<td>Attitude to speeding</td>
<td>21.5 (10.14)</td>
<td>0</td>
<td>51.0</td>
<td>17</td>
<td>.92</td>
</tr>
<tr>
<td>Attitude to drink driving</td>
<td>2.9 (3.38)</td>
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<td>16.8</td>
<td>6</td>
<td>.83</td>
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<tr>
<td>Attitude to aggressive riding behaviour</td>
<td>20.6 (17.12)</td>
<td>0</td>
<td>84.0</td>
<td>10</td>
<td>.89</td>
</tr>
<tr>
<td>Riding errors</td>
<td>1.0 (1.76)</td>
<td>0</td>
<td>11.0</td>
<td>11</td>
<td>.94</td>
</tr>
<tr>
<td>Competition</td>
<td>0.9 (1.39)</td>
<td>0</td>
<td>6.0</td>
<td>6</td>
<td>.91</td>
</tr>
<tr>
<td>Quickly getting ahead</td>
<td>1.6 (1.50)</td>
<td>0</td>
<td>5.0</td>
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<td>.87</td>
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<tr>
<td>Braking traffic rules</td>
<td>2.7 (0.97)</td>
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<td>6.0</td>
<td>6</td>
<td>.88</td>
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<tr>
<td>Self identification</td>
<td>7.5 (4.12)</td>
<td>0</td>
<td>15.0</td>
<td>5</td>
<td>.89</td>
</tr>
<tr>
<td>Anxiety</td>
<td>11.3 (5.53)</td>
<td>0</td>
<td>32.0</td>
<td>8</td>
<td>.77</td>
</tr>
<tr>
<td>Hostility</td>
<td>10.9 (5.37)</td>
<td>0</td>
<td>30.0</td>
<td>8</td>
<td>.73</td>
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<tr>
<td>Altruism</td>
<td>23.2 (5.46)</td>
<td>0</td>
<td>32.0</td>
<td>8</td>
<td>.83</td>
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<tr>
<td>Excitement seeking</td>
<td>15.6 (6.59)</td>
<td>0</td>
<td>31.0</td>
<td>8</td>
<td>.78</td>
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<tr>
<td>Normlessness</td>
<td>7.2 (3.29)</td>
<td>0</td>
<td>16.0</td>
<td>4</td>
<td>.62</td>
</tr>
</tbody>
</table>

Table: Results of factor analyses
Exemplary descriptive Results

- **Frequency of use:**

- **Driving licence:** Ø 23 years

- **Distance travelled:** Ø 5,163 km/year

- **Accident involvement:** 10%
  - **Highest accident rate:** 18-24 years (17%)
Exemplary descriptive Results

Number and rate of accident involved motorcyclists by involvement in car accident (left) and by frequency of motorcycle use (right)
Results - Personality cluster

Standardised values of personality traits and identification scale per type

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-1.3
-0.8
-0.3
0.2
0.7
1.2

Z-value

Type 1
Type 3
Type 5

Type 2
Type 4

Anxiety    Hostility    Altruism    Excitement seeking    Normlessness    Identification
Results - Personality cluster

Standardised values of personality traits and identification scale per type

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## Results - Group differences

<table>
<thead>
<tr>
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<th>TYPE 1</th>
<th>TYPE 2</th>
<th>TYPE 3</th>
<th>TYPE 4</th>
<th>TYPE 5</th>
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</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>42.1</td>
<td>47.2</td>
<td>38.3</td>
<td>43.8</td>
<td>43.9</td>
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<td></td>
<td>(12.82)</td>
<td>(12.56)</td>
<td>(11.88)</td>
<td>(12.31)</td>
<td>(12.87)</td>
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<tr>
<td>Accident involvement</td>
<td>9 %</td>
<td>9 %</td>
<td>23 %</td>
<td>9 %</td>
<td>4 %</td>
</tr>
<tr>
<td>Traffic offences</td>
<td>13 %</td>
<td>5 %</td>
<td>22 %</td>
<td>7 %</td>
<td>8 %</td>
</tr>
<tr>
<td>Yearly distance in km</td>
<td>7,595</td>
<td>4,263</td>
<td>6,535</td>
<td>3,822</td>
<td>4,026</td>
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<tr>
<td></td>
<td>(4,824)</td>
<td>(3,049)</td>
<td>(4,476)</td>
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<td>Attitude to speeding</td>
<td>25.3</td>
<td>14.7</td>
<td>30.6</td>
<td>19.9</td>
<td>20.6</td>
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<tr>
<td></td>
<td>(8.77)</td>
<td>(7.24)</td>
<td>(9.28)</td>
<td>(9.54)</td>
<td>(8.58)</td>
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<tr>
<td>Attitude to drink driving</td>
<td>1.7</td>
<td>1.3</td>
<td>6.2</td>
<td>2.9</td>
<td>2.7</td>
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<td>(2.50)</td>
<td>(2.04)</td>
<td>(4.26)</td>
<td>(3.08)</td>
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<tr>
<td>Attitude to aggressive riding behaviour</td>
<td>18.4</td>
<td>10.0</td>
<td>36.7</td>
<td>22.1</td>
<td>19.0</td>
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<td></td>
<td>(17.72)</td>
<td>(10.46)</td>
<td>(20.54)</td>
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<td>(12.47)</td>
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<tr>
<td>Riding errors</td>
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<td>1.4</td>
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<td>(0.91)</td>
<td>(0.78)</td>
<td>(1.75)</td>
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<tr>
<td>Competition</td>
<td>1.1</td>
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<td>0.8</td>
<td>0.6</td>
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<td></td>
<td>(1.40)</td>
<td>(0.52)</td>
<td>(1.95)</td>
<td>(1.26)</td>
<td>(1.03)</td>
</tr>
<tr>
<td>Quickly getting ahead</td>
<td>1.8</td>
<td>0.8</td>
<td>2.3</td>
<td>1.6</td>
<td>1.5</td>
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<tr>
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<td>(1.09)</td>
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<td>2.7</td>
<td>2.6</td>
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<tr>
<td></td>
<td>(1.05)</td>
<td>(0.61)</td>
<td>(1.17)</td>
<td>(0.95)</td>
<td>(0.89)</td>
</tr>
</tbody>
</table>

Mean age, accident involvement, traffic offences, yearly distance in kilometres, attitude and behaviour scales per personality type.
Discussion

- First study that found motorcyclist subtypes based on personality characteristics
- Clustering was successful and in line with previous research
- Substantial differences in personality structure
  → but also with regard to road safety relevant criteria
- One high-risk group (Type 3)
  → this group should be main focus for previous road safety measures
Thank you for your attention

Source all pictures: German Road Safety Council (DVR)

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